DoD Manual 4715.05, Volume 2

Overseas Environmental Baseline Guidance Document: Air and Toxics

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Approved by:	W. Jordan Gills, Assistant Secretary of Defense for Sustainment

Purpose: This manual, known as the OEBGD, is composed of multiple volumes, each addressing specific areas of environmental management such as conservation; air and toxics; water; hazardous materials, storage tanks, spills, and pesticides; and waste. In accordance with the authority in DoD Directives (DoDDs) 5134.01 and 4715.1E and the July 13, 2018 Deputy Secretary of Defense memorandum and the requirements in DoD Instruction (DoDI) 4715.05:

- This manual:
  - Implements policy, assigns responsibilities, and provides standards to protect human health and the environment on enduring installations under DoD control outside the United States.
  - Considers and, where relevant, incorporates generally accepted federal environmental standards applicable to DoD installations, facilities, and actions in the United States, and incorporates requirements of U.S. law that have extraterritorial application to the DoD.
  - Is used by DoD lead environmental components (LECs) to establish and update final governing standards (FGSs).
  - Establishes baseline environmental standards for installations in countries for which an FGS is not required or has not been developed.
- This volume identifies environmental standards for installations to ensure:
  - The control of air emission sources.
  - The control and abatement of threats from asbestos.
  - The identification, control, or elimination of lead-based paint (LBP) hazards in child-occupied facilities and military family housing.

- The control of threats from the storage, use, and disposal of polychlorinated biphenyls (PCBs).

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SECTION 1: GENERAL ISSUANCE INFORMATION

1.1. APPLICABILITY.

This volume:

a. Applies to:

(1) OSD, the Military Departments, the Office of the Chairman of the Joint Chiefs of Staff and the Joint Staff, the Combatant Commands, the Office of the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the DoD (referred to collectively in this issuance as the "DoD Components").

(2) Actions of the DoD Components on installations, as defined in DoDI 4715.05, under DoD control outside the United States.

(3) Support functions for U.S. military vessels, ships, aircraft, and space vehicles provided by the DoD Components, including management and disposal of off-loaded waste or hazardous materials.

b. Does not apply to:

(1) U.S. military vessels, ships, aircraft, or space vehicles.

(2) Off-installation training.

(3) Contingency locations, which are addressed in DoDI 4715.22.

(4) Facilities and activities associated with the Naval Nuclear Propulsion Program, in accordance with Executive Order (E.O.) 12344 and conducted pursuant to Section 7158 of Title 42, United States Code.

(5) Actions to remediate environmental contamination, which are addressed in DoDI 4715.08.

(6) Environmental analyses conducted in accordance with E.O. 12114.

(7) DoD installations that do not have the potential to affect the natural environment (e.g., activities that are primarily administrative) or where, in consultation with the Assistant Secretary of Defense for Sustainment, the geographic Combatant Commander has determined that no significant force health protection or environmental threats exist.

(8) Activities, systems, operations, and areas where DoD has no authority or responsibility including Cooperative Security Locations.

(9) Status-of-forces agreements between host nations (HNs) and U.S. exceptions.

c. Does not create any rights or obligations enforceable against the United States, DoD, or any of its Components, nor does it create any standard of care or practice for individuals. Although this manual refers to other DoDDs, DoDIs, and DoD manuals, it is intended only to coordinate the requirements of those issuances as required to implement the policies in DoDI 4715.05. This manual does not change other DoDDs, DoDIs, or DoD manuals or alter DoD policies. Conflicts, issues, or concerns related to the country-specific FGS or this manual should be presented to the LEC or the Combatant Commander, as appropriate.

1.2. POLICY.

In accordance with the policy in DoDI 4715.05, the DoD:

a. Manages and applies installation assets to sustain the DoD national defense mission; uses environmental, safety, and occupational health management systems in mission planning and execution across all military operations and activities; and ensures all organizations plan, program, and budget to manage the environmental, safety, and occupational health risks that their activities generate.

b. Establishes, maintains, and complies with the FGSs to protect human health and the environment for those foreign countries identified by the Under Secretary of Defense for Acquisition and Sustainment or listed in the Appendix to Enclosure 3 of DoDI 4715.05. The FGSs will reconcile the requirements of applicable international agreements and applicable HN environmental standards with E.O. 12088 and this manual.

SECTION 2: RESPONSIBILITIES

2.1. DOD COMPONENT HEADS.

The DoD Component heads:

a. Apply this volume when no FGS applies.

b. Plan, program, and budget to meet the standards contained in this volume.

2.2. COMBATANT COMMANDERS.

In addition to the responsibilities in Paragraph 2.1. and through the Chairman of the Joint Chiefs of Staff, the Combatant Commanders:

a. Provide general oversight and coordination with the DoD LECs, as necessary, to carry out their missions in accordance with this volume.

b. Adjudicate requests for exceptions to the requirements of this volume in accordance with DoDI 4715.05, when the Military Department requesting the exception is also the DoD LEC. When the Combatant Commander is the DoD LEC and requests an exception, the request is elevated to the Assistant Secretary of Defense for Sustainment for adjudication.

2.3. COMMANDER, UNITED STATES EUROPEAN COMMAND (USEUCOM).

The Commander, USEUCOM, is designated as the DoD Theater Environmental Coordinator for Europe due to the unique construct and influence of the European Union. In addition to the responsibilities in Paragraphs 2.1. and 2.2., the Commander, USEUCOM, oversees the consistent application of this volume at installations within the European Union and geographically located within the USEUCOM area of responsibility. Additional guidance is provided in Enclosure 4 of DoDI 4715.05.

SECTION 3: GENERAL OEBGD GUIDANCE

3.1. USE OF THIS VOLUME AND FGSS.

DoD LECs use this volume to conduct the comparative analysis of air and toxics required to develop each country-specific FGS. The comparative analysis considers HN environmental standards, international agreements, and the standards found in this volume, with the more protective standard being used to establish the FGS. The FGSs ensure consistent application of environmental standards for all installations operated by DoD Components within an HN. Compliance with the standards of this volume is achieved by complying with the current FGSs, since the standards of this volume are reflected in the FGSs. In cases where updates or revisions to this volume have not yet been considered and incorporated into an FGS, installations must comply with the more protective standard, whether it is found in this volume or the FGS.a. For DoD Components on DoD installations in foreign countries for which FGSs are not required, or have yet to be established, installations must comply with applicable international agreements, applicable HN environmental standards pursuant to Section 1-801 of E.O. 12088, and this volume. In cases of conflicting requirements, the DoD Components will normally comply with the standard that is more protective of human health and the environment.

b. DoD Components will consult with the DoD LEC or, if no DoD LEC is designated, with the applicable Combatant Commander on actions that could seriously affect mission, involve a substantial commitment of funds, or set a precedent.

3.2. AIR AND TOXICS MANAGEMENT.

This volume contains standards for the management of air emissions, asbestos, LBP, and PCBs on DoD installations outside the United States. These standards apply to all facilities, tenants, operations, and activities under DoD control on the installation.

3.3. EFFECTIVE DATES.

Standards identified in this manual are effective immediately upon publication. Installations and DoD Components must plan, program, and budget in accordance with Section 6 of Enclosure 3 of DoDI 4715.05.

3.4. NONCOMPLIANCE TERMINOLOGY.

Terms such as “noncompliance,” “out of compliance,” “violation,” “exceedance,” “nonconformity,” and “nonconformance” are used synonymously to describe the condition of failing to meet a standard or a specific limit or value within a standard in this manual.

3.5. SAMPLING AND ANALYTICAL CONSIDERATIONS.

a. In many cases, standards of this manual are based on specific monitoring, sampling, and analytical methods that must be considered when determining compliance or comparing with HN standards.

b. Laboratory analyses necessary to implement the FGS or this volume must normally be conducted in a laboratory that has been certified by a U.S. or HN regulatory authority, or accredited through the DoD Environmental Laboratory Accreditation Program, for the applicable test method and follows required quality assurance and quality control protocol. In the absence of a certified laboratory, analyses may also be conducted at a laboratory that has an established reliable record of quality assurance compliance with standards for the applicable test method that are generally recognized by appropriate industry or scientific organizations.

c. Field sample and data collection must be conducted by personnel with demonstrated experience in the applicable test method and sampling. All procedures used for testing, quality assurance, and reporting of results should be those commonly accepted in the field of air pollution control.

3.6. RECORDKEEPING.

All records generated while implementing the standards in this manual must be maintained by installations in accordance with the FGS, this manual, DoDI 5015.02, and DoD Component policies.

3.7. RELATED PROGRAMS.

Additional guidance about related programs and initiatives that may apply outside the United States is included in other DoD policies and issuances.

a. Pollution prevention is addressed in DoDD 4715.1E and DoDIs 4715.23 and 4150.07.

b. Sustainable procurement is addressed in DoDI 4105.72.

c. Hazard communication is addressed in DoDI 6050.05.

d. Safety and occupational health is addressed in DoDIs 6055.01 and 6055.05.

e. Energy management is addressed in DoDIs 4170.11 and 4140.25.

SECTION 4: AIR EMISSIONS

4.1. INTRODUCTION.

This section contains standards on the control of air emissions sources. It includes, but is not limited to, control of emissions from boilers, incinerators, dry cleaning machines, solvent cleaning machines, stationary combustion sources, and use of ozone-depleting substances (ODSs). See Table 1 for the location of additional standards in this manual related to air emission sources.

Table 1. Additional Standards Related to Air Emission Sources

For:	See:
Asbestos	Section 5 of this volume
Hazardous materials	Volume 4, Section 4
Petroleum, oil, and lubricants	Volume 4, Section 5
Underground storage tanks	Volume 4, Section 6
Hazardous waste	Volume 5, Section 5

4.2. GENERAL.

Installations must ensure compliance with the following standards for air emission sources, as applicable. For sources covered in Tables 2, 6, 10, and 11 through 20, units in use as of the date of this publication must be operated and maintained according to manufacturer specifications, but are not required to be retrofitted or replaced in order to meet emission concentration limits.

a. Maintenance and Repair of Equipment.

All equipment that generates air pollutants must be operated and maintained in accordance with the manufacturer's specifications, including preventive maintenance inspections. Any equipment failing to meet emission limits prescribed in this section must be evaluated along with any affiliated pollution control devices for needed repairs or changes in operating parameters to bring emissions into compliance. Equipment must be repaired or replaced as soon as technically feasible.

b. Stack Height and Diameter.

Stack height and diameter must be based on industry standards and practices for the specific source and dispersion modeling, as applicable, to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant as a result of atmospheric downwash.

c. Source Testing.

All emission sources requiring testing or continuous emissions monitoring systems (CEMS) must have sampling and testing facilities that ensure safe and easy access (including platforms and sampling ports, as well as power sources for test equipment) to determine the nature and

quality of emissions that are or may be discharged as a result of source operations. All equipment and support facilities used for source testing, CEMS operation, and quality assurance should be compliant with industry standards.

d. Recordkeeping.

The following recordkeeping requirements apply to all units.

(1) Retain records related to compliance with emission limits for 3 years (e.g., continuous monitoring system results, test results, tune-up records, fuel certifications, performance test results).

(2) Retain manufacturer specifications, manufacturer-supplied certificates of conformity, manufacturer-supplied emissions test data, maintenance inspection logs, one-time performance test results, and repair records for the life of the unit.

e. Personnel Qualifications.

Personnel involved in activities associated with the control of air emission sources should be trained consistent with their responsibilities. Personnel must meet the training and qualification standards of Paragraphs 4.4.c. and 4.9.e.(1), as applicable.

4.3. BOILERS.

Installations must ensure that boilers meet the standards of this paragraph, as applicable. Standards for boilers specified below are based on several parameters, including heat input capacity, date when construction began, and type of fuel combusted.

a. Air Emission Limits.

(1) The following standards apply to units with a maximum design heat input capacity greater than or equal to 10.56 gigajoules per hour (GJ/hr) [10 million British thermal units per hour (MMBtu/hr)]:

(a) Boiler units must meet the emission limits for specific sized units shown in Table 2.

(b) For units combusting liquid fossil fuel, compliance with particulate matter (PM) and sulfur dioxide (SO_2) emission limits must be demonstrated by combusting oil containing no more than 0.50 weight percent sulfur demonstrated by fuel certification.

(2) Initial demonstration of compliance with the Table 2 emission limits can be accomplished using one or more of the following:

(a) Test data from the boiler manufacturer.

(b) Test data from the owner/operator.

(c) Data from a CEMS and/or a continuous opacity monitoring system.

(d) Data from fuel analysis/certification (where applicable).

(3) Subsequent demonstration of compliance:

(a) Is required if significant changes occur to the boiler (e.g., modification, reconstruction) that may affect emissions or if there is a change in fuel type/quality.

(b) Must be accomplished every 3 years for these categories of emission limits:

1. The mercury (Hg) and carbon monoxide (CO) limits applicable to boilers combusting solid fossil fuel.

2. Those emission limits that only apply to units that began construction or reconstruction after June 4, 2010 (i.e., emission limits with footnote "h" or "l" in Table 2).

b. Work Practice Standards, Emission Reduction Measures, and Management Practices.

(1) Tune-up Requirements.

Unless specifically exempted, conduct a boiler tune-up in accordance with manufacturer specifications, but no less frequently than specified in Table 3 (every 2 years or every 5 years).

(2) Energy Assessment Recommendations.

The purpose of the energy assessment is to identify energy conservation measures that can be implemented to reduce system and facility energy demand, which would reduce fuel use and emissions. Energy assessment recommendations for boilers are detailed in Table 4. Unless specifically exempted in Table 4, a one-time energy assessment should be performed for all existing boilers with a maximum design heat input capacity greater than or equal to 10.56 GJ/hr [10 MMBtu/hr]. A one-time energy assessment should also be performed for any energy use systems associated with those boilers that equal or exceed specified energy use levels (i.e., equal or exceed a specified percentage of a regulated boiler's total energy production). As an alternative to performing the one-time energy assessment, facilities can demonstrate that the facility energy program is compatible with International Organization for Standardization 50001.

Table 2. Emission Limits for Boilers[a]

FUEL TYPE	MAXIMUM DESIGN HEAT INPUT CAPACITY										
	10.56 to 105.6 GJ/hr [10 to 100 MMBtu/hr]					Greater than 105.6 GJ/hr [100 MMBtu/hr]					
	PM[b] (kg/GJ) [lb/MMBtu]	SO_2 (kg/GJ) [lb/MMBtu]	Hg[c] (kg/GJ) [lb/MMBtu]	CO[d] (ppm)	Opacity[e] (%)	PM[b] (kg/GJ) [lb/MMBtu]	SO_2 (kg/GJ) [lb/MMBtu]	NO_x (kg/GJ) [lb/MMBtu]	Hg[c] (kg/GJ) [lb/MMBtu]	CO[d] (ppm)	Opacity (%)
Gaseous Fuel							0.21 [0.50][f]	0.09 [0.20]			
Gaseous Coal-Derived Fuel							0.21 [0.50]	0.21 [0.50]			
Liquid Fossil Fuel	0.01 [0.03][g, h]	0.21 [0.50][g]			20	0.04 [0.10][i] or 0.01 [0.03][f]	0.21 [0.50]	0.17 [0.40]			20
Solid Fossil Fuel	0.04 [0.10][j] 0.01 [0.03][k] or 0.18 [0.42][l]	0.506 [1.2]	0.000009 [0.000022]	420	20	0.04 [0.10][i] or 0.01 [0.03][f]	0.506 [1.2]	0.30 [0.70]	0.000009 [0.000022]	420	20
Biomass Fuel	0.13 [0.30][j] 0.01 [0.03][k] or 0.03 [0.07][l]				20[m]	0.09 [0.20][i] or 0.01 [0.03][f]					20[m]

CO = carbon monoxide, Hg = mercury, kg/GJ = kilogram per gigajoules, lb/MMBtu = pound per million British thermal units, NO_x = nitrogen oxide, ppm = parts per million

[a] Unless otherwise specified, emission limits for units with a design capacity in the range of 10.56 to 105.6 GJ/hr [10 to 100 MMBtu/hr] apply to units that began construction, modification, or reconstruction after June 9, 1989, while emission limits for units with a design capacity greater than 105.6 GJ/hr [100 MMBtu/hr] apply to units that began construction, modification, or reconstruction after June 19, 1984. The PM and opacity emission limits apply at all times, except during periods of startup, shutdown, or malfunction. The SO_2, NO_x, Hg, and CO emission limits apply at all times, including periods of startup, shutdown, and malfunction.

[b] Boilers combusting the following fuels are not subject to PM standards:

(1) oil that contains no more than 0.5 weight percent sulfur;

(2) coke oven gas;

(3) a mixture of the first two fuels; or

(4) either of the first two fuels (or a mixture of the first two fuels) in combination with other fuels not subject to a PM standard and not using a post-combustion technology (except a wet scrubber) to reduce SO_2 or PM emissions.

[c] Compliance with Hg emission limits may be met by using fuel analysis.

[d] CO emission limits are on a dry basis corrected to 3 percent oxygen (O_2).

Table 2. Emission Limits for Boilers[a], Continued

[e] Opacity limits do not apply to boilers less than 31.65 GJ/hr [30 MMBtu/hr].
[f] Limit only applies to units that began construction, modification, or reconstruction after February 28, 2005.
[g] Limit must be met by combusting oil containing no more than 0.50 weight percent sulfur as demonstrated by fuel certification.
[h] Limit only applies to units that began construction or reconstruction after June 4, 2010.
[i] Limit applies to units that began construction, modification, or reconstruction after June 19, 1984 but before or on February 28, 2005.
[j] Limit applies to units greater than or equal to 31.65 GJ/hr [30 MMBtu/hr] that began construction, modification, or reconstruction after June 9, 1989 but before or on February 28, 2005.
[k] Limit applies to units greater than or equal to 31.65 GJ/hr [30 MMBtu/hr] that began construction, modification, or reconstruction after February 28, 2005.
[l] Limit applies to units between 10.56 and 31.65 GJ/hr [10 and 30 MMBtu/hr] that began construction or reconstruction after June 4, 2010.
[m] Limit only applies to wood fuel (i.e., wood products and wood residue).

Table 3. Tune-up Requirements for Boilers

EXEMPT UNITS	
The following types of units are exempt from all tune-up requirements: - Gas-fired boilers[a] - Boilers that burn solid or hazardous waste - Hot water heaters[b] - Waste heat boilers[c] - Temporary boilers[d] - Residential boilers - Electric boilers[e] - Electric utility steam generating units	
APPLICABILITY	
Biennial Tune-up	Required for the following boilers: - Oil-fired boilers with a heat input capacity greater than 5.28 GJ/hr [5 MMBtu/hr] - Coal-fired boilers with a heat input capacity less than 10.56 GJ/hr [10 MMBtu/hr] - Biomass boilers (all sizes)
5-Year Tune-up	Required for the following boilers: - Oil-fired boilers with a heat input capacity less than or equal to 5.28 GJ/hr [5 MMBtu/hr] - Seasonal boilers[f] - Limited-use boilers[g] - Boilers with an O_2 trim system[h] that maintains an optimum air-to-fuel ratio
DATE FOR INITIAL OR FIRST TUNE-UP	
Biennial Tune-up	As soon as possible, but within 25 months after publication of this manual or within 25 months of initial startup, whichever is later
5-Year Tune-up	As soon as possible, but within 61 months after publication of this manual or within 61 months of initial startup, whichever is later
REQUIRED TUNE-UP FREQUENCY	
Biennial Tune-up	Within 25 months of previous tune-up
5-Year Tune-up	Within 61 months of previous tune-up
TUNE-UP REQUIREMENTS	
1. As applicable, inspect the burner and clean or replace any components of the burner as necessary. For units requiring a biennial tune-up, the burner inspection may be delayed until the next scheduled unit shutdown, not to exceed 36 months from the previous inspection. For units requiring a 5-year tune-up, the burner inspection may be delayed until the next scheduled unit shutdown, but each burner must be inspected at least once every 72 months.	
2. Inspect the flame pattern, as applicable, and adjust the burner as necessary to optimize the flame pattern. The adjustment should be consistent with the manufacturer's specifications, if available.	
3. Inspect the system controlling the air-to-fuel ratio, as applicable, and ensure that it is correctly calibrated and functioning properly. For units requiring a biennial tune-up, the inspection may be delayed until the next scheduled unit shutdown, not to exceed 36 months from the previous inspection. For units requiring a 5-year tune-up, the inspection may be delayed until the next scheduled unit shutdown, but each system controlling the air-to-fuel ratio must be inspected at least once every 72 months.	
4. Optimize total emissions of CO. This optimization should be consistent with the manufacturer's specifications, if available, and with any NO_x requirement to which the unit is subject.	
5. Measure the concentrations in the effluent stream of CO in ppm, by volume, and O_2 in volume percent, before and after the adjustments are made (measurements may be either on a dry or wet basis, as long as it is the same basis before and after the adjustments are made). Measurements may be taken using a portable CO analyzer.	

Table 3. Tune-up Requirements for Boilers, Continued

TUNE-UP REQUIREMENTS, continued
6. Maintain a report on site that contains the following information: (i) The concentrations of CO in the effluent stream in ppm, by volume, and O_2 in volume percent, measured at high fire or typical operating load, before and after the tune-up. (ii) A description of any corrective actions taken as a part of the tune-up. (iii) The type and amount of fuel used over the 12 months before the tune-up, but only if the unit was physically and legally capable of using more than one type of fuel during that period. Units sharing a fuel meter may estimate the fuel use by each unit.
7. If the unit is not operating on the required date for a tune-up, the tune-up must be conducted within 30 calendar days of startup.
[a] Includes any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or periodic testing on liquid fuel. Periodic testing of liquid fuel must not exceed a combined total of 48 hours during any calendar year. [b] A closed vessel with a capacity of no more than 454 liters [120 gallons] in which water is heated by combustion of fuel and hot water is withdrawn for use external to the vessel. Hot water boilers (i.e., boilers not generating steam) with a heat input capacity of less than 1.69 GJ/hr [1.6 MMBtu/hr] are included in this definition. The 454 liters [120 gallons] capacity threshold to be considered a hot water heater is independent of the 1.69 GJ/hr [1.6 MMBtu/hr] heat input capacity threshold for hot water boilers. Hot water heater also means a tankless unit that provides on-demand hot water. [c] A device that recovers normally unused energy (e.g., hot exhaust gas) and converts it to usable heat. Waste heat boilers are also referred to as heat recovery steam generators. [d] A boiler that is designed to, and is capable of, being carried or moved from one location to another and does not remain at one location for 12 consecutive months or longer. [e] A boiler in which electric heating serves as the source of heat. Electric boilers that burn gaseous or liquid fuel during periods of electrical power curtailment or failure are included in this definition. [f] A boiler that undergoes a shutdown for a period of at least 7 consecutive months (or 210 consecutive days) each 12-month period due to seasonal conditions, except for periodic testing. Periodic testing must not exceed a combined total of 15 days during the 7-month shutdown. This definition only applies to boilers combusting oil or biomass. [g] A boiler that burns any amount of solid, liquid, or gaseous fuels and has an enforceable average "annual capacity factor" of no more than 10 percent. Annual capacity factor is the ratio between the actual heat input to a boiler from the fuels burned during a calendar year and the potential heat input to the boiler had it been operated for 8,760 hours during a year at the maximum steady state design heat input capacity. [h] A system of monitors that is used to maintain excess air at the desired level in a combustion device. A typical system consists of a flue gas O_2 and/or CO monitor that automatically provides a feedback signal to the combustion air controller.

Table 4. Energy Assessment for Boilers

EXEMPT UNITS	
The following types of units are exempt from all energy assessment requirements: - Gas-fired boilers - Boilers that burn solid or hazardous waste - Hot water heaters - Waste heat boilers - Temporary boilers - Residential boilers - Electric boilers - Electric utility steam generating units - Limited-use boilers	
APPLICABILITY	
Recommended for existing boilers[a] greater than or equal to 10.56 GJ/hr [10 MMBtu/hr].	
ENERGY ASSESSMENT RECOMMENDATIONS	
A one-time energy assessment should be performed by a qualified energy assessor. The energy assessment should include all of the affected boiler systems[b] and consist of the following:	
1. A visual inspection of the boiler system.	
2. An evaluation of operating characteristics of the affected boiler systems, specifications of energy use systems, operating and maintenance procedures, and unusual operating constraints.	
3. An inventory of major energy use systems consuming energy from affected boiler(s) and which are under control of the boiler owner or operator.	
4. A review of available architectural and engineering plans, facility operation and maintenance procedures and logs, and fuel usage.	
5. A list of major and cost-effective energy conservation measures that are within the facility's control.	
6. A list of the energy savings potential of the energy conservation measures identified.	
7. A comprehensive report detailing the ways to improve efficiency, the cost of specific improvements, benefits, and the time frame for recouping those investments.	
SCOPE OF ENERGY ASSESSMENT	
Facilities with affected boilers with a combined heat input capacity of < 316,761 gigajoules per year (GJ/yr) [0.3 trillion Btu/year (TBtu/yr)]	• Length: 8 on-site technical labor hours maximum, but may be longer at the discretion of the owner or operator of the affected source. • Systems: The boiler system(s) and any on-site energy use system(s) accounting for at least 50 percent of the affected boiler(s) energy (e.g., steam, hot water, process heat, or electricity) production, as applicable.
Facilities with affected boilers with a combined heat input capacity of 316,761 to 1,055,870 GJ/yr [0.3 to 1 TBtu/yr]	• Length: 24 on-site technical labor hours maximum, but may be longer at the discretion of the owner or operator of the affected source. • Systems: The boiler system(s) and any on-site energy use system(s) accounting for at least 33 percent of the affected boiler(s) energy (e.g., steam, hot water, process heat, or electricity) production, as applicable.
Facilities with affected boilers with a combined heat input capacity of > 1,055,870 GJ/yr [1 TBtu/yr]	• Length: Up to 24 on-site technical labor hours in length for the first 1,055,870 GJ/yr [1 TBtu/yr] plus 8 on-site technical labor hours for every additional 1,055,870 GJ/yr [1 TBtu/yr] not to exceed 160 on-site technical hours, but may be longer at the discretion of the owner or operator of the affected source. • Systems: The boiler system(s) and any energy use system(s) accounting for at least 20 percent of the affected boiler(s) energy (e.g., steam, hot water, process heat, or electricity) production, as applicable.
[a] Existing boilers began construction or reconstruction on or before June 4, 2010. [b] The boiler and associated components such as feedwater systems, combustion air systems, fuel systems (including burners), blowdown systems, combustion control systems, steam systems, and condensate return systems, directly connected to and serving the energy use systems.	

4.4. INCINERATORS.

Installations must ensure that incinerators meet the standards of this paragraph, as applicable. The following requirements apply to all incinerators except those combusting hazardous waste or munitions. Refer to Section 5 of Volume 5 of this manual for information regarding hazardous waste management. Emission limits do not apply during periods of startup, shutdown, or malfunction.

a. Municipal Waste Combustion (MWC) Units.

Each MWC unit must comply with the applicable emission limits and monitoring requirements in Table 5. If more than one MWC unit is at the same location, their capacities should be considered in aggregate to determine their emission limits.

b. Hospital and Infectious Medical Waste Incinerator (HIMWI).

Each HIMWI unit must comply with the applicable emission limits and monitoring requirements in Table 6. These requirements do not apply to pyrolysis units, or units that burn only pathology waste, low-level radioactive waste, or chemotherapeutic waste. Refer to Section 6 of Volume 5 of this manual for medical waste management requirements.

c. Operator Training.

No incinerators can be operated unless a fully trained and qualified unit operator is accessible at the facility or able to be at the facility within 1 hour. The trained unit operator may operate the unit directly or be the direct supervisor of one or more other plant personnel who operate the unit. Operators must have completed a training course that includes:

(1) Environmental concerns, including types of emissions.

(2) Basic combustion principles, including products of combustion.

(3) Operation of the specific type of incinerator to be used by the operator, including proper startup, waste charging, and shutdown procedures.

(4) Combustion controls and monitoring.

(5) Operation of air pollution control equipment and factors affecting performance, if applicable.

(6) Inspection and maintenance of the incinerator and air pollution control devices.

(7) Methods to monitor pollutants, including monitoring of incinerator and control device operating parameters, and monitoring equipment calibration procedures, where applicable.

(8) Actions to correct malfunctions or conditions that may lead to malfunction.

(9) Bottom and fly ash characteristics and handling procedures.

(10) Applicable regulations.

(11) Pollution prevention.

(12) Waste management practices.

(13) Recordkeeping requirements.

Table 5. Emission Limits for MWCs[a]

UNIT TYPE	LARGE MWC			SMALL MWC				OSWI AND AIR CURTAIN INCINERATORS
	Constructed/ Modified/ Reconstructed between December 20, 1989 and September 20, 1994	Constructed/ Modified/ Reconstructed between September 20, 1994 and December 19 2005	Constructed/ Modified/ Reconstructed after December 19, 2005	Constructed on or before August 30, 1999		Constructed after August 30, 1999 or Modified/Reconstructed after June 6, 2001		Began Construction after December 9, 2004 or Modified/ Reconstructed on or after June 16, 2006
RATED CAPACITY	Greater than 227 Mtons/day [(250 tons/day]			32-227 Mtons/day [35-250 tons/day]				Less than 32 Mtons/day [35 tons/day]
				Class I[c]	Class II[c]	Class I[c]	Class II[c]	
PM	34 mg/dscm[b, d, f]	24 mg/dscm[b, d, f]	20 mg/dscm[b, d, f]	27 mg/dscm[b, d, f]	70 mg/dscm[b, d, f]	24 mg/dscm[b, d, f]		29 mg/dscm[b, f]
Opacity	10 percent[b, d, g]	10 percent[b, d, g]		10 percent[b, d, g]		10 percent[b, d, g]		10 percent[b, f, g]
Dioxin/Furan	30 ng/dscm[b, h]	30 ng/dscm or 13 ng/dscm[b, h, i]		30 ng/dscm (w/o ESP[b, h, j]) 60 ng/dscm (w/ ESP)[b,j]	125 ng/dscm[b, h]	13 ng/dscm[b, h]		33 ng/dscm[b, f]
SO_2	30 ppmv or 80% reduction[d, e, k]	30 ppmv or 80% reduction[d, e, k]		31 ppmv or 75% reduction[d, e, k]	50 ppmv or 77% reduction[d, e, k]	30 ppmv or 80% reduction[d, e, k]		3.1 ppmv[f]
Hydrogen Chloride	25 ppmv or 95% reduction[b, f, k]	25 ppmv or 95% reduction[b, f, k]		31 ppmv or 95% reduction[b, f, k]	250 ppmv or 50% reduction[b, f, k]	25 ppmv or 95% reduction[b, f, k]		15 ppmv[b, f]
NOx	180 ppmv[d, e]	150 ppmv or 180 ppmv[d, e, l]				180 ppmv or 150 ppmv[d, e, l]	500 ppmv[d, e]	103 ppmv[f]
- Mass burn water wall				200 ppmv[d, e, m]				
- Mass burn rotary water wall				170 ppmv[d, e, m]				

Table 5. Emission Limits for MWCs[a], Continued

UNIT TYPE	LARGE MWC			SMALL MWC				OSWI AND AIR CURTAIN INCINERATORS
	Constructed/ Modified/ Reconstructed between December 20, 1989 and September 20, 1994	Constructed/ Modified/ Reconstructed between September 20, 1994 and December 19 2005	Constructed/ Modified/ Reconstructed after December 19, 2005	Constructed before August 30, 1999		Constructed after August 30, 1999 or Modified/Reconstructed after June 6, 2001		Began Construction after December 9, 2004 or Modified/ Reconstructed on or after June 16, 2006
RATED CAPACITY	Greater than 227 Mtons/day [250 tons/day]			32-227 Mtons/day [35-250tons/day]				Less than 32 Mtons/day [35 tons/day]
				Class I[c]	Class II[c]	Class I[c]	Class II[c]	
- Mass burn refractory				350 ppmv[d, e, m]				
- Mass burn rotary refractory				350 ppmv[d, e, m]				
- RDF				250 ppmv[d, e, m]				
- Fluidized bed				220 ppmv[d, e, m]				
- Modular excess air				190 ppmv[d, e, m]				
- Modular starved air				380 ppmv[d, e, m]				
CO[n]								40 ppmv[d, o]
- Mass burn water wall	100 ppmv[d, p]	100 ppmv[d, p]		100 ppmv[d, p]		100 ppmv[d, p]		
- Mass burn refractory	100 ppmv[d, p]	100 ppmv[d, p]		100 ppmv[d, p]		100 ppmv[d, p]		
- Mass burn rotary refractory				100 ppmv[d, p]				
- Mass burn rotary water wall	100 ppmv[d, m]	100 ppmv[d, m]		100 ppmv[d, m]		100 ppmv[d, m]		
- Modular starved air	50 ppmv[d, p]	50 ppmv[d, p]		50 ppmv[d, p]		50 ppmv[d, p]		
- Modular excess air	50 ppmv[d, p]	50 ppmv[d, p]		50 ppmv[d, p]		50 ppmv[d, p]		
- RDF stoker	150 ppmv[d,m]	150 ppmv[d, m]		200 ppmv[d, m]		150 ppmv[d, m]		

Table 5. Emission Limits for MWCs[a], Continued

UNIT TYPE	LARGE MWC			SMALL MWC				OSWI AND AIR CURTAIN INCINERATORS
	Constructed/ Modified/ Reconstructed between December 20, 1989 and September 20, 1994	Constructed/ Modified/ Reconstructed between September 20, 1994 and December 19 2005	Constructed/ Modified/ Reconstructed after December 19, 2005	Constructed before August 30, 1999		Constructed after August 30, 1999 or Modified/Reconstructed after June 6, 2001		Began Construction after December 9, 2004 or Modified/ Reconstructed on or after June 16, 2006
RATED CAPACITY	Greater than 227 Mtons/day [250 tons/day]			32-227 Mtons/day [35-250 tons/day]				Less than 32 Mtons/day [35 tons/day]
				Class I[c]	Class II[c]	Class I[c]	Class II[c]	
Fluidized bed, mixed fuel, (wood/refuse derived fuel)				200 ppmv[d, m]		200 ppmv[d, m]		Fluidized bed, mixed fuel, (wood/refuse derived fuel)
Fluidized bed				100 ppmv[d,p]		100 ppmv[d,p]		
Bubbling fluidized bed combustor	100 ppmv[d, p]	100 ppmv[d, p]						
Circulating fluidized bed combustor	100 ppmv[d, p]	100 ppmv[d, p]						
Pulverized coal/RDF mixed fuel-fired combustor	150 ppmv[d, o]	150 ppmv[d, p]				150 ppmv[d, p]		
Spreader stoker coal/RDF mixed fuel-fired combustor	150 ppmv[d, m]	150 ppmv[d, m]		200 ppmv[d, m]		150 ppmv[d, m]		
Cadmium		20 µg/dscm[b]	10 µg/dscm[b]	0.040 mg/dscm[b]	0.10 mg/dscm[b]	0.020 mg/dscm[b]		18 µg/dscm[b, f]

Table 5. Emission Limits for MWCs[a], Continued

UNIT TYPE	LARGE MWC			SMALL MWC				OSWI AND AIR CURTAIN INCINERATORS
	Constructed/ Modified/ Reconstructed between December 20, 1989 and September 20, 1994	Constructed/ Modified/ Reconstructed between September 20, 1994 and December 19 2005	Constructed/ Modified/ Reconstructed after December 19, 2005	Constructed before August 30, 1999		Constructed after August 30, 1999 or Modified/Reconstructed after June 6, 2001		Began Construction after December 9, 2004 or Modified/ Reconstructed on or after June 16, 2006
RATED CAPACITY	Greater than 227 Mtons/day [250 tons/day]			32-227 Mtons/day [35-250 tons/day]				Less than 32 Mtons/day [35 tons/day]
				Class I[c]	Class II[c]	Class I[c]	Class II[c]	
Lead		200 mg/dscm[b]	140 mg/dscm[b]	0.49 mg/dscm[b]		1.6 mg/dscm[b]		0.20 mg/dscm[b]
Mercury		80 µg/dscm or 85% reduction[b, q]	50 µg/dscm or 85% reduction[b, q]	0.080 mg/dscm or 85% reduction[b, q]		0.080 mg/dscm or 85% reduction[b, q]		74 µg/dscm[b, f]
Fugitive Ash		5% of hourly observation period[b, f]		5% of hourly observation period[b, f]		5% of hourly observation period [b, f]		

dscm = dry standard cubic meter, ESP = electrostatic precipitator, mg = milligram, Mton = metric ton, OSWI = other solid waste incinerator, ppmv = parts per million by volume, RDF = refuse-derived fuel, µg = microgram

[a] Emission limit concentrations (mg/dscm, ppmv) are corrected to 7 percent O_2, dry basis at standard conditions.

[b] Requires annual demonstration of compliance, except for Class II and OSWI pollutants that have shown compliance with emission limits for 3 consecutive years. For these pollutants, demonstration of compliance can be demonstrated every 3 years.

[c] Class I units mean small MWC units that are located at MWC plants with an aggregate plant combustion capacity more than 227 Mtons/day [250 ton/day] of municipal solid waste (MSW). Class II units mean small MWC units that are located at MWC plants with an aggregate plant combustion capacity no more than 227 Mtons/day [250 ton/day] of MSW.

[d] Emission rate and parameters measured using a CEMS, except for OSWI units, which only require CEMS for CO monitoring.

[e] 1-hour (hr) average.

[f] Average over three 1-hr minimum runs.

[g] 6-minute average.

[h] Average over three 4-hr runs.

[i] 30 ng/dscm for first 3 years following the date of initial startup, for facilities constructed, modified, or reconstructed or before November 20, 1997, 13 ng/dscm thereafter.

[j] ESP = electrostatic precipitator.

[k] Comply with less stringent requirement; reduced by weight or volume from potential emissions.

[l] 180 ppmv during first year, 150 ppmv thereafter.

[m] 24-hr average.

[n] Measured at the combustor outlet.

[o] 12-hr average.

[p] 4-hr average.

[q] Comply with less stringent requirement; reduced by weight from potential emissions.

Table 6. Emission Limits for HIMWI[a]

RATED CAPACITY	HIMWI CONSTRUCTED BETWEEN JUNE 20, 1996 AND DECEMBER 1, 2008, OR MODIFIED BETWEEN MARCH 16, 1998 AND APRIL 6, 2010			HIMWI CONSTRUCTED AFTER DECEMBER 1, 2008 OR MODIFIED AFTER APRIL 6, 2010		
	Small Continuous or Intermittent: <90 kg/hr [200 lb/hr] Batch: <726 kg/day [1600 lb/day]	Medium Continuous or Intermittent: 91-226 kg/hr [201-499 lb/hr] Batch: 726-1814 kg/day [1601-3999 lb/day]	Large Continuous or Intermittent: >227 kg/hr [500 lb/hr] Batch: >1814 kg/day [4000 lb/day]	Small Continuous or Intermittent: <90 kg/hr [200 lb/hr] Batch: <726 kg/day [1600 lb/day]	Medium Continuous or Intermittent: 91-226 kg/hr [201-499 lb/hr] Batch: 726-1814 kg/day [1601-3999 lb/day]	Large Continuous or Intermittent: >227 kg/hr [500 lb/hr] Batch: >1814 kg/day [4000 lb/day]
PM[e, g, i]	69 mg/dscm	34 mg/dscm		66 mg/dscm	22 mg/dscm	18 mg/dscm
Opacity[e]	10 percent[b]			6 percent[b]		
Dioxins/Furans[h, i]	125 ng/dscm or 2.3 ng/dscm TEQ	25 ng/dscm or 0.6 ng/dscm TEQ		16 ng/dscm or 0.013 ng/dscm TEQ	0.47 ng/dscm or 0.014 ng/dscm TEQ	9.3 ng/dscm or 0.035 ng/dscm TEQ
SO_2[j]	55 ppmv			1.4 ppmv		8.1 ppmv
Hydrogen Chloride[e, g, i]	15 ppmv or 99% reduction[c]			15 ppmv	7.7 ppmv	5.1 ppmv
NO_x[j]	250 ppmv			67 ppmv		140 ppmv
CO[d, e, g, i]	40 ppmv			20 ppmv	1.8 ppmv	11 ppmv
Cadmium[g, i]	0.16 mg/dscm or 65% reduction[c]	0.04 mg/dscm or 90% reduction[c]		0.017 mg/dscm	0.0098 mg/dscm	0.00013 mg/dscm
Lead[g, i]	1.2 mg/dscm or 70% reduction[c]	0.07 mg/dscm or 98% reduction[c]		0.31 mg/dscm	0.018 mg/dscm	0.0069 mg/dscm
Mercury[g, i]	0.55 mg/dscm or 85% reduction[c]			0.014 mg/dscm	0.0035 mg/dscm	0.00013 mg/dscm
Fugitive Ash	5% of hourly observation period[f]			5% of hourly observation period[f]		

Table 6. Emission Limits for HIMWI[a], Continued

TEQ = toxic equivalency factor
[a] Emission limit concentrations (mg/dscm, ppmv) are corrected to 7 percent O_2, dry basis at standard conditions. Conduct an initial performance test to determine compliance with emission and opacity limits, and to establish operating parameters.
[b] 6-minute average.
[c] Comply with less stringent requirement; reduced by weight or volume from potential emissions.
[d] Measured at the combustor outlet in conjunction with a measurement of O_2 concentration.
[e] Conduct annual performance tests to determine compliance. Facilities may conduct performance tests for PM, CO, and hydrochloride every third year if the previous three HMIWI performance tests demonstrate that the facility is in compliance with the emission limits for PM, CO, or hydrochloride.
[f] Perform annual fugitive testing (large HMIWI only).
[g] 3-run average, 1-hr minimum per run. Unless equipped with CEMS.
[h] 3-run average, 4-hr minimum per run. Unless equipped with CEMS.
[i] If equipped with CEMS, determine compliance using a 12-hr rolling average.
[j] Testing not required.

4.5. PERCHLOROETHYLENE (PCE) DRY CLEANING MACHINES.

Installations must ensure that PCE dry cleaning machines meet the standards of this paragraph, as applicable. The following requirements apply to all dry cleaning machines, except for coin-operated machines.

a. Emissions from PCE dry cleaning machines installed before September 22, 1993, must be controlled with a refrigerated condenser, unless a carbon adsorber was already installed. The temperature of the refrigerated condenser must be maintained at 7 degrees Celsius (°C) [45 degrees Fahrenheit (°F)] or less.

b. All PCE dry cleaning systems installed between September 22, 1993 and December 21, 2005 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at 7 °C [45 °F] or less.

c. All PCE dry cleaning systems installed on or after December 21, 2005 must route the air-PCE gas-vapor stream contained within each dry cleaning machine through a refrigerated condenser and pass the air-PCE gas-vapor stream from inside the dry cleaning machine drum through a non-vented carbon adsorber or equivalent control device immediately before the door of the dry cleaning machine is opened. The carbon adsorber must be desorbed in accordance with manufacturer's instructions. The temperature of the refrigerated condenser must be maintained at 7 °C [45 °F] or less.

4.6. HALOGENATED SOLVENT CLEANING MACHINES.

Installations must ensure that halogenated solvent cleaning machines meet the standards of this paragraph, as applicable. These requirements apply to all solvent cleaning machines that use solvents containing more than 5 percent by weight of the following halogenated solvents: methylene chloride (Chemical Abstracts Service (CAS) No. 75-09-2), PCE (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), carbon tetrachloride (CAS No. 56-23-5), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents.

a. Cold Solvent Cleaning Machine.

(1) When not in use, cover all cold cleaning machines (remote reservoir and immersion tanks). Covers must be free of cracks, holes, and other defects.

(2) Maintain a 2.5 centimeter (cm) [1 inch] water layer or a freeboard ratio of at least 0.75 for immersion type cold cleaning machines.

(3) Collect and store waste solvent in closed containers.

(4) If a flexible hose or flushing device is used, only perform flushing within the freeboard area of the solvent cleaning machine.

(5) Drain solvent cleaned parts.

(6) Maintain solvent level at or below the fill line.

(7) Immediately wipe up spills that occur during solvent transfer. Store used wipe rags in covered containers in accordance with Paragraph 5.9.d. of Volume 5 of this manual.

(8) When an air- or pump-agitated solvent bath is used, operate the agitator to produce a rolling motion of the solvent but not observable splashing against tank walls or parts being cleaned.

(9) When the cover is open, do not expose the cold cleaning machine to drafts.

b. Vapor Cleaning Machines (Vapor Degreasers).

All vapor cleaning machines (vapor degreasers) must incorporate control designs and meet solvent idling emission limits found in Table 7. In addition, these work practices must be observed:

(1) Use covers across the cleaning machine opening(s) during idling and down times, or limit the flow of air across the top of the freeboard area. Covers must be free of cracks, holes, and other defects.

(2) In an open-top batch vapor cleaning machine, do not occupy more than 50 percent of the solvent/air interface area with parts baskets or the parts being cleaned.

(3) Perform spraying operations within the vapor zone or within a section of the solvent cleaning machine that is not directly exposed to the ambient air (i.e., a baffled or enclosed area of the solvent cleaning machine).

(4) Orient parts so that the solvent drains from them freely. Tip or rotate parts with cavities or blind holes before removing them from a solvent cleaning machine.

(5) Do not remove parts baskets or parts from any solvent cleaning machine until dripping has stopped.

(6) During startup of each vapor cleaning machine, turn on the primary condenser before the sump heater.

(7) During shutdown of each vapor cleaning machine, turn off the sump heater and allow the solvent vapor layer to collapse before turning off the primary condenser.

(8) When solvent is added or drained from any solvent cleaning machine, transfer the solvent using threaded or other leak-proof couplings and locate the end of the pipe in the solvent sump beneath the liquid solvent surface.

(9) Collect and store waste solvent, still bottoms, and sump bottoms in closed containers and mange in accordance with Section 5 of Volume 5 of this manual.

(10) Sponges, fabric, wood, and paper products must not be cleaned.

Table 7. Vapor Cleaning Machine Control Combinations and Solvent Idling Emission Limits[a]

UNIT TYPE	SOLVENT/AIR INTERFACE AREA	CONTROL COMBINATION OPTIONS	SOLVENT IDLING EMISSION LIMITS
Batch Vapor Cleaning Machine (New and Existing)	< 1.21 m^2 [13 ft^2]	Working-mode Cover[b]/Freeboard Ratio of 1.0/Superheated Vapor[c]	0.22 kg/hr/m^2[2b] [0.045 lb/hr/ft^2]
		Freeboard Refrigeration Device[d]/Superheated Vapor[c]	
		Working-mode Cover[b]/Freeboard Refrigeration Device[d]	
		Reduced Room Draft[e]/Freeboard Ratio of 1.0/Superheated Vapor[c]	
		Freeboard Refrigeration Device[d]/Reduced Room Draft	
		Freeboard Refrigeration Device[d]/Freeboard Ratio of 1.0	
		Freeboard Refrigeration Device[d]/Dwell[f]	
		Reduced Room Draft/Dwell[g]/Freeboard Ratio of 1.0	
		Freeboard Refrigeration Device[d]/Carbon Adsorber[g]	
		Freeboard Ratio of 1.0/Superheated Vapor[c]/Carbon Adsorber[g]	
	> 1.21 m^2 [13 ft^2]	Freeboard Refrigeration Device[d]/Freeboard Ratio of 1.0/Superheated Vapor[c]	0.22 kg/hr/m^2 [0.045 lb/hr/ft^2]
		Dwell[f]/Freeboard Refrigeration Device[d]/Reduced Room Draft	
		Working-mode Cover[b]/Freeboard Refrigeration Device[c]/Superheated Vapor[c]	
		Freeboard Ratio of 1.0/Reduced Room Draft/Superheated Vapor[c]	
		Freeboard Refrigeration Device[d]/Reduced Room Draft/Superheated Vapor[c]	
		Freeboard Refrigeration Device [d]/Reduced Room Draft/Freeboard Ratio of 1.0	
		Freeboard Refrigeration Device[d]/Superheated Vapor[c]/Carbon Adsorber[g]	
Existing In-line Cleaning Machines		Superheated Vapor[c]/Freeboard Ratio of 1.0	0.10 kg/hr/m^2 [0.021 lb/hr/ft^2]
		Freeboard Refrigeration Device[d]/Freeboard Ratio of 1.0	
		Dwell[g]/Freeboard Refrigeration Device[d]	
		Dwell[g]/Carbon Adsorber[g]	
New In-line Cleaning Machines		Superheated Vapor[c]/Freeboard Refrigeration Device[d]	0.10 kg/hr/m^2 [0.021 lb/hr/ft^2]
		Freeboard Refrigeration Device[d]/Carbon Adsorber[g]	
		Superheated Vapor[c]/Carbon Adsorber[g]	

Table 7. Vapor Cleaning Machine Control Combinations and Idling Emission Limits, Continued

m^2 = square meter, ft^2 = square foot [a] Compliance is shown by employing one of the approved control combinations for a unit or demonstrating that the cleaning machine can achieve and maintain the solvent idling emission limit. [b] Cover opens only for part entrance and removal and completely covers the cleaning machine openings when closed; working-mode cover free of cracks, holes, and other defects. [c] Maintain solvent vapor temperature at the center of the superheated vapor zone greater than 5.6 °C [10 °F] above the solvent's boiling point, and follow manufacturer specified minimum dwell time. [d] Maintain the chilled air blanket temperature at less than 30 percent of the solvent's boiling point, as measured at the center of the air blanket. [e] Limit the movement of air across the top of the freeboard area of the solvent cleaning machine or within the solvent cleaning machine enclosure to less than 15.2 meters per minute [50 feet (ft) per minute], at any time. [f] Determine and use appropriate dwell time for each part type (or parts basket), or determine and use the maximum dwell time using the most complex part type (or parts basket). [g] Limit organic solvent emissions to less than 100 ppm of any halogenated hazardous air pollutant (HAP) compound; do not bypass the carbon adsorber during desorption; and locate the lip exhaust above the solvent cleaning machine cover so that the cover closes below the lip exhaust level.

4.7. STATIONARY COMBUSTION TURBINES (STATIONARY GAS TURBINES).

Installations must ensure that stationary combustion turbines meet the standards of this paragraph, as applicable.

a. Operate and maintain the stationary combustion turbine, air pollution control equipment, and monitoring equipment in a manner consistent with manufacturer specifications and industry standards and practices for minimizing emissions at all times, including during startup, shutdown, and malfunction.

b. The following requirements apply to all stationary combustion turbines with a heat input at peak load equal to or greater than 10.56 GJ/hr [10 MMBtu/hr], based on the lower heating value (LHV) of the fuel fired that began construction, modification, or reconstruction after October 3, 1977 but before February 18, 2005. Emergency gas turbines, military gas turbines installed for use at military training facilities, and firefighting gas turbines are exempt from NO_x emission limits, as are units with a heat input at peak load less than 105.6 GJ/hr [100 MMBtu/hr] based on the LHV of the fuel fired, that began construction before October 3, 1982.

(1) Each unit must comply with the NO_x emission limits in Table 8.

Table 8. NO_x Emission Limits for Stationary Gas Turbines – Non-Emergency Engines that Began Construction, Modification, or Reconstruction after October 3, 1977 but on or before February 18, 2005[a, b]

GAS TURBINE HEAT INPUT AT PEAK LOAD	**Y[c]**	NO_x EMISSION CONCENTRATION[d]
$\geq$ 10.56 GJ/hr [10 MMBtu/hr] and < 105.6 GJ/hr [100 MMBtu/hr][e]	Manufacturer's rated heat rate at manufacturer's **rated load** (kilojoules per watt hour) or actual measured heat rate based on LHV of fuel as measured at actual peak load for the facility.	$0.0075(14.4)/Y + F^f$
>105.6 GJ/hr [100 MMBtu/hr][e]	Manufacturer's rated heat rate at manufacturer's **rated peak load** (kilojoules per watt hour) or actual measured heat rate based on LHV of fuel as measured at actual peak load for the facility.	$0.0150(14.4)/Y + F^f$

[a] Except as exempted in accordance with Paragraph 4.7.b.
[b] To ensure compliance with these limits, for units using water or steam injection to control NO_X emissions, install, calibrate, maintain, and operate a continuous monitoring system to monitor and record the fuel consumption and the ratio of water or steam to fuel being fired in the turbine to ensure the average steam or water to fuel ratio falls within the acceptable ratio needed to demonstrate compliance. As an alternative, install, certify, maintain, operate, and quality-assure a CEMS consisting of NO_X and O_2 monitors or use a carbon dioxide (CO_2) monitor to adjust the measured NO_x concentration to 15 percent O_2. For any turbine that does not use water or steam to control NO_x emissions, a CEMS may be used but is not required.
[c] The value of Y must not exceed 14.3 kilojoules [13.6 British thermal units] per watt hour.
[d] Allowable NO_X emission concentration (percent by volume at 15 percent O_2 and on a dry basis).
[e] Based on the LHV of the fuel fired.
[f] F = NO_X emission allowance for fuel-bound nitrogen. The use of F is optional but, if used, is defined according to the nitrogen content of the fuel in Table 9.

Table 9. NO_x Emission Allowance for Fuel-Bound Nitrogen

N (FUEL-BOUND NITROGEN PERCENT BY WEIGHT)	F (NO_x PERCENT BY VOLUME)
$N \leq 0.015$	0
$0.015 < N \leq 0.1$	0.04(N)
$0.1 < N \leq 0.25$	0.004+0.0067(N–0.1)
$N > 0.25$	0.005

(2) The maximum sulfur content for any fuel burned in a stationary gas turbine must not exceed 0.8 percent by weight [8,000 ppm by weight].

c. The following requirements apply to stationary combustion turbines with a heat input at peak load equal to or greater than 10.56 GJ/hr [10 MMBtu/hr], based on the higher heating value (HHV) of the fuel, which began construction, modification, or reconstruction after February 18, 2005. Combustion turbine test cells and stands are exempt. Emergency combustion turbines are exempt from the NO_x emission limits.

(1) Each unit must meet the applicable NO_x emission limits in Table 10.

(2) The total sulfur content for any liquid fuel burned must not exceed 0.4 percent by weight (4,000 ppm by weight). The total sulfur content for natural gas must not exceed 9.1 grams [140 grains] of sulfur per 2.8 kiloliters [100 standard cubic ft].

Table 10. NO_x Emission Limits for Stationary Gas Turbines that Began Construction, Modification, or Reconstruction after February 18, 2005[a, b]

COMBUSTION TURBINE TYPE	COMBUSTION TURBINE HEAT INPUT (EXCEPT AS NOTED) AT PEAK LOAD (HHV)	NO_x EMISSION LIMITS
New turbine firing natural gas, electric generating.	≤ 53 GJ/hr [50 MMBtu/hr]	42 ppm at 15 percent O_2 or 290 ng/J of useful output [2.3 lb/MWh][c]
New turbine firing natural gas, mechanical drive.	≤ 53 GJ/hr [50 MMBtu/hr]	100 ppm at 15 percent O_2 or 690 ng/J of useful output [5.5 lb/MWh]
New turbine firing natural gas.	> 53 GJ/hr [50 MMBtu/hr] and 897 GJ/hr [850 MMBtu/hr]	25 ppm at 15 percent O_2 or 150 ng/J of useful output [1.2 lb/MWh]
New, modified, or reconstructed turbine firing natural gas.	> 897 GJ/hr [850 MMBtu/hr]	15 ppm at 15 percent O_2 or 54 ng/J of useful output [0.43 lb/MWh]
New turbine firing fuels other than natural gas, electric generating.	≤ 53 GJ/hr [50 MMBtu/hr]	96 ppm at 15 percent O_2 or 700 ng/J of useful output [5.5 lb/MWh]

Table 10. NO_x Emission Limits for Stationary Gas Turbines that Began Construction, Modification or Reconstruction after February 18, 2005[a, b], Continued

COMBUSTION TURBINE TYPE	COMBUSTION TURBINE HEAT INPUT (EXCEPT AS NOTED) AT PEAK LOAD (HHV)	NO_x EMISSION LIMITS
New turbine firing fuels other than natural gas, mechanical drive.	≤ 53 GJ/hr [50 MMBtu/hr]	150 ppm at 15 percent O_2 or 1,100 ng/J of useful output [8.7 lb/MWh]
New turbine firing fuels other than natural gas.	> 53 GJ/hr [50 MMBtu/hr] and 897 GJ/hr [850 MMBtu/hr]	74 ppm at 15 percent O_2 or 460 ng/J of useful output [3.6 lb/MWh]
New, modified, or reconstructed turbine firing fuels other than natural gas.	> 897 GJ/hr [850 MMBtu/hr]	42 ppm at 15 percent O_2 or 160 ng/J of useful output [1.3 lb/MWh]
Modified or reconstructed turbine.	≤ 53 GJ/hr [50 MMBtu/hr]	150 ppm at 15 percent O_2 or 1,100 ng/J of useful output [8.7 lb/MWh]
Modified or reconstructed turbine firing natural gas.	> 53 GJ/hr [50 MMBtu/hr] and 897 GJ/hr [850 MMBtu/hr]	42 ppm at 15 percent O_2 or 250 ng/J of useful output [2.0 lb/MWh]
Modified or reconstructed turbine firing fuels other than natural gas.	> 53 GJ/hr [50 MMBtu/hr] and 897 GJ/hr [850 MMBtu/hr]	96 ppm at 15 percent O_2 or 590 ng/J of useful output [4.7 lb/MWh]
Turbines operating at less than 75 percent of peak load and turbines operating at less than 0 °F.	≤ 108 GJ/hr [30 MW] output	150 ppm at 15 percent O_2 or 1,100 ng/J of useful output [8.7 lb/MWh]
Turbines operating at less than 75 percent of peak load and turbines operating at less than 0 °F.	> 108 GJ/hr [30 MW] output	96 ppm at 15 percent O_2 or 590 ng/J of useful output [4.7 lb/MWh]
Heat recovery units operating independent of the combustion turbine.	All sizes	54 ppm at 15 percent O_2 or 110 ng/J of useful output [0.86 lb/MWh]

ng/J = nanograms per Joule, lb/MWh = pound per megawatt-hour, MW = megawatt

[a] Except as exempted in accordance with Paragraph 4.7.c.

[b] To ensure compliance with these limits, if using water or steam injection to control NO_X emissions, install, calibrate, maintain, and operate a continuous monitoring system to monitor and record the fuel consumption and the ratio of water or steam to fuel being fired in the turbine to ensure the average steam or water to fuel ratio falls within the acceptable ratio needed to demonstrate compliance. If not using water or steam injection to control NO_X emissions, conduct annual performance tests (no more than 14 calendar months following the previous performance test) or use continuous parameter monitoring to demonstrate continuous compliance. As an alternative for either case, install, calibrate, maintain, and operate a CEMS.

4.8. STATIONARY RECIPROCATING INTERNAL COMBUSTION ENGINES (RICE).

Installations must ensure that stationary RICE meet the standards of this paragraph, as applicable.

a. Operation and Maintenance.

(1) Operate and maintain RICE and air pollution control equipment according to manufacturer's specifications or in a manner consistent with industry standards and practices for minimizing emissions.

(2) Minimize idle time during startup and ensure startup time does not exceed 30 minutes, the point at which engines become subject to applicable emission limits.

b. Compression Ignition RICE.

(1) Each compression ignition RICE must meet the emission limits or work practices identified in Tables 11 through 16, as appropriate. Engines with a national security exemption are not subject to these requirements but must follow manufacturer specifications for operation and maintenance. Engines used in test cells and test stands are exempt. Existing residential, commercial, or institutional emergency engines that were purchased prior to June 12, 2006 are exempt from the requirements of Table 16.

(2) All non-exempt diesel compression ignition RICE must operate solely on fuel having a maximum sulfur content of 50 ppm [0.005 percent by weight].

(3) For all model year 2007 and later engines, model year 2006 engines manufactured after April 1, 2006 (July 1, 2006 for fire pump engines), and all engines reconstructed after July 11, 2005, compliance with emission limits must be demonstrated by purchasing a certified engine or conducting testing to show that the engine's emissions meet the standards. For all other engines with emission limits, compliance is demonstrated by purchasing a certified engine, keeping records of engine manufacturer data indicating compliance with the standards, or conducting an initial performance test to demonstrate compliance with the emission standards. For engines with work practice standards, compliance is demonstrated by documenting that the work practices have been accomplished.

(4) Emergency engines must be equipped with a non-resettable hour meter, and engine operating hours should be recorded by type of use (e.g., emergency, maintenance and testing, other non-emergency).

Table 11. Emergency Compression Ignition RICE Model Years 2007 and After - Emission Limits[a]

ENGINE POWER RANGE	ENGINE MODEL YEAR RANGE	EMISSIONS LIMITS g/kW-hr [g/HP-hr]					SMOKE OPACITY (ACCELERATION, LUGGING, PEAK OF LUGGING OR ACCELERATION)[1]
		NMHC	NMHC + NO_x	NO_x	PM	CO	
kW < 8 HP < 11]	2007		7.5 [5.6]		0.8 [0.6]	8 [6.0]	20/15/50%
	2008 and later				0.4 [0.3]		
8 ≤ kW < 19 [11 ≤ HP < 25]	2007		7.5 [5.6]		0.8 [0.6]	6.6 [4.9]	
	2008 and later				0.4 [0.3]		
19 ≤ kW < 37 [25 ≤ HP < 50]	2007		7.5 [5.6]		0.6 [0.4]	5.5 [4.1]	
	2008 and later				0.3 [0.22]		
37 ≤ kW < 56 [50 ≤ HP < 75]	2007		7.5 [5.6]		0.4 [0.3]	5.0 [3.7]	
	2008 and later		4.7 [3.5]				
56 ≤ kW < 75 [75 ≤ HP < 101]	2007		7.5 [5.6]		0.4 [0.3]	5.0 [3.7]	
	2008 and later		4.7 [3.5]				
75 ≤ kW < 130 [101 ≤ HP < 171]	2007 and later		4.0 [3.0]		0.3 [0.22]	5.0 [3.7]	
130 ≤ kW < 225 [171 ≤ HP < 302]			4.0 [3.0]		0.2 [0.15]	3.5 [2.6]	
225 ≤ kW < 450 [302 ≤ HP < 603]			4.0 [3.0]		0.2 [0.15]	3.5 [2.6]	
450 ≤ kW < 560 [603 ≤ HP < 751]			4.0 [3.0]		0.2 [0.15]	3.5 [2.6]	
560 ≤ kW < 900 [751 ≤ HP < 1207]			6.4 [4.8]		0.2 [0.15]	3.5 [2.6]	
900 ≤ kW < 2,237 [1207 ≤ HP < 3,000]			6.4 [4.8]		0.2 [0.15]	3.5 [2.6]	
kW ≥ 2,237 [HP ≥ 3,000]	2007 - 2010	1.3 [1.0]	6.4 [4.8]	9.2 [6.9]	0.54 [0.40]	11.4 [8.5]	
	2011 and later				0.2 [0.15]	3.5 [2.6]	

HP = horsepower, kW = kilowatt, NMHC = nonmethane hydrocarbons, g/HP-hr = grams per horsepower hour, g/kW-hr = grams per kilowatt hour

[a] Emissions limits in this table do not apply to fire pump engines – see Table 15.

[1] Exhaust smoke opacity is expressed in percentage for acceleration, lugging, and peak modes (acceleration/lugging/peak).

Table 12. Non-Emergency Compression Ignition RICE Model Years 2007 and After - Emission Limits

ENGINE POWER RANGE	ENGINE MODEL YEAR RANGE	EMISSIONS LIMITS g/kW-hr [g/HP-hr]					SMOKE OPACITY (ACCELERATION, LUGGING, PEAK OF LUGGING, OR ACCELERATION)[1]
		NMHC	NMHC + NO_x	NO_x	PM	CO	
kW < 8 [HP < 11]	2007		7.5 [5.6]		0.8 [0.6]	8.0 [6.0]	20/15/50%
	2008 - 2014				0.4 [0.3]		
	2015 and later				0.4 [0.3]		
8 ≤ kW < 19 [11 ≤ HP < 25]	2007		7.5 [5.6]		0.8 [0.6]	6.6 [4.9]	
	2008 - 2014				0.4 [0.3]		
	2015 and later				0.4 [0.3]		
19 ≤ kW < 37 [25 ≤ HP < 50]	2007		7.5 [5.6]		0.6 [0.4]	5.5 [4.1]	
	2008 - 2012		7.5 [5.6]		0.3 [0.22]		
	2013 - 2014		7.5 [5.6]		0.03 [0.02]		
	2015 and later		4.7 [3.5]		0.03 [0.02]		
37 ≤ kW < 56 [50 ≤ HP < 75]	2007		7.5 [5.6]		0.4 [0.3]	5.0 [3.7]	
	2008 - 2012		4.7 [3.5]		0.3 [0.22]		
	2013 - 2014		4.7 [3.5]		0.03 [0.02]		
	2015 and later		4.7 [3.5]		0.03 [0.02]		
56 ≤ kW < 75 [75 ≤ HP < 101]	2007		7.5 [5.6]		0.4 [0.3]	5.0 [3.7]	
	2008 - 2011		4.7 [3.5]		0.4 [0.3]		
	2012 - 2013	0.19 [0.14]		0.4 [0.3]	0.2 [0.15]		
	2014 and later	0.19 [0.14]		0.4 [0.3]	0.02		
75 ≤ kW < 130 [101 ≤ HP < 171]	2007 - 2011		4.0 [3.0]		0.3 [0.22]	5.0 [3.7]	20/15/50%
	2012 - 2013	0.19 [0.14]		0.4 [0.3]	0.02 [0.015]		
	2014 and later	0.19 [0.14]		0.4 [0.3]	0.02 [0.015]		
130 ≤ kW < 225 [171 ≤ HP < 302]	2007 - 2010		4.0 [3.0]		0.2 [0.15]	3.5 [2.6]	
	2011 - 2013	0.19 [0.14]		0.4 [0.3]	0.02 [0.015]		
	2014 and later	0.19 [0.14]		0.4 [0.3]	0.02 [0.015]		

Table 12. Non-Emergency Compression Ignition RICE Model Years 2007 and After - Emission Limits, Continued

ENGINE POWER RANGE	ENGINE MODEL YEAR RANGE	EMISSIONS LIMITS g/kW-hr [g/HP-hr]					SMOKE OPACITY (ACCELERATION, LUGGING, PEAK OF LUGGING OR ACCELERATION)[1]
		NMHC	NMHC + NO_x	NO_x	PM	CO	
225 ≤ kW < 450 [302 ≤ HP < 603]	2007 - 2010		4.0 [3.0]		0.2 [0.15]	3.5 [2.6]	20/15/50%
	2011 - 2013	0.19 [0.14]		0.40 [0.30]	0.02 [0.015]		
	2014 and later	0.19 [0.14]		0.4 [0.3]	0.02 [0.015]		
450 ≤ kW < 560 [603 ≤ HP < 751]	2007 - 2010		4.0 [3.0]		0.2 [0.15]	3.5 [2.6]	
	2011 - 2013	0.19 [0.14]		0.40 [0.30]	0.02 [0.015]		
	2014 and later	0.19 [0.14]		0.4 [0.3]	0.02 [0.015]		
560 ≤ kW < 900 [751 ≤ HP < 1207]	2007 - 2010		6.4 [4.8]		0.2 [0.15]	3.5 [2.6]	
	2011 - 2014	0.4 [0.3]		3.5 [2.6]	0.1 [0.075]		
	2015 and later	0.19 [0.14]		0.67 [0.50]	0.03 [0.02]		
900 ≤ kW < 2,237 [1207 ≤ HP < 3,000]	2007 - 2010		6.4 [4.8]		0.2 [0.15]	3.5 [2.6]	
	2011 - 2014	0.4 [0.3]		0.67 [0.50]	0.1 [0.075]		
	2015 and later	0.19 [0.14]		0.67 [0.50]	0.03 [0.02]		
2,237≤ kW [3,000 ≤ HP]	2007 - 2010	1.3 [1.0]		9.2 [6.9]	0.54 [0.40]	11.4 [8.5]	
	2011 - 2014		6.4 [4.8]		0.2 [0.15]	3.5 [2.6]	
	2015 and later	0.19 [0.14]		0.67 [0.50]	0.03 [0.02]	3.5 [2.6]	

[1] Exhaust smoke opacity is expressed in percentage for acceleration, lugging, and peak modes (acceleration/lugging/peak).

Table 13. Compression Ignition RICE Pre 2007a Model Year and 2007 to 2010 Model Years Rated >2,237 kW [3,000 HP] – Emission Limits[b]

ENGINE POWER RANGE	ENGINE MODEL YEAR RANGE	EMISSION LIMITS g/kW-hr [g/HP-hr]				
		NMHC + NO_X	HC	NO_X	CO	PM
kW < 8 [HP < 11]	2006 and earlier	10.5 [7.8]			8.0 [6.0]	1.0 [0.75]
8 ≤ kW < 19 [11 ≤ HP < 25]	2006 and earlier	9.5 [7.1]			6.6 [4.9]	0.80 [0.60]
19 ≤ kW < 37 [25 ≤ HP < 50]	2006 and earlier	9.5 [7.1]			5.5 [4.1]	0.80 [0.60]
37 ≤ kW < 56 [50 ≤ HP < 75]	2006 and earlier			9.2 [6.9]		
56 ≤ kW < 75 [75 ≤ HP < 101]	2006 and earlier			9.2 [6.9]		
75 ≤ kW < 130 [101 ≤ HP < 175]	2006 and earlier			9.2 [6.9]		
130 ≤ kW < 225 [175 ≤ HP < 300]	2006 and earlier		1.3 [1.0]	9.2 [6.9]	11.4 [8.5]	0.54 [0.40]
225 ≤ kW < 450 [300 ≤ HP < 600]	2006 and earlier		1.3 [1.0]	9.2 [6.9]	11.4 [8.5]	0.54 [0.40]
450 ≤ kW < 560 [600 ≤ HP < 750]	2006 and earlier		1.3 [1.0]	9.2 [6.9]	11.4 [8.5]	0.54 [0.40]
kW ≥ 560 [HP ≥ 750]	2006 and earlier		1.3 [1.0]	9.2 [6.9]	11.4 [8.5]	0.54 [0.40]
kW ≥ 2,237 [HP ≥ 3,000]	2007 - 2010		1.3 [1.0]	9.2 [6.9]	11.4 [8.5]	0.54 [0.40]

Table 13. Compression Ignition RICE Pre 2007 Model Year and 2007 to 2010 Model Years Rated >2,237 kW [3,000 HP][a] – Emission Limits, Continued

HC = hydrocarbon [a] The pre-2007 model year RICE subject to these emission limits include model year 2006 RICE manufactured after April 1, 2006 and any pre-2007 RICE reconstructed after July 11, 2005. For this table, "reconstructed" means the replacement of components to such an extent that the fixed capital cost of the new components exceeds 75 percent of the fixed capital cost that would be required to construct a comparable new engine. [b] Emission limits in this table do not apply to fire pump engines.

Table 14. Non-Emergency Compression Ignition RICE Manufactured On or Before April 1, 2006 - Emission Limits[a]

ENGINE POWER RANGE	ENGINE MODEL YEAR RANGE	CO[b]
225 ≤ kW < 373 [300 ≤ HP < 500]	2006 and earlier	49 ppmvd at 15% O_2 or 70% reduction
kW ≥ 373 [HP ≥ 500]	2006 and earlier	23 ppmvd at 15% O_2 or 70% reduction

ppmvd = parts per million by volume, dry basis

[a] Pre-2007 model year RICE that are reconstructed after July 11, 2005 are subject to the emission limits in Table 13 instead of Table 14. For this table, "reconstructed" means the replacement of components to such an extent that the fixed capital cost of the new components exceeds 75 percent of the fixed capital cost that would be required to construct a comparable new engine.

[b] Compliance with the CO emission limits typically requires installation of a control device, such as an oxidation catalyst.

Table 15. Fire Pump Compression Ignition Engines Model Years 2007 and After - Emission Limits

ENGINE POWER RANGE	ENGINE MODEL YEAR RANGE	EMISSIONS LIMITS g/kW-hr [g/HP-hr]			SMOKE OPACITY (ACCELERATION, LUGGING, PEAK OF LUGGING OR ACCELERATION)[1]
		NMHC + NOx	PM	CO	
kW < 8 [HP < 11]	2007 - 2010	10.5 [7.8]	1.0 [0.75]	8.0 [6.0]	20/15/50%
	2011 and later	7.5 [5.6]	0.4 [0.3]		
8 ≤ kW < 19 [11 ≤ HP < 25]	2007 - 2010	9.5 [7.1]	0.8 [0.6]	6.6 [4.9]	
	2011 and later	7.5 [5.6]	0.4 [0.3]		
19 ≤ kW < 37 [25 ≤ HP < 50]	2007 - 2010	9.5 [7.1]	0.8 [0.6]	5.5 [4.1]	
	2011 and later	7.5 [5.6]	0.3 [0.22]		
37 ≤ kW < 56 [50 ≤ HP < 75]	2007 - 2010	10.5 [7.8]	0.8 [0.6]	5.0 [3.7]	
	2011 and later	4.7 [3.5]	0.4 [0.3]		
56 ≤ kW < 75 [75 ≤ HP < 101]	2007 - 2010	10.5 [7.8]	0.8 [0.6]	5.0 [3.7]	
	2011 and later	4.7 [3.5]	0.4 [0.3]		
75 ≤ kW < 130 [101 ≤ HP < 171]	2007 - 2009	10.5 [7.8]	0.8 [0.6]	5.0 [3.7]	
	2010 and later	4.0 [3.0]	0.3 [0.22]		
130 ≤ kW < 225 [171 ≤ HP < 302]	2007 - 2008	10.5 [7.8]	0.54 [0.40]	3.5 [2.6]	
	2009 and later	4.0 [3.0]	0.2 [0.15]		
225 ≤ kW < 450 [302 ≤ HP < 603)	2007 - 2008	10.5 [7.8]	0.54 [0.40]	3.5 [2.6]	
	2009 and later	4.0 [3.0]	0.2 [0.15]		
450 ≤ kW < 560 [603 ≤ HP < 751)	2007 - 2008	10.5 [7.8]	0.54 [0.40]	3.5 [2.6]	
	2009 and later	4.0 [3.0]	0.2 [0.15]		
kW ≥ 560 [HP ≥ 751]	2007	10.5 [7.8]	0.54 [0.40]	3.5 [2.6]	
	2008 and later	6.4 [4.8]	0.2 [0.15]		

Table 16. Compression Ignition RICE Purchased Before June 12, 2006 – Work Practice Standards

ENGINE POWER RANGE	WORK PRACTICE STANDARDS Perform annually or at the frequency listed below, whichever comes first.		
	Change Oil and Filter[a]	Inspect Air Cleaner; Replace As Necessary	Inspect All Hoses and Belts; Replace as Necessary
Emergency Engines - All Power Ranges	500 hours	1,000 hours	500 hours
Non-Emergency Engines kW ≤ 225 [HP ≤ 300]	1,000 hours	1,000 hours	500 hours

[a] The oil change requirement specified in this table may be extended through the use of an oil analysis program performed at the same frequency specified in the table for changing the oil. At a minimum, the oil analysis program must analyze the following parameters for compression ignition engines: total base number, viscosity, and percent water content. The oil life may be extended if the analysis indicates the oil meets the following specifications: the total base number is not less than 30 percent of the total base number of the oil when new; the viscosity of the oil has not changed by more than 20 percent from the viscosity of the oil when new; and the percent water content (by volume) is not greater than 0.5.

c. Spark Ignition RICE.

(1) Spark ignition RICE must meet the emission limits identified in Tables 17, 18, 19, or 20, as appropriate. Engines with a national security exemption are not subject to these requirements, but must follow manufacturer specifications and industry standards and practices for operation and maintenance. Engines used in test cells and test stands are exempt. Existing residential, commercial, or institutional emergency engines are exempt from the requirements of Table 20. Existing engines are those that commenced construction or reconstruction before June 12, 2006.

(2) For engines manufactured after July 1, 2007, compliance with emission limits must be demonstrated by purchasing a certified engine or conducting testing to show that the engine's emissions meet the standards.

Table 17. Emergency Spark Ignition RICE Purchased or Reconstructed On or After June 12, 2006 – Emission Limits

FUEL TYPE	ENGINE POWER RANGE	MANUFACTURED DATE[a]	EMISSIONS LIMITS g/kW-hr [g/HP-hr]				EMISSIONS LIMITS ppmvd at 15% O_2		
			HC + NO_x	NO_x	CO	VOC	NO_x	CO	VOC
All	kW < 19 [HP < 25]	July 1, 2008 to December 31, 2010	13.4 [10.0]		519 [387]				
		On or After January 1, 2011	8.0 [6.0]		610 [455]				
Natural Gas and Liquefied Petroleum Gas (LPG)[b]	19 ≤ kW < 99 [25 ≤ HP < 130]	On or After January 1, 2009	13.4 [10.0]		519 [387]				
	kW ≥ 99 [HP ≥ 130]	On or After January 1, 2009		2.7 [2.0]	5.4 [4.0]	1.3 [1.0]	160	540	86
Gasoline	19 ≤ kW < 99 [25 < HP < 130]	On or After January 1, 2009	13.4 [10.0]		519 [387]				
	kW ≥ 99 [HP ≥ 130]	On or After January 1, 2009	2.7 [2.0]		4.4 [3.3]				

VOC = volatile organic compound

[a] Reconstructed engines with a manufactured date prior to July 1, 2009 (prior to July 1, 2008 for engines < 19 kW) must meet the standards applicable to engines manufactured on July 1, 2009 (on July 1, 2008 for engines < 19 kW).

[b] Demonstrate compliance in either g/kW-hr or ppmvd at 15 percent O_2.

Table 18. Non-Emergency Spark Ignition RICE Purchased or Reconstructed On or After June 12, 2006 – Emission Limits

ENGINE TYPE AND FUEL	ENGINE POWER RANGE	MANUFACTURED ON OR AFTER[a]	EMISSION LIMITS						
			g/kW-h [g/HP-hr]				ppmvd at 15% O_2		
			HC + NO_x	NO_X	CO	VOC[b]	NO_X	CO	VOC[b]
All	kW ≤ 19 [HP < 25]	July 1, 2008 to December 31, 2010	13.4 [10.0]		519 [387]				
		On or After January 1, 2011	8.0 [6.0]		610 [455]				
Rich Burn LPG	kW ≥ 19 [HP ≥ 25]	July 1, 2008	2.7 [2.0]		4.4 [3.3.]				
Natural Gas[b, c] and Lean Burn LPG[b, c] except lean burn 500 ≤ HP < 1,350)	19 ≤ kW < 75 [25 ≤ HP < 100]	July 1, 2008	2.7 [2.0]		4.4 [3.3]				
	75 ≤ kW < 373 [100 ≤ HP < 500]	July 1, 2008		2.7 [2.0]	5.4 [4.0]	1.3 [1.0]	160	540	86
		January 1, 2011		1.3 [1.0]	2.7 [2.0]	0.9 [0.7]	82	270	60
	kW ≥ 373 [HP ≥ 500]	July 1, 2007		2.7 [2.0]	5.4 [4.0]	1.3 [1.0]	160	540	86
		July 1, 2010		1.3 [1.0]	2.7 [2.0]	0.9 [0.7]	82	270	60
Lean Burn Natural Gas[b] and LPG[b]	373 ≤ kW < 1007 [500 ≤ HP < 1,350]	January 1, 2008		2.7 [2.0]	5.4 [4.0]	1.3 [1.0]	160	540	86
		July 1, 2010		1.3 [1.0]	2.7 [2.0]	0.9 [0.7]	82	270	60

Table 18. Non-Emergency Spark Ignition RICE Purchased or Reconstructed On or After June 12, 2006 – Emission Limits, Continued

ENGINE TYPE AND FUEL	ENGINE POWER RANGE	MANUFACTURED ON OR AFTER[a]	EMISSION LIMITS						
			g/kW-h [g/HP-hr]				ppmvd at 15% O_2		
			HC + NO_x	NO_X	CO	VOC[b]	NO_X	CO	VOC[b]
Gasoline[d]	kW ≥ 19 [HP ≥ 25]	July 1, 2008	2.7 [2.0][d]		4.4 [3.3]	NA			

[a] Reconstructed engines with a manufactured date prior to July 1, 2008 (prior to July 1, 2007 for natural gas and lean burn LPG engines > 373 kW or prior to January 1, 2008 for lean burn natural gas and LPG engines in the range of 373 to 1007 kW) must meet the standards applicable to engines manufactured on July 1, 2008 (on July 1, 2007 for natural gas and lean burn LPG engines > 373 kW or on January 1, 2008 for lean burn natural gas and LPG engines in the range of 373 to 1007 kW).
[b] Demonstrate compliance in units of g/HP-hr or ppmvd at 15 percent O_2.
[c] Excluding emissions of formaldehyde.
[d] Can demonstrate compliance by either meeting the numeric limit or (HC + NO_x) × $CO^{0.784}$ less than or equal to 8.57, where the maximum NO_x is 2.7 g/kW-hr and maximum CO is 20.6 g/kW-hr.

Table 19. Non-Emergency Spark Ignition RICE Manufactured Before July 1, 2007a – Pollution Control Requirements

ENGINE POWER RANGE	ANNUAL OPERATION TIME	BURN TYPE	POLLUTION CONTROL REQUIRED TO BE INSTALLED
kW ≥ 373 [HP ≥ 500]	> 24 hours per year	4SLB	Install an oxidation catalyst to reduce HAP emissions
		2SLB or 4SRB	
	≤ 24 hours per year	4SRB	Install non-selective catalytic reduction to reduce HAP emissions
		2SLB or 4SLB	
2SLB = 2-stroke lean burn, 4SLB = 4-stroke lean burn, 4SRB = 4-stroke rich burn [a] Manufactured before July 1, 2008 for lean burn engines with a maximum engine power greater than or equal to 373 kW [500 HP] and less than 1,007 kW [1,350 HP].			

Table 20. Spark Ignition RICE Manufactured Before June 12, 2006 – Work Practice Standards

ENGINE POWER RANGE	ENGINE IGNITION TYPE	WORK PRACTICE STANDARDS Perform annually or at the frequency listed below, whichever comes first.			
		Change Oil and Filter[a]	Inspect Air Cleaner; Replace As Necessary	Inspect All Hoses and Belts; Replace as Necessary	Inspect Spark Plugs; Replace as Necessary
Emergency Engines - All Power Ranges		500 hours	1,000 hours	500 hours	
Non-Emergency Engines - All Power Ranges	2 SLB	4,320 hours		4,320 hours	4,320 hours
Non-Emergency Engines kW ≤ 373 [HP ≤ 500]	4SLB or 4SRB	1,440 hours		1,440 hours	1,440 hours
Non-Emergency Engines kW > 373 [HP > 500]	4SLB or 4SRB	500 hours		500 hours	1,000 hours
[a] The oil change requirement specified in this table may be extended through the use of an oil analysis program, performed at the same frequency specified in the table for changing the oil. At a minimum, the oil analysis program must analyze the following parameters for spark ignition engines: total acid number, viscosity, and percent water content. The oil life may be extended if the analysis indicates the oil meets the following specifications: The total acid number does not increase by more than 3.0 mg of potassium hydroxide per gram from the total acid number of the oil when new; the viscosity of the oil has not changed by more than 20 percent from the viscosity of the oil when new; and the percent water content (by volume) is not greater than 0.5.					

4.9. UNITS CONTAINING ODSS AND SUBSTITUTES FOR ODSS.

Installations must ensure that units containing ODSs meet the standards of this paragraph, as applicable. ODSs are listed in Table 21 (Class I), Table 22 (Class II), and Table 23 (Blend). The standards in Paragraphs 4.9.b. through 4.9.e. apply to direct atmospheric emissions of ODSs from refrigeration and fire suppression equipment. These standards also apply to substitutes for ODSs, such as hydrofluorocarbons (HFCs), where indicated.

a. Substitutes Exempt from Refrigerant Management Requirements.

The following substitutes are exempt from the refrigerant management requirements:

(1) Carbon dioxide in any application.

(2) Nitrogen in any application.

(3) Water in any application.

(4) Ammonia in commercial or industrial process refrigeration or absorption units.

(5) Chlorine in industrial process refrigeration (processing of chlorine and chlorine compounds).

(6) Hydrocarbons in industrial process refrigeration (processing of hydrocarbons).

(7) Ethane (R-170) in very low temperature refrigeration equipment and equipment for non-mechanical heat transfer.

(8) Propane (R-290) in retail food refrigerators and freezers (stand-alone units only); household refrigerators, freezers, and combination refrigerators and freezers; self-contained room air conditioners for residential and light commercial air-conditioning and heat pumps; vending machines; and effective January 3, 2017, self-contained commercial ice machines, very low temperature refrigeration equipment, and water coolers.

(9) Isobutane (R-600a) in retail food refrigerators and freezers (stand-alone units only); household refrigerators, freezers, and combination refrigerators and freezers; and vending machines.

(10) R-441A in retail food refrigerators and freezers (stand-alone units only); household refrigerators, freezers, and combination refrigerators and freezers; self-contained room air conditioners for residential and light commercial air-conditioning; heat pumps; and vending machines.

Table 21. Class I ODS Chemicals

CHEMICAL NAME[a]	SYMBOL	CAS NO.	REF NO.	COMMON NAME
FIRE SUPPRESSANTS				
Bromochlorodifluoromethane	CF2ClBr	353-59-3	Halon 1211	
Bromotrifluoromethane	CF3Br	75-63-8	Halon 1301	
Dibromotetrafluoroethane	C2F4Br2	124-73-2	Halon 2402	
Chlorobromomethane	CH2BrCl	74-97-5	Halon 1011	CBM
Bromodifluoromethane	HBFC-12B1	1511-62-2	Halon 1201	FM-100
REFRIGERANTS				
Trichlorofluoromethane	CFC-11	75-69-4	R-11	Freon 11
Dichlorodifluoromethane	CFC-12	75-71-8	R-12	Freon 12
Chlorotrifluoromethane	CFC-13	75-72-9	R-13	Freon 13
Pentachlorofluoroethane	CFC-111	354-58-5	R-111	
Tetrachlorodifluoroethane	CFC-112	76-12-0	R-112	
Dichlorotetrafluoroethane	CFC-114	76-14-2	R-114	
Chloropentafluoroethane	CFC-115	76-15-3	R-115	
Heptachlorofluoropropane	CFC-211	422-78-6		
Hexachlorodifluoropropane	CFC-212	3182-26-1		
Pentachlorotrifluoropropane	CFC-213	2354-06-5		
Tetrachlorotetrafluoropropane	CFC-214	29255-31-0		
Trichloropentafluoropropane	CFC-215	4259-43-2		
Dichlorohexafluoropropane	CFC-216	661-97-2		
Chloroheptafluoropropane	CFC-217	422-86-6		
REFRIGERANT BLENDS				
R-12 (74%) and HFC-152a (26%)			R-500	
R-12 (25%) and R-22 (75%)			R-501	
R-115 (51%) and R-22 (49%)			R-502	
R-13 (59.9%) and HFC-23 (40.1%)			R-503	
OTHERS				
Tetrachloromethane	CCL4	56-23-5	solvent	Carbon Tet
1,1,1 Trichloroethane	TCA	71-55-6	solvent	Methyl Chloroform
Trichlorotrifluoroethane	CFC-113	76-13-1	solvent	Freon 113
Bromomethane	MBX	74-83-9	pesticide	Methyl Bromide

[a] All isomers of these chemicals are ODSs, except isomers of 1,1,1-trichloroethane (also known as methyl chloroform) such as 1,1,2-trichloroethane.

Table 22. Class II ODS Chemicals

CHEMICAL NAME[a]	HCFC	SYMBOL	CAS NO.	REF NO.	COMMON NAME
FIRE SUPPRESSANTS					
Dichlorotrifluoroethane	HCFC-123	C2HF3Cl2	306-83-2	R-123	Halotron I
REFRIGERANTS					
Dichlorofluoromethane	HCFC-21	CHFCl2	75-43-4	R-21	Freon 21
Monochlorodifluoromethane	HCFC-22	CHF2Cl	75-45-6	R-22	Freon 22, Genetron 22, Forane 22, Refron 22
Monochlorofluoromethane	HCFC-31	CH2FCl	593-70-4	R-31	Genetron 31
Dichlorotrifluoroethane	HCFC-123	C2HF3Cl2	306-83-2	R-123	Suva 123, Freon 123, Genetron 123, Halotron I
Monochlorotetrafluoroethane	HCFC-124	C2HF4Cl	2837-89-0	R-124	Suva 124, Freon 124, Genetron 124, FE-241
Trichlorofluoroethane	HCFC-131	C2H2FCl3	359-28-4		
Dichlorodifluoroethane	HCFC-132b	C2H2F2Cl2	1649-08-7		
Monochlorotrifluoroethane	HCFC-133a	C2H2F3Cl	75-88-7		
Monochlorodifluoroethane	HCFC-142b	C2H3F2Cl	75-68-3	R-142b	Genetron 142b
Hexachlorofluoropropane	HCFC-221	C3HFCl6	422-26-4		
Pentachlorodifluoropropane	HCFC-222	C3HF2Cl5	422-49-1		
Tetrachlorotrifluoropropane	HCFC-223	C3HF3Cl4	422-52-6		
Trichlorotetrafluoropropane	HCFC-224	C3HF4Cl3	422-54-8		
Monochlorohexafluoropropane	HCFC-226	C3HF6Cl	431-87-8		
Pentachlorofluoropropane	HCFC-231	C3H2FCl5	421-94-3		
Tetrachlorodifluoropropane	HCFC-232	C3H2F2Cl4	460-89-9		
Trichlorotrifluoropropane	HCFC-233	C3H2F3Cl3	7125-84-0		
Dichlorotetrafluoropropane	HCFC-234	C3H2F4Cl2	425-94-5		

Table 22. Class II ODS Chemicals, Continued

CHEMICAL NAME[a]	HCFC	SYMBOL	CAS NO.	REF NO.	COMMON NAME
Monochloropentafluoropropane	HCFC-235	C3H2F5Cl	460-92-4		
Tetrachlorofluoropropane	HCFC-241	C3H3FCl4	666-27-3		
Trichlorodifluoropropane	HCFC-242	C3H3F2Cl3	460-63-9		
Dichlorotrifluoropropane	HCFC-243	C3H3F3Cl2	460-69-5		
Monochlorotetrafluoropropane	HCFC-244	C3H3F4Cl	134190-50-5		
Trichlorofluoropropane	HCFC-251	C3H4FCl3	421-41-0		
Dichlorodifluoropropane	HCFC-252	C3H4F2Cl2	819-00-1		
Monochlorotrifluoropropane	HCFC-253	C3H4F3Cl	460-35-5		
Dichlorofluoropropane	HCFC-261	C3H5FCl2	420-97-3		
Monochlorodifluoropropane	HCFC-262	C3H5F2Cl	421-02-3		
Monochlorofluoropropane	HCFC-271	C3H6FCl	430-55-7		

HCFC = hydrochlorofluorocarbon
[a] All isomers of these chemicals are ODSs, except isomers of 1,1,1-trichloroethane (also known as methyl chloroform) such as 1,1,2-trichloroethane.

Table 23. Class II ODS Blend Chemicals

CHEMICAL NAME[a]	SYMBOL	CAS NO.	REF NO.	COMMON NAME
FIRE SUPPRESSANT BLENDS				
R-22 (82%), R-124 (9.5%) and R-123 (4.75%)			NAF S III	
R-123 (55%), R-124 (31%) and R-134a			NAF P III	
REFRIGERANT BLENDS				
R-22 (53%), R-124 (34%) and R-152a			R-401A	MP-39
R-22 (61%), R-124 (28%) and R-152a			R-401B	MP-66
R-22 (33%), R-124 (52%) and R-152a			R-401C	MP-52
R-22 (38%), R-125 and propane			R-402A	HP-80
R-22 (60%), R-125 and propane			R-402B	HP-81
R-22 (75%), octafluoropropane and propane			R-403A	
R-22 (55%), octafluoropropane and propane			R-403B	
R-22 (45%), R-142b (5.5%), R-152a and octafluorocyclobutane			R-405A	G2015
R-22 (55%), R-142b (41%) and isobutene			R-406A	Autofrost

Table 23. Class II ODS Blend Chemicals, Continued

CHEMICAL NAME[a]	SYMBOL	CAS NO.	REF NO.	COMMON NAME
R-22 (47%), R-143a and R-125			R-408A	
R-22 (60%), R-124 (25%) and R-142b (15%)			R-409A	FX-56
R-22 (65%), R-124 (25%) and R-142b (10%)			R-409B	FX-57
R-22 (87.5%), R-152a and propylene			R-411A	G2018A
R-22 (94%), R-152a and propylene			R-411B	G2018B
R-22 (70%), R-142b (25%) and octafluoropropane			R-412A	
R-22 (51%), R-124 (28.5%), R-142b (16.5%) and isopropane			R-414A	GHG-X4
R-22 (50%), R-124 (39%), R-142b (9.5%) and isopropane			R-414B	Hot Shot
R-22 (82%) and R-152a			R-415A	
R-22 (25%) and R-152a			R-415B	
R-124 (39.5%), R-134a and butane			R-416A	FR-12, FRIG-C
R-22 (96%), R-152a and propane			R-418A	
R-142b (12%) and R-134a			R-420A	
R-22 (44%) and octafluoropropane			R-509	
OTHERS				
Tetrachlorofluoroethane	HCFC-121	354-14-3		lubricant
Trichlorodifluoroethane	HCFC-122	41834-16-6		lubricant
Dichlorofluoroethane	HCFC-141b	1717-00-6		solvent
Dichloropentafluoropropane	HCFC-225ca	422-56-0		solvent
Dichloropentafluoropropane	HCFC-225cb	507-55-1		solvent
[a] All isomers of these chemicals are ODSs, except isomers of 1,1,1-trichloroethane (also known as methyl chloroform) such as 1,1,2-trichloroethane.				

b. Production and Use of Class I and II ODSs.

Production of Class I ODSs has been banned. Production of Class II ODSs is being phased out and no Class II ODSs will be produced after January 1, 2030. All existing commercial systems using Class I and Class II ODSs must be phased out at the end of their life cycle. No new commercial systems may be purchased containing these substances. Use of Class I ODSs is only permitted for weapons systems and when supplied by the Defense Logistics Agency (DLA) from the DoD stockpile. Use of Class II ODSs is permitted only in existing air-conditioning and refrigeration equipment until the end of their life cycle.

c. Labeling.

All containers or products containing a Class I or Class II substance must bear the warning statement, in English and the predominant language of the HN, shown in Figure 1. The label must be clearly legible and conspicuous and not interfere with, detract from, or obscure any labeling information required to be on the equipment or container. Alternative placement of the warning such as on hang tags, invoices, bills of lading, package inserts, or other supplemental printed materials is also acceptable. Containers and products must comply with labeling and other requirements for hazardous materials in Section 4 of Volume 4 of this manual, as applicable.

Figure 1. Class I or Class II Warning Label

> WARNING: Contains [or Manufactured with, if applicable] [insert name of substance], a substance which harms public health and environment by destroying ozone in the upper atmosphere.

d. Refrigerants.

(1) Refrigerant Recovery and Recycling.

All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air-conditioning units, or motor vehicle air conditioners containing ODS refrigerants, must be performed using commercially available refrigerant recovery and recycling equipment operated by trained personnel. Refrigerant technicians must be trained in proper recovery and recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards and practices or HN equivalent. Use of refrigerant recovery and recycling equipment is not required for ammonia, carbon dioxide, and pure hydrocarbon refrigerants.

(2) Refrigerant Venting Prohibition.

Any ODS refrigerants and their substitutes (such as HFCs) must not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air-conditioning units, or motor vehicle air conditioners. *De minimis* releases associated with good faith attempts to recycle or recover ODS or substitute refrigerants are not subject to this prohibition. Ammonia, carbon dioxide, and pure hydrocarbon refrigerants are not subject to the venting prohibition.

(3) Refrigerant Leak Monitoring and Repair.

Monitor refrigeration equipment containing 22.7 kg [50 lbs] or more of ODS refrigerant for leakage and, if found to be leaking, repair in accordance with the following standards within 30 days.

(a) Commercial Refrigeration Equipment.

Commercial refrigeration equipment and industrial process refrigeration equipment normally containing 22.7 kg [50 lbs] or more of refrigerant in any single circuit must have leaks

repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

(b) Industrial Process Refrigeration (IPR) Equipment.

IPR equipment normally containing 22.7 kg [50 lbs] or more of refrigerant in any single circuit must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

(c) Comfort Cooling and Other Appliances.

Comfort cooling and other appliances normally containing more than 22.7 kg [50 lbs] of refrigerant in any single circuit and not covered by Paragraphs 4.9.d.(3)(a) and 4.9.d.(3)(b) must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period.

(d) Leak Rate Calculation.

Leak rates must be calculated every time an ODS refrigerant is added to an appliance with a full charge of 22.7 kg [50 lbs] or more of refrigerant in any single circuit unless the addition qualifies as a seasonal variance or is made immediately after a retrofit or the installation of a new appliance.

(e) Verification Testing.

Both an initial verification test (conducted prior to adding refrigerant back into equipment) and a follow-up verification test (conducted after the equipment returns to normal operating conditions) must be conducted to verify leak repairs.

e. Fire Suppression Agent (Halon).

(1) Technician Training.

Technicians who test, maintain, service, repair, or dispose of halon-containing equipment must be trained in halon emission reduction within 30 days of hire.

(2) Venting Prohibition.

Halon must not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or using such equipment for technician training. This venting prohibition does **not** apply to the following halon releases:

(a) *De minimis* releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

(b) Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

(c) Releases during the testing of fire extinguishing systems, if all of the following are true:

1. Systems or equipment employing suitable alternative fire extinguishing agents are not available.

2. Release of extinguishing agent is essential to demonstrate equipment functionality.

3. Failure of system or equipment would pose great risk to human safety or the environment.

4. A simulant agent cannot be used.

4.10. MOTOR VEHICLES.

Installations must ensure that DoD-owned and -leased motor vehicles:

a. Use only unleaded gasoline, if available on the local economy, in vehicles that are designed for this fuel.

b. Use lowest sulfur content diesel available (not to exceed 50 ppm) in diesel-fueled vehicles.

SECTION 5: ASBESTOS

5.1. INTRODUCTION.

This section contains standards on the control of threats to human health from asbestos. It covers the identification and abatement of asbestos containing material (ACM) when the asbestos poses a threat and during activities that may disturb asbestos, such as demolition or renovation. Policy requirements for a comprehensive occupational health and safety program are not covered in this section. To protect personnel from asbestos exposure, refer to DoDIs 6055.01 and 6055.05.

5.2. PERSONNEL QUALIFICATION.

Installations must ensure that:

a. The asbestos program manager, custodial staff, maintenance staff, and individuals involved in asbestos management are trained consistent with their responsibilities and DoDIs 6055.01 and 6055.05.

b. Training includes, as appropriate:

(1) Asbestos hazards and worker protection.

(2) Notifications.

(3) Material identification,

(4) Control procedures for removals including, at least, wetting, local exhaust ventilations, negative pressure enclosures, glove-bag procedures, and high-efficiency particulate air filters.

(5) Waste disposal work practices; and recordkeeping.

5.3. ASBESTOS CONTROLS.

Installations must:

a. Appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

b. Prepare and implement an asbestos management plan. At a minimum, the plan must include:

(1) A list of known and presumed ACM, by location, on the installation.

(2) A notification and education program to inform all persons affected (e.g., workers, tenants, building occupants) where potentially friable ACM is located, and how and why to avoid disturbing the ACM.

(3) Regular ACM surveillance to note, assess, and document any changes in the ACM's condition.

(4) Work control or permit systems to control activities that might disturb ACM.

(5) Operations and maintenance work practices to avoid or minimize fiber release during activities affecting ACM.

(6) Recordkeeping to document operations and maintenance activities related to asbestos identification management and abatement.

(7) Training for the asbestos program manager, custodial staff, maintenance staff, and those involved in asbestos management activities.

(8) Procedures to assess and prioritize identified hazards for abatement.

(9) Procedures to prevent the use of ACM in new construction.

5.4. ASBESTOS ABATEMENT.

Installations must perform asbestos abatement in accordance with the standards of this paragraph.

a. Asbestos Determination.

Before demolition or renovation of a facility, determine whether or not the activity will remove or disturb ACM, and record it on the project authorization document (e.g., work order).

b. Asbestos Assessment.

When removing or disturbing friable ACM, prepare and display a written assessment of the action at the location to ensure affected personnel are aware of the potential hazards and the actions being undertaken. A copy of the assessment must also be maintained on permanent file. The assessment must include:

(1) Type of operation: demolition or renovation.

(2) Description of the facility or affected part of the facility including the size, age, and present and past use of the facility.

(3) Procedure, including analytical methods, used to detect the presence of regulated ACM and Category I and Category II nonfriable ACM.

(4) Estimated amount of:

(a) Regulated ACM to be removed from the facility.

(b) Category I and Category II nonfriable ACM in the affected part of the facility that will not be removed before demolition.

(5) Location, street address, and building number (if applicable) of the facility being demolished or renovated.

(6) Scheduled starting and completion dates of asbestos removal work, or any other activity such as site preparation, that would break up, dislodge, or similarly disturb asbestos material.

(7) Scheduled starting and completion dates of demolition or renovation.

(8) Description of planned demolition or renovation work and method(s) to be used, including a description of affected facility components.

(9) Description of work practices and engineering controls, including asbestos removal and waste-handling emission control procedures.

(10) Name and location of the waste disposal site where the asbestos-containing waste material will be deposited.

(11) Description of procedures to follow if unexpected regulated ACM is found or Category II nonfriable ACM becomes crumbled, pulverized, or reduced to powder.

c. Asbestos Removal.

(1) Remove friable ACM when it poses a threat to release airborne asbestos fibers and can’t be reliably repaired or isolated.

(2) Before disturbing or demolishing a facility or part of a facility, remove all regulated ACM in the area to be disturbed.

(3) Remove ACM according to the following procedures:

(a) Adequately wet all regulated ACM exposed during cutting or disjoining operations.

(b) Carefully lower each unit or section to the floor and to ground level, not dropping, throwing, sliding, or otherwise damaging or disturbing the regulated ACM.

(c) When ACM is stripped from a facility component while it remains in place in the facility, adequately wet the regulated ACM during the stripping operation.

(d) Wetting is not required in renovation operations if the following emission control methods are used:

1. A local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the stripping and removal of the asbestos materials. The system must exhibit no visible emissions to the outside air.

2. A glove-bag system designed and operated to contain the particulate asbestos material produced by the stripping of the asbestos materials.

3. Leak-tight wrapping to contain all regulated ACM before dismantlement.

4. Other methods equivalent to wetting, when wetting would result in equipment damage or a safety hazard and the methods in Paragraphs 5.4.c.(3)(d)1. through 5.4.c.(3)(d)3. can't be used.

(4) After regulated ACM removal from the facility, ensure the ACM is stripped or contained in leak-tight wrapping, except for large facility components as identified in Paragraph 5.4.c.(4)(b).

(a) If stripped, either:

1. Adequately wet the regulated ACM during stripping, or

2. Use a local exhaust ventilation and collection system designed and operated to capture the particulate asbestos material produced by the stripping. The system must exhibit no visible emissions to the outside air.

(b) For large facility components such as reactor vessels, large tanks, and steam generators (but not beams), the regulated ACM is not required to be stripped if the component is removed, transported, stored, disposed of, or reused without disturbing or damaging the regulated ACM and the component is encased in leak-tight wrapping. The leak-tight wrapping must be labelled during all loading and unloading operations as well as during storage and displayed in a manner that a person can easily read. Use the language, in English and the predominant language of the HN, shown in Figure 2.

Figure 2. Leak-Tight Wrapping Label

DANGER ASBESTOS DUST HAZARD CANCER AND LUNG DISEASE HAZARD AUTHORIZED PERSONNEL ONLY

(c) For all ACM, including material that has been removed or stripped:

1. Adequately wet the material and ensure that it remains wet until collected and contained or treated in preparation for disposal.

2. Carefully lower the material to the ground and floor, not dropping, throwing, sliding, or otherwise damaging or disturbing the material.

3. Transport the material to the ground using leak-tight chutes or containers if it has been removed or stripped more than 15.24 meter [50 ft] above ground level and was not removed as units or in sections.

(d) When the temperature at the point of wetting is below 0 °C (32 °F), the wetting provisions identified in Paragraphs 5.4.c.(3)(a) and 5.4.c.(3)(c) need not be followed.

(e) If a facility component contains or is coated or covered with ACM, it must be removed as units or in sections, to the maximum extent possible.

(f) If a facility will be demolished by intentional burning, all regulated ACM - including Category I and Category II nonfriable ACM - must be removed before burning.

5.5. ASBESTOS DISPOSAL.

Installations must dispose of asbestos in accordance with these standards.

a. When disposing of ACM waste, adequately wet and seal it (including any wastewater containing ACM) in a leak-proof container, and properly dispose of it in an MSW landfill facility in accordance with Section 4 of Volume 5 of this manual.

b. Label containers in English and the predominant language of the HN as shown in Figure 3.

Figure 3. Leak-Proof Container Label

DANGER CONTAINS ASBESTOS FIBERS MAY CAUSE CANCER CAUSES DAMAGE TO LUNGS DO NOT BREATHE DUST AVOID CREATING DUST

c. Maintain permanent records documenting the disposal action and site.

5.6. DOD SCHOOL COMPLIANCE.

Installations must ensure that DoD schools comply with applicable requirements of Section 2643(1) of Title 15, United States Code and implementing regulations in Part 763, Subpart E, of Title 40, Code of Federal Regulations.

5.7. RECORDKEEPING.

Installations must maintain records of asbestos operation and maintenance activities consistent with the asbestos management plan, including at a minimum, records of asbestos determinations and disposal.

SECTION 6: LBP

6.1. INTRODUCTION.

This section contains standards on the identification, control, or elimination of LBP hazards in child-occupied facilities and military family housing through interim controls or abatement. To protect personnel from lead exposure, refer to guidance found in DoDIs 6055.01 and 6055.05.

6.2. PERSONNEL QUALIFICATIONS.

Installations must ensure that all personnel participating in activities that involve LBP, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

6.3. USE OF LEAD-CONTAINING PAINT IN CONSUMER PRODUCTS.

a. Installations must ensure that they do not use consumer products with lead-containing paint. Consumer products include those customarily produced or distributed for sale that are used by consumers in or around a household, in schools, or in recreation. Specific banned hazardous products are:

(1) Toys and other articles intended for use by children that are labelled "lead-containing paint."

(2) Furniture that is labelled "lead-containing paint."

b. Installations must ensure LBP is not used for any new construction or renovation project. All materials purchased and used for projects must be evaluated, especially for projects involving family housing and schools.

6.4. LBP HAZARD ABATEMENT PROGRAM.

Installations must develop and implement a multi-disciplinary LBP hazard management program to identify, evaluate, and reduce LBP hazards in child-occupied facilities and military family housing.

a. Identify and maintain a record of LBP hazards in child-occupied facilities and military family housing using these methods:

(1) LBP risk assessment screening. If the screening identifies dust-lead levels greater than 431 $\mu g/m^2$ [40 $\mu g/ft^2$] for floors or greater than 2,691 $\mu g/m^2$ [250 $\mu g/ft^2$] for interior window sills, perform an LBP risk assessment.

(2) LBP risk assessments.

(3) Routine facility inspection for fire and safety.

(4) Occupant, facility manager, and worker reports of deteriorated paint.

(5) Results of childhood blood lead screening or reports of children identified to have a confirmed concentration of lead in whole blood of 20 μg/deciliter for a single test or 15-19 μg/deciliter in two tests taken at least 3 months apart.

(6) LBP re-evaluations.

(7) Review of construction, painting, and maintenance histories.

b. Manage identified LBP hazards through interim controls or abatement.

c. Disclose the presence of any known LBP or LBP hazards to occupants of child-occupied facilities and military family housing and provide information on LBP hazard reduction.

d. Before conducting remodeling or renovation projects, inform occupants of military family housing of the hazards associated with these activities and provide information on protecting family members from the hazards of LBP.

e. Ensure occupant and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have LBP.

6.5. DISPOSAL OF LEAD-CONTAMINATED WASTE.

Installations must dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Section 5 of Volume 5 of this manual.

SECTION 7: PCBS

7.1. INTRODUCTION.

This section contains standards on the control and abatement of threats to human health and the environment from the handling, use, storage, and disposal of PCBs. These standards include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers, fluorescent light ballasts, and cables.

7.2. GENERAL.

Installations must comply with the following standards:

a. Minimize the use of PCBs and PCB items without degrading mission performance.

b. Do not purchase or otherwise take control of PCBs or PCB items for use.

c. Ensure all procurement of transformers or any other equipment containing dielectric or hydraulic fluid includes a manufacturer's certification that the equipment contains no detectable PCBs (less than 2 ppm).

d. Affix permanent labels, in English and the predominant language of the HN, to newly procured transformers and equipment stating they are PCB-free (no detectable PCBs).

e. Maintain a written inventory if PCB items are located on the installation:

(1) Include a current list, by type, of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of during that year.

(2) Maintain the inventory for a period of at least 3 years from the disposal of the last item on the list.

f. Document all required PCB periodic inspections at the installation. Maintain the inspection records and maintenance history for at least 3 years after disposal.

g. Prominently mark all PCB large high-voltage capacitors, equipment, items, and transformers that contain PCBs greater than 50 ppm, and containers used to store the preceding items, as well as rooms, vaults, and storage areas containing, storing, or accumulating PCB items and transformers for disposal. Marking must be in English and the predominant language of the HN and may be painted, affixed using an adhesive label, or accomplished using any other method that meets these standards:

(1) Identifies the item as containing PCBs.

(2) Identifies the descriptive name, instructions, cautions, or other information applied to PCBs and PCB items.

(3) Warns against improper disposal and handling.

(4) Provides a phone number in case of spills or if questions arise about disposal.

h. If not already marked, mark PCB large low-voltage capacitors and equipment containing a PCB transformer or PCB large high-voltage capacitor in accordance with Paragraphs 7.2.g.(1) through 7.2.g.(4).

7.3. SPILL PREVENTION AND RESPONSE.

Installations must:

a. Ensure the installation spill prevention and response plan addresses PCB items, including temporary storage items. Section 7 of Volume 4 of this manual provides standards for spill prevention and response plans.

b. Immediately respond to spills of PCB liquids at concentrations of 50 ppm or greater and clean up in accordance with the following:

(1) Clean surfaces in substantial contact areas to 10 µg per 100 square centimeters (cm^2) [.065 µg per 100 square inches].

(2) Clean surfaces in all other contact areas to 100 µg per 100 cm^2 [.65 µg per 100 square inches].

(3) Remove contaminated soil in restricted access areas until the soil tests no higher than 25 ppm PCBs and backfill with clean soil containing less than 1 ppm PCBs. For restricted access areas where PCB spills have been cleaned up, annotate installation real property records to note the level of PCBs remaining in the soil, including the extent of sampling, date and type of sampling, and a reference to any reports documenting the site conditions.

(4) Remove contaminated soil in unrestricted access areas to a minimum depth of 22.4 cm [10 inches] or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and backfill with clean soil containing less than 1 ppm PCBs.

7.4. PCB TRANSFORMER MANAGEMENT.

Installations must comply with the following standards:

a. Consider and treat all transformers as PCB transformers unless there is information to the contrary.

b. Do not use PCB transformers in any application that poses a risk of contamination to food, water, or feed.

c. Register all PCB transformers with the servicing fire department.

d. For any PCB transformer, evaluate replacement with a non-PCB transformer as a long-term, cost-saving measure. If replacement with a non-PCB item is not possible or practicable, equip the PCB transformers in use in or near commercial buildings, or located in sidewalk vaults, with electrical protection to minimize transformer failure that would result in the release of PCBs.

e. Once PCB transformers are removed, they must be disposed. Reuse of PCB transformers is prohibited.

f. Service PCB transformers as follows:

(1) Only service transformers classified as PCB-contaminated electrical equipment with dielectric fluid containing less than 500 ppm PCBs.

(2) Do not perform any servicing of PCB transformers that requires removal of the transformer coil.

(3) Capture and reuse dielectric fluids removed during servicing as dielectric fluid for PCB transformers or dispose of fluids in accordance with Paragraph 7.7. Do not mix dielectric fluid from a PCB transformer with the dielectric fluid from PCB-contaminated electrical equipment.

(4) Do not use in any electrical equipment dielectric fluids containing less than 500 ppm PCBs that are mixed with fluids containing 500 ppm or greater PCBs, regardless of the resulting PCB concentration. Consider the entire mixture to be greater than 500 ppm PCBs.

g. Inspect all in-service PCB transformers for evidence of damage, leaks, or spills at least every 3 months, except for those transformers that must only be inspected every 12 months:

(1) PCB transformers with an impervious, undrained secondary containment capacity of 100 percent of dielectric fluid.

(2) PCB transformers tested and found to contain less than 60,000 ppm PCBs at least every 12 months.

h. Manage leaking PCB transformers in a manner that minimizes exposure and contamination. Perform appropriate spill response in accordance with Paragraph 7.3. Capture and dispose of leaking PCB fluids in accordance with Paragraph 7.7.

(1) If any PCB transformer is involved in a fire and was subjected to heat or pressure sufficient to result in violent or nonviolent rupture, take measures to contain and control any potential releases of PCBs and incomplete combustion products into water. These measures may include:

(a) Blocking of all floor drains in the vicinity of the transformer.

(b) Containing water runoff.

(c) Controlling and treating (prior to release) any water used in subsequent cleanup operations.

(2) Leaking PCB transformers must be:

(a) Repaired or replaced within 48 hours of discovery of a leak, or as soon as possible thereafter.

(b) Inspected daily until repaired or replaced.

7.5. MANAGEMENT OF OTHER PCB ITEMS.

Installations must:

a. Service electromagnets, switches, and voltage regulators that may contain PCBs at any concentration as follows:

(1) Only service PCB-contaminated electrical equipment with dielectric fluid containing less than 500 ppm PCBs.

(2) Do not service any electromagnet, switch, or voltage regulator with a PCB concentration of greater than or equal to 500 ppm that requires the removal and rework of the internal components.

(3) Capture PCBs removed during servicing and either reuse them as dielectric fluid or dispose of them properly in accordance with Paragraph 7.7.

(4) Do not mix or add PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of greater than or equal to 500 ppm to dielectric fluid from PCB-contaminated electrical equipment.

b. Manage capacitors containing PCBs at any concentration by prohibiting:

(1) Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors that pose an exposure risk to food, water, or feed.

(2) Use of PCB large high-voltage and PCB large low-voltage capacitors unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation must not have public access and must have an adequate roof, walls, and floor to contain any release of PCBs.

c. Mark any PCB item removed from service with the date it was removed.

7.6. STORAGE.

a. Installations must store PCBs and PCB items awaiting disposal in facilities that have:

(1) Roofs and walls that exclude precipitation.

(2) A containment berm at least 15.24 cm [6 inches] high, sufficient to contain twice the internal volume of the largest PCB article, or 25 percent of the total internal volume of all PCB articles or containers stored, whichever is greater.

(3) Continuous, smooth, and impervious flooring material that contains no drain valves, floor drains, expansion joints, sewer line, or other opening that would permit liquids to flow from the curbed area.

(4) To the maximum extent practicable, been located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where there is a high possibility of such risks, the installation spill prevention and response plan must address the risk.

b. Installations may temporarily store these items in an area that does not comply with Paragraph 7.6.a. for up to 30 days from the date of removal from service, subject to weekly inspection:

(1) Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment.

(2) Leaking PCB articles and PCB equipment in a leak-proof PCB container that contains sufficient absorbent material to absorb the fluid contained in the leaking article or equipment.

(3) PCB containers in which non-liquid PCBs have been placed.

(4) PCB containers in which:

(a) PCBs at a concentration between 50-499 ppm have been placed.

(b) The containers are marked to indicate there is less than 500 ppm PCBs.

c. Installations must store non-leaking and structurally undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid on pallets or raised platforms, next to a storage area meeting the standards of Paragraph 7.6.a. if they are inspected weekly.

d. Installations must inspect all other PCB storage areas at least monthly.

e. Installations must ensure containers used for the storage of PCBs are at least as secure as those required for transport for disposal by DLA Disposition Services.

7.7. DISPOSAL.

a. Disposal through DLA Disposition Services.

Installations must dispose of PCBs through DLA Disposition Services, who will dispose of PCB items in accordance with Volume 4 of DoD Manual 4160.21 and the disposal requirements of this paragraph. Table 24 identifies acceptable methods of disposal for each PCB waste type.

Table 24. PCB Waste Disposal

PCB WASTE TYPE	DISPOSAL			
	Incinerator[a]	High-Efficiency Boiler[b]	Chemical Waste Landfill	Solid Waste Landfill
Dielectric Fluid > 500 ppm	X			
Dielectric Fluid > 50 ppm ≤ 500 ppm	X	X		
Rags, Soil, Debris > 50 ppm	X		X	
PCB Transformers	X		X[c]	
PCB Capacitors	X			X[d]
PCB Hydraulic Machines				X[e]
PCB Electrical Equipment				X[c]
PCB Articles	X	X[c]		
PCB Containers > 500 ppm	X	X[c]		

[a] 99.9 percent combustion efficiency.
[b] Minimum rating of 53 GJ/hr [50 MMBtu/hr] and fueled by natural gas, oil, or coal.
[c] Transformer, capacitor, article, container, and all inner workings are first drained of free-flowing product.
[d] Intact non-leaking small capacitors with total quantity less than 45.4 kg [100 lbs].
[e] Machines with concentrations greater than 50 ppm are drained of all free-flowing liquid. Machines with concentrations of greater than 1,000 ppm are flushed, before disposal, with a solvent containing less than 50 ppm PCBs.

b. Disposal Records.

If the installation generates PCB waste, it must maintain an audit trail for the waste that is at least as stringent as that required under the standards in Paragraph 5.10.c.(4) of Volume 5.

c. PCB Disposal in Boilers.

Where PCB fluids, items, or articles are disposed of in a high-temperature boiler, installations must follow these procedures:

(1) If the boiler uses natural gas or oil as the primary fuel, the CO concentration in the stack must be 50 ppm or less and the excess O_2 at least 3 percent when PCBs are being burned.

(2) If the boiler uses coal as the primary fuel, the CO concentration in the stack is 100 ppm or less and the excess O_2 is at least 3 percent when PCBs are being burned.

(3) The mineral oil dielectric fluid does not comprise more than 10 percent, by volume, of the total fuel feed rate.

(4) The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start-up or shut-down operations.

(5) The performance of the boiler is continuously monitored for CO and excess O_2 percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning less than 112,500 liters [30,000 gallons] of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes.

(6) The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes.

(7) The flow of mineral oil dielectric fluid is stopped if the standards respecting CO or excess O_2 are exceeded.

d. PCB Disposal in Incinerators.

Where PCB fluids, items or articles are disposed of in an incinerator, installations must follow these procedures:

(1) Ensure combustion standards maintain the introduced liquids for a 2-second dwell time at 1,200 °C, plus or minus 100 °C [2,200 °F +/- 212 °F], and 3-percent excess O_2 in the stack gas or maintenance of the introduced liquids for a 1-1/2 second dwell time at 1,600 °C, plus or minus 100 °C [3,050 °F +/- 212 °F] and 2-percent excess O_2 in the stack gas.

(2) Ensure combustion efficiency, measured by the ratio of the concentration of CO_2 to the total concentration of both CO_2 and CO, is maintained at least 99.9 percent.

(3) Measure and record the rate and quantity of PCBs that are fed to the combustion system at regular intervals not greater than 15 minutes.

(4) Continuously measure and record the temperatures of the incineration process.

(5) Automatically stop the flow of PCBs to the incinerator if temperature standards are not met.

(6) Conduct sufficient monitoring to ensure that the first time an incinerator is used for disposal, it operates within the standards identified in Paragraphs 7.7.d.(1) through 7.7.d.(5).

(7) Conduct continuous monitoring of O_2 and CO and periodic monitoring of CO_2 during incineration of PCBs.

e. PCB Containers.

After draining all free-flowing liquid, installations must dispose of PCB containers used to contain only PCBs at a concentration less than 500 ppm as MSW.

f. Retrogrades of PCB Items.

Installations must dispose of PCB items through DLA Disposition Services. DLA Disposition Services must return DoD-generated PCB items manufactured in the United States to the United States for delivery to a permitted disposal facility if HN or third country disposal is not possible, is prohibited, or would not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with the standards in Paragraph 7.2.g.

7.8. RECORDKEEPING.

Installations must maintain an inventory and inspection records (including maintenance history) for PCB items for at least 3 years after disposal. Installations must maintain an audit trail for disposal records of PCB items.

GLOSSARY

G.1. ACRONYMS.

ACRONYM	MEANING
ACM	asbestos containing material
°C	degrees Celsius
CAS	Chemical Abstracts Service
CEMS	continuous emission monitoring system
cm	centimeter
cm^2	square centimeter
CO	carbon monoxide
CO_2	carbon dioxide
DLA	Defense Logistics Agency
DoDD	DoD directive
DoDI	DoD instruction
dscm	dry standard cubic meter
E.O.	Executive order
ESP	electrostatic precipitator
°F	degrees Fahrenheit
FGS	final governing standard
ft	foot or feet
ft^2	square foot or feet
g/HP-hr	grams per horsepower hour
g/kW-hr	grams per kilowatt hour
GJ/hr	gigajoules per hour
GJ/yr	gigajoules per year
HAP	hazardous air pollution
HC	hydrocarbon
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
Hg	mercury
HHV	higher heating value
HIMWI	hospital and infectious medical waste incinerator
HN	host nation
HP	horsepower
hr	hour
IPR	industrial process refrigeration

ACRONYM	MEANING
J	joule
kg	kilogram
kg/GJ	kilogram per gigajoules
kW	kilowatt
lb	pound
lb/MMBtu	pound per million British thermal units
lb/MWh	pound per megawatt-hour
LBP	lead-based paint
LEC	lead environmental component
LHV	lower heating value
LPG	liquefied petroleum gas
µg	microgram
µg/ft^2	microgram per square foot
µg/m^2	microgram per square meter
m^2	square meter
mg	milligram
mg/dscm	milligram per dry standard cubic meter
MMBtu/hr	million British thermal units per hour
MSW	municipal solid waste
Mton	metric ton
MW	megawatt
MWC	municipal waste combustion
MWh	megawatt-hour
ng	nanogram
ng/dscm	nanogram per dry standard cubic meter
ng/J	nanograms per joule
NMHC	nonmethane hydrocarbons
NO_x	nitrogen oxide
O_2	oxygen
ODS	ozone-depleting substance
OSWI	other solid waste incinerator
PCB	polychlorinated biphenyls
PCE	Perchloroethylene
PM	particulate matter
ppm	parts per million
ppmv	parts per million by volume
ppmvd	parts per million by volume, dry basis

ACRONYM	MEANING
RDF	refuse-derived fuel
RICE	reciprocating internal combustion engines
SLB	stroke lean burn
SO_2	sulfur dioxide
SRB	stroke rich burn
TBtu/yr	trillion British thermal units per year
TEQ	toxic equivalency factor
USEUCOM	United States European Command
VOC	volatile organic compound

G.2. DEFINITIONS.

Unless otherwise noted, these terms and their definitions are for the purpose of this volume.

TERM	DEFINITION
abatement	In the context of LBP in Section 6, any set of measures designed to permanently eliminate LBP or LBP hazards. Abatement includes the removal of LBP and lead-contaminated dust, the permanent enclosure or encapsulation of LBP, the replacement of components or fixtures painted with LBP, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

TERM	DEFINITION
ACM	Any material containing more than 1 percent asbestos by weight. Category I nonfriable ACM. Asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos. Category II nonfriable ACM. Any material, excluding Category I nonfriable ACM, containing more than 1 percent asbestos that when dry cannot be crumbled, pulverized, or reduced to powder by hand pressure. friable ACM. Friable asbestos material; Category I nonfriable ACM that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading; or Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.
adequately wet	Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions coming from ACM are observed, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.
air curtain incinerator	See definition of "MWC units."
air pollutant	Any air pollution agent or combination of such agents, including any physical, chemical, biological, or radioactive substance or matter that is emitted into the ambient air, including precursors to the formation of an air pollutant.
applicable HN environmental standards	Defined in DoDI 4715.05.
asbestos	Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated or altered.
bare soil	Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

TERM	DEFINITION
capacitor	A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric. small capacitor. A capacitor that contains less than 1.36 kg [3 lbs] of dielectric fluid. large high-voltage capacitor. A capacitor that contains 1.36 kg [3 lbs] or more of dielectric fluid and that operates at 2,000 volts (alternating current or direct current) or above. large low-voltage capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and that operates below 2,000 volts (alternating current or direct current).
category I nonfriable ACM	See definition of "ACM."
category II nonfriable ACM	See definition of "ACM."
chemical waste landfill	A landfill where a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.
child-occupied facility	A facility, or portion of a facility, visited regularly by the same child, under 6 years of age, on at least two different days within any week, provided that: Each days' visit lasts at least 3 hours; The combined weekly visits last at least 6 hours; and The combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.
clearance	Visual evaluation and testing (collection and analysis of environmental samples) conducted after LBP hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exist in a facility frequented by children under 6 years of age.
cold cleaning machine	Any device or piece of equipment that contains or uses liquid solvent, into which parts are placed to remove soil and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, non-boiling solvent to clean the parts are classified as cold cleaning machines.

TERM	DEFINITION
comfort cooling	An air-conditioning appliance used to provide cooling in order to control heat or humidity in occupied facilities including but not limited to residential, office, and commercial buildings. Comfort cooling appliances include, but are not limited to, chillers, commercial split systems, and packaged roof-top units.
commercial refrigeration	A refrigeration appliance used in the retail food and cold storage warehouse sectors. Retail food appliances include the refrigeration equipment found in supermarkets, convenience stores, restaurants and other food service establishments. Cold storage includes the refrigeration equipment used to store meat, produce, dairy products, and other perishable goods.
commercial/retail waste	See definition of "MSW."
commercial RICE	See definition of "stationary RICE."
construction	Defined in Section 60.2 of Title 40, CFR.
deteriorated paint	Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking, or is otherwise damaged or separated from the substrate.
DoD school	A primary or secondary school that serves dependents of the U.S. military and civilian personnel and is operated by the DoD Education Activity.
dust-lead hazard	See definition of "LBP hazard."
emergency combustion turbine	Defined in Section 60.331 of Title 40, CFR.
emergency compression ignition or emergency spark ignition RICE	See definition of "stationary RICE."
encapsulation	The application of any covering or coating that acts as a barrier between the LBP and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

TERM	DEFINITION
enclosure	The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between LBP and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.
enduring location	Defined in DoDI 4715.05.
energy use systems	Systems located on-site that use energy (steam, hot water, process heat, or electricity) from a boiler. Includes, but is not limited to, process heating; compressed air systems; machine drive (motors, pumps, fans); process cooling; facility heating, ventilation, and air-conditioning systems; hot water systems; building envelope; and lighting.
evaluation	In the context of LBP in Section 6, a visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, LBP, or an LBP hazard.
FGS	Defined in DoDI 4715.05.
freeboard ratio	The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.
friable ACM	Any material containing more than 1 percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
friction surface	An interior or exterior surface that is subject to abrasion or friction, including, but not limited to, window, floor, and stair surfaces.
halogenated solvent	Solvents that contain a halogen such as chlorine, bromine, or iodine.
hazard reduction	Measures designed to reduce or eliminate human exposure to LBP hazards through various methods, including interim controls or abatement or a combination of the two.

TERM	DEFINITION
HIMWI	Any device that combusts any amount of hospital waste or infectious medical waste, as defined in Section 6 of Volume 5 of this manual. large HIMWI units. An HIMWI whose maximum design waste burning capacity is more than 227 kg [500 lbs] per hour; A continuous or intermittent HIMWI whose maximum charge rate is more than 227 kg [500 lbs] per hour; or batch HIMWI whose maximum charge rate is more than 1,814 kg [4,000 lbs] per day. medium HIMWI units. An HIMWI whose maximum design waste burning capacity is more than 91 kg [200 lbs] per hour but less than or equal to 227 kg [500 lbs] per hour; A continuous or intermittent HIMWI whose maximum charge rate is more than 91 kg [200 lbs] per hour but less than or equal to 227 kg [500 lbs] per hour; or A batch HIMWI whose maximum charge rate is more than 726 kg [1,600 lbs] per day but less than or equal to 1,814 kg [4,000 lbs] per day. small HIMWI units. An HIMWI whose maximum design waste burning capacity is less than or equal to 91 kg [200 lbs] per hour; A continuous or intermittent HIMWI whose maximum charge rate is less than or equal to 91 kg [200 lbs] per hour; or A batch HIMWI whose maximum charge rate is less than or equal to 726 kg [1,600 lbs] per day.
hospital waste	Discards generated at a hospital, except unused items returned to the manufacturer. Hospital waste does not include human corpses, remains, and anatomical parts that are intended for interment or cremation.
impact surface	An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.
in or near commercial buildings	Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters [98.4 ft] of a non-industrial, non-substation building.

TERM	DEFINITION
incinerator	In the context of: PCB disposal in Section 7, an engineered device using controlled-flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high-temperature boilers. Air emissions in Section 4, any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.
industry standards and practices	Applicable or recognized standards and practices relevant to the design, construction, installation, operation and maintenance, inspection, and repair of facilities and equipment.

TERM	DEFINITION
infectious medical waste	Solid waste produced by medical facilities that is specially managed because it has the potential to cause disease in humans or animals, or may pose a risk to both individuals or community health if not managed properly, and that includes the following classes: Microbiology waste, including cultures and stocks of etiologic agents that, due to their species, type, virulence, or concentration, are known to cause disease in humans. Pathology waste, including tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Waste contaminated with an infectious agent, including carcasses, body parts, blood, and bedding are also included. Non-contaminated carcasses of animals that died from natural causes or vehicular impact are typically not considered pathology waste and are disposed of as solid waste where local regulations permit. Blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products that are capable of releasing these materials during handling. Potentially infectious materials, including fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids. Sharps, including hypodermic needles, syringes, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, Pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste. Infectious waste from isolation rooms, but only including those items that were contaminated or likely to have been contaminated with infectious agents or pathogens, including bodily excretions and discarded materials contaminated with blood.
installation	Defined in DoDI 4715.05.
institutional RICE	See definition of “stationary RICE.”
institutional waste	See definition of “MSW.”

TERM	DEFINITION
institutional waste incinerator	See definition of "MWC units."
interim controls	A set of measures designed to temporarily reduce human exposure or likely exposure to LBP hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.
international agreement	Defined in DoDI 4715.05.
IPR	Complex customized appliances that include industrial ice machines, appliances used directly in the generation of electricity, and ice rinks. Where one appliance is used for both industrial process refrigeration and other applications, it is considered industrial process refrigeration equipment if 50 percent or more of its operating capacity is used for industrial process refrigeration.
large high-voltage capacitor	See definition of "capacitor."
large HIMWI	See definition of "HIMWI."
large low-voltage capacitor	See definition of "capacitor."
LBP	Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per cm^2, or 0.5 percent by weight or 5,000 ppm by weight.

TERM	DEFINITION
LBP hazard	Includes paint-lead hazard, dust-lead hazard, or soil-lead hazard: paint-lead hazard. A paint-lead hazard is any of the following: Any LBP on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill or floor) are equal to or greater than the dust-lead hazard levels identified in the definition of dust-lead hazard. Any damaged or otherwise deteriorated LBP on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe). Any chewable lead-based painted surface on which there is evidence of teeth marks. Any other deteriorated LBP in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility. dust-lead hazard. Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples. soil-lead hazard. Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm (microgram per gram) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.
lead-containing paint	Paint or other similar surface coating materials containing lead or lead compounds in which the lead content (calculated as lead material) is in excess of 0.009 percent by weight of the total nonvolatile content of the paint or the weight of the dried paint film.
leak	In the context of PCBs in Section 7, any instance in which a PCB article, container, or equipment has any PCBs on any portion of its external surface.
leak inspection	The examination of an appliance to determine the location of refrigerant leaks.
leak rate	The rate at which an appliance is losing refrigerant, measured between refrigerant charges. The leak rate is expressed in terms of the percentage of the appliance's full charge that would be lost over a 12-month period if the current rate of loss were to continue over that period.

TERM	DEFINITION
malfunction	Defined in Section 63.1101 of Title 40, CFR.
medium HIMWI	See definition of "HIMWI."
modification	In addition to the definition in Section 60.2 of Title 40, CFR: Routine maintenance, repair, and replacement is not considered a physical change, and the following are not considered a change in the method of operation: An increase in the production rate, if such increase does not exceed the operating design capacity of the source. An increase in the hours of operation. Use of an alternative fuel or raw material if, prior to the effective date of a paragraph in this part of the CFR that imposes conditions on or limits modifications, the source is designed to accommodate such alternative use.
motor vehicle	Any commercially available vehicle that is not adapted to military use which is self-propelled and designed for transporting persons or property on a street or highway, including, but not limited to, passenger cars, light-duty vehicles, and heavy-duty vehicles.
MSW	Any residential, commercial or retail, or institutional waste. Residential waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial or retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (nonmedical waste), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Residential, commercial or retail, and institutional waste does not include yard waste and RDF; used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

TERM	DEFINITION
MWC units	Any equipment that combusts solid, liquid, or gasified MSW including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Large MWC units have a rated capacity greater than 227 Mtons [250 tons] per day. Small MWC units have a rated capacity of 32-227 Mtons [35-250 tons] per day. Very small MWC units have the capacity to combust less than 32 Mtons [35 tons] per day of MSW or RDF. air curtain incinerator. An incineration unit operating by forcefully projecting a curtain of air across an open, integrated combustion chamber (fire box) or open pit or trench (trench burner) in which combustion occurs. institutional waste incinerator. Any combustion unit that combusts institutional waste and is a distinct operating unit of the institutional facility that generated the waste. Institutional waste incineration units include field-erected, modular, cyclonic burn barrel, and custom built incineration units operating with starved or excess air, and any air curtain incinerator that is a distinct operating unit of the institutional facility that generated the institutional waste. OSWI. Either a very small MWC unit or an institutional waste incineration unit.
ODS	Either a Class I or Class II substance as listed in Tables 21, 22, and 23.
OSWI	See definition of "MWC units."
pathology waste	See definition of "infectious medical waste."
paint-lead hazard	See definition of "LBP hazard."
PCB	Any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances that contain such substance.
PCB article	Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCBs. This includes capacitors, transformers, electric motors, pumps, and pipes.

TERM	DEFINITION
PCB article container	Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.
PCB capacitor	Any capacitor that contains greater than or equal to 500 ppm PCBs.
PCB container	Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.
PCB-contaminated electrical equipment	Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain greater than or equal to 50 ppm PCBs, but less than 500 ppm PCBs.
PCB equipment	Any manufactured item, other than a PCB container or a PCB article container, that contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.
PCB item	Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of greater than or equal to 50 ppm.
PCB transformer	Any transformer, whether in use or in storage, that contains greater than or equal to 500 ppm PCBs.
permanent	In the context of LBP in Section 6, an expected design life of at least 20 years.
pyrolysis	Thermochemical decomposition of organic material at elevated temperatures in the absence of O_2 (or any halogen).
qualified energy assessor	Someone with the demonstrated background, experience, and abilities to evaluate energy savings opportunities for steam generation and major energy using systems.
re-evaluation	A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following LBP hazard reduction where LBP is still present.

TERM	DEFINITION
reconstruction or reconstructed	Unless otherwise specified, the replacement of components of a source to such an extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new source.
refrigerant	Any substance that is used for heat transfer purposes and provides a cooling effect.
regulated ACM	See definition for "ACM."
replacement	In the context of LBP in Section 6, a strategy of abatement that entails removing building components that have surfaces coated with LBP (such as windows, doors, and trim) and installing new components free of LBP.
residential RICE	See definition of "stationary RICE."
residential waste	See definition of "MSW."
restricted access area	Areas where access by unauthorized personnel is controlled by fences, other man-made structures, or naturally occurring barriers such as mountains, cliffs, or rough terrain.
risk assessment	An on-site investigation to determine the existence, nature, severity, and location of LBP hazards and the provision of a report explaining the results of the investigation and options for reducing LBP hazards.
risk assessment screen	A sampling protocol that is used in dwellings in relatively good condition and where the probability of finding LBP hazards is low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.
shutdown	The cessation of operation of an affected source or equipment. Includes, but is not limited to, periodic maintenance, replacement of equipment, or repair.
small capacitor	See definition of "capacitor."
small HIMWI	See definition of "HIMWI."
soil-lead hazard	See definition of "LBP hazard."

TERM	DEFINITION
stack	Any point in a source designed to emit solids, liquids, or gases into the air, including a pipe or duct but not including flares.
standards	Substantive elements of U.S. laws and federal regulations applicable to DoD installations, facilities, and actions in the United States or that have extraterritorial application.
startup	The first time the source begins production or the first time additional or changed equipment is put into operation.
stationary combustion turbine (stationary gas turbine)	All equipment, including, but not limited to, the turbine, the fuel, air, lubrication and exhaust gas systems, control systems (except emissions control equipment), heat recovery system, and any ancillary components and subcomponents comprising any simple cycle stationary combustion turbine, any regenerative or recuperative cycle stationary combustion turbine, any combined cycle combustion turbine, and any combined heat and power combustion turbine based system. Stationary means that the combustion turbine is not self-propelled or intended to be propelled while performing its function. It may, however, be mounted on a vehicle for portability.

TERM	DEFINITION
stationary RICE	Any internal combustion engine that uses reciprocating motion to convert heat energy into mechanical work. Stationary means that it remains in a single location (i.e., does not move at all) for 12 months or longer or is expected to remain in a single location for 12 months or longer. commercial RICE. A RICE used in commercial establishments such as office buildings, hotels, stores, telecommunications facilities, restaurants, financial institutions such as banks, doctor's offices, and sports and performing arts facilities. emergency compression ignition or emergency spark ignition RICE. Any stationary RICE that is operated to provide electrical power or mechanical work during an emergency situation. Examples include engines used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or engines used to pump water in the case of fire or flood, etc. To be considered "emergency," an engine must not operate more than 100 hours per calendar year for non-emergency purposes, including maintenance and testing. institutional RICE. A RICE used in institutional establishments such as medical centers, nursing homes, research centers, institutions of higher education, correctional facilities, elementary and secondary schools, libraries, religious establishments, police stations, and fire stations. residential RICE. A RICE used in residential establishments such as homes or apartment buildings.
substantial contact area	An area that is subject to public access on a routine basis or that could result in skin contact.
United States	Defined in DoDI 4715.05.
vapor cleaning machine	A batch or in-line solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

REFERENCES

Code of Federal Regulations, Title 40

Deputy Secretary of Defense Memorandum, "Establishment of the Office of the Under Secretary of Defense for Research and Engineering and the Office of the Under Secretary of Defense for Acquisition and Sustainment," July 13, 2018

DoD Directive 4715.1E, "Environment, Safety, and Occupational Health (ESOH)," March 19, 2005, as amended

DoD Directive 5134.01, "Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L))," December 9, 2005, as amended

DoD Instruction 4105.72, "Procurement of Sustainable Goods and Services," September 7, 2016, as amended

DoD Instruction 4140.25, "DoD Management Policy for Energy Commodities and Related Services," June 25, 2015, as amended

DoD Instruction 4150.07, "DoD Pest Management Program," December 26, 2019

DoD Instruction 4170.11, "Installation Energy Management," December 11, 2009, as amended

DoD Instruction 4715.05, "Environmental Compliance at Installations Outside the United States," November 1, 2013, as amended

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Executive Order 12088, "Federal Compliance with Pollution Control Standards," October 13, 1978, as amended

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Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982

International Organization for Standardization 50001, "Energy Management," current edition[1]
United States Code, Title 10, Section 165
United States Code, Title 15, Section 2643(1)
United States Code, Title 42, Section 7158

[1] Available for purchase at http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=51297