DEPARTMENT OF DEFENSE

# JAPAN ENVIRONMENTAL GOVERNING STANDARDS

December 2012


**ISSUED BY**
**HEADQUARTERS, U.S. FORCES JAPAN**

HEADQUARTERS
UNITED STATES FORCES, JAPAN
APO AREA PACIFIC 96328-5068

DEC 17 2012

MEMORANDUM FOR SEE DISTRIBUTION

FROM: HQ USFJ/J00

SUBJECT: 2012 Japan Environmental Governing Standards

1. Attached are the 2012 Japan Environmental Governing Standards (JEGS). Components are directed to implement the 2012 JEGS upon receipt.

2. As environmental law continues to evolve, the JEGS may be amended in the future. The HQ USFJ point of contact concerning JEGS is Mr. Sean Barron, Senior Staff Environmental Officer, at DSN 225-4733, or e-mail at sean.barron@usfj.mil.

SALVATORE A. ANGELELLA
Lieutenant General, USAF
Commander

Attachment:
The 2012 JEGS

cc:
USFJ/J03/J06/J09/J021/J5

DISTRIBUTION: USARJ, CNFJ, USAFJ, MARFORJ, USAEDJ, DET 3, USAFSAM, USAPHCR-Pacific, DLA-DS-Sagami, and AMEMB/POLMIL

# EXECUTIVE SUMMARY

On 7 July 1992, the Deputy Under Secretary of Defense for Environmental Security appointed COMUSJAPAN as the Executive Agent for environmental matters in Japan. An Executive Agent‘s responsibility is to develop and maintain the Final Governing Standards (FGS) for their Area of Responsibility.

The FGS for Japan are known as the Japan Environmental Governing Standards (JEGS). The JEGS were developed in accordance with DoD Instruction 4715.5 (“Management of Environmental Compliance at Overseas Installations”), the Status of Forces Agreement, and other applicable international agreements. The JEGS are based upon the format and standards of DoD Instruction 4715.05-G, “Overseas Environmental Baseline Guidance Document” (OEBGD). Service Components will need to develop instructions for their own management practices.

The completion of the JEGS was the result of teamwork by USFJ service components, installations, and other pertinent organizations within USFJ’s area of responsibility. The JEGS is the primary source for environmental guidance and standards for US Forces in Japan.

The 2012 JEGS are an update of the 2010 JEGS which were published in November of the same year. The changes were made based on applicable Japanese Criteria that was adequately defined andgenerally in effect and enforced against host government and private sector activities, and that provided greater protection to the environment than described in the OEBGD.

The JEGS does not address environmental contamination or abatement standards, as these issues are fully covered under DoD Instruction 4715.8 (“Environmental Remediation for DoD Activities Overseas”) and USFJ Instruction 32-7002 (“Environmental Executive Agent Remediation Policy”).

Other than as provided in Chapter 8, “Medical Waste Management,” the JEGS does not address management or disposal of radioactive waste. These matters are addressed in DoD 4715.6-R (“Low-Level Radioactive Waste Disposal Program”) and service component directives.

| LIST OF UPDATES/REVALIDATIONS | | |
|---|---|---|
| **CHANGE NUMBER** | **DATE** | **POSTED BY** |
| First Issue | 31-Jan-1995 | Sunny Sea |
| Second Issue | 31-May-1996 | Sunny Sea |
| Third Issue | 31-Jan-1997 | Sunny Sea |
| Fourth Issue | 31-Oct-2001 | Robert Starks |
| Version 1.1 | 14-Jun-2002 | Martin Westman |
| Fifth Issue | 26-Jul-2004 | Justin Lancaster |
| Sixth Issue | 7-Sep-2006 | Justin Lancaster |
| Seventh Issue | Sep-2008 | Hector Jamilli |
| Eighth Issue | 30-Nov-2010 | Joseph Cook |
| Ninth Issue | 17-Dec-2012 | Sean Barron |
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# C1. CHAPTER 1

# OVERVIEW

## C1.1. PURPOSE

C1.1.1. The primary purpose of these Final Governing Standards (FGS) is to provide environmental compliance criteria and management practices to be used by United States (U.S.) Department of Defense (DoD) installations in Japan. This document implements DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," dated 22 April 1996, and is based upon DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document" (OEBGD), dated 1 May 2007.

C1.1.2. These FGS were developed by comparing and adopting the more protective criteria of the OEBGD, applicable Government of Japan (GoJ) national and prefectural environmental laws and regulations, and applicable international agreements. These FGS are consistent with the applicable provisions of Article IV of the "Agreement under Article VI of the Treaty of Mutual Cooperation and Security between the United States of America and Japan, Regarding Facilities and Areas and the Status of United States Armed Forces in Japan," also known as the "Status of Forces Agreement (SOFA) between the United States and Japan."

## C1.2. APPLICABILITY

C1.2.1. These JEGS apply to actions of the DoD Components at all installations located within Japan.

C1.2.2. DoD activities and installations may issue supplementary criteria more protective of the environment than required by these FGS, provided they first obtain written concurrence from the EEA. Requests for more protective criteria shall be evaluated based on their potential impact upon other activities and installations, and upon their relationship with GoJ authorities. DoD activities and installations shall clearly identify variances from these FGS in all requests for resources.

C1.2.3. DoD Components shall not enter into agreements with GoJ authorities at any level that establishes a criterion for compliance different than provided in these FGS without the prior written approval of the EEA.

## C1.3. EXEMPTIONS. These FGS do not apply to:

C1.3.1. DoD installations that do not have more than *de minimis* potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices, and other similar organizations), or for which the DoD Components exercise control only on a temporary or intermittent basis.

C1.3.2. Leased, joint use, and similar facilities to the extent that the DoD does not control the instrumentality or operation that a criterion seeks to regulate.

C1.3.3. Operations of U.S. military vessels or the operations of U.S. military aircraft, or off installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when U.S. forces are operating as part of a multi-national force not under full control of the U.S. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DoD Directives (DoDD) and Instructions (DoDI), and environmental annexes incorporated into operation plans or operation orders. However, these FGS do apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DoD Components, including management or disposal of off-loaded waste or material.

C1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order (E.O.) 12344, "Naval Nuclear Propulsion Program," and conducted pursuant to 42 United States Code (U.S.C.) 7158.

C1.3.5. The determination or conduct of remediation to correct environmental problems caused by the DoD's past activities.

C1.3.6. Environmental analyses conducted under E.O. 12114, "Environmental Effects Abroad of Major Federal Actions."

C1.4. DEFINITIONS. For purposes of these FGS, unless otherwise indicated, the following definitions apply:

C1.4.1. Existing Facility. Any facility and/or building, source, or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified.

C1.4.2. New Facility. Any facility and/or building, source, or project with a construction start date on or after 1 October 1994, or a pre-existing facility that has been substantially modified since 1 October 1994.

C1.4.3. Requirements.

C1.4.3.1. Particular provisions of U.S. law respecting environmental protection on DoD installations within the U.S.

C1.4.3.2. GoJ laws of general applicability, including those specifically delegated to prefectural or local governments for implementation, respecting environmental protection and which are generally applied to the Japan Self Defense Force (JSDF).

C1.4.3.3. DoD installations overseas shall use these FGS as standards for environmental compliance rather than the individual source documents that have been reconciled by the EEA in the creation of these FGS.

C1.4.4. Substantial Modification. Any modification to a facility and/or building the cost of which exceeds $1 million, regardless of funding source.

## C1.5. ADDITIONAL INFORMATION

C1.5.1. The DoD Components shall establish and implement an environmental audit program to ensure that overseas installations assess compliance with these FGS at least once every 3 years at all major installations.

C1.5.2. DoDI 4715.4, "Pollution Prevention," dated June 18, 1996, implements policy, assigns responsibility, and prescribes procedures for implementation of pollution prevention programs throughout the DoD. As a matter of DoD policy, these FGS should be consulted for particular requirements that apply to activities in Japan. Where economically advantageous and consistent with mission requirements, pollution prevention shall be the preferred means for attaining compliance with these FGS.

C1.5.3. Laboratory analyses necessary to implement these FGS shall normally be conducted in a laboratory certified by a U.S. or GoJ regulatory authority for the applicable test method. In the absence of a certified laboratory, analyses may also be conducted at a laboratory that has an established reliable record of QA compliance with standards for the applicable test method that are generally recognized by appropriate industry or scientific organizations.

C1.5.4. Unless otherwise specified, all record keeping requirements, including assessments, inspection records, logs, manifests, notices, forms, and formats, are described in accordance with paragraph C4.4.2 of DoD 8910.1-M, "DoD Procedures for Management of Information Requirements."

C1.5.5. These FGS do not create any rights or obligations enforceable against the U.S., the DoD, or any of its components, nor does it create any standard of care or practice for individuals. Although these FGS refer to other DoDDs and DoDIs, it is intended only to coordinate the requirements of those directives as required to implement the policies found in DoDI 4715.5. These FGS do not change other DoDDs or DoDIs or alter DoD policies.

C1.5.6. When these FGS were developed, DoD activities and installations were located in the following prefectures or special administrative areas: Aomori, Tokyo, Kanagawa, Saitama, Hiroshima, Shizuoka, Nagasaki, Yamaguchi, and Okinawa. If DoD activities are, or are expected to be, located in any other prefecture, the EEA shall be contacted to determine if any changes in the FGS are warranted for that prefecture.

## C1.6. PERMITS AND LICENSES

C1.6.1. In accordance with the SOFA, permits, licenses, or other forms of official approvals are not required by DoD activities and installations. Permits, licenses, or other forms of official approvals may, however, be required under GoJ law for certain contracted activities specified herein. When required, all such permits, licenses and other forms of official approval shall be obtained by the contractor from the appropriate GoJ authorities. DoD Components shall assist contractors when they are applying for a required permit, license or other form of official approval by providing necessary information only.

C1.6.2. If the conditions of any permit, license or other form of official approval provides for a less protective standard than are prescribed in these FGS, these FGS shall remain the compliance standard unless a waiver is obtained in writing from the EEA.

## C1.7. ENVIRONMENTAL EXECUTIVE AGENT

C1.7.1. In accordance with DoDI 4715.5, the EEA for these FGS is the Commander, U.S. Forces, Japan (COMUSJAPAN). Any questions or comments pertaining to these FGS shall be sent to:

Commander, U.S. Forces, Japan
Unit 5068, Attn: USFJ/J4
APO, AP 96328-5068

DSN Voice (315) 225-4713
DSN FAX (315) 225-4709
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# C2. CHAPTER 2

# AIR EMISSIONS

## C2.1. SCOPE

This Chapter contains criteria for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 15, "Asbestos."

## C2.2. DEFINITIONS

C2.2.1. Coal Refuse. Waste products from coal mining, cleaning and coal preparation operations (e.g., culm and gob) containing coal, matrix material, clay, and other organic and inorganic material.

C2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/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, nonboiling solvent to clean the parts are classified as cold cleaning machines.

C2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

C2.2.4. Diesel Engine Generating Unit. Diesel Engine Generating Units that have a combustion rate ≥50 liters (13.2 gallons) per hour when calculated in terms of fuel oil consumption.

C2.2.5. Dioxins. Dioxins defined in this chapter are polychlorinated dibenzofurans (PCDFs), polychlorinated dibenzo-para-dioxins (PCDDs) and coplanar polychlorinated biphenyls (coplanar PCBs).

C2.2.6. Existing Incinerators. Any incinerator constructed on or before 1 December 1997.

C2.2.7. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid or gaseous fuel derived from such material for the purpose of creating useful heat.

C2.2.8. 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.

C2.2.9. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depletion Substances (ODS).

C2.2.10. Gaseous (Compressed Gas) Engine Generating Unit. Gaseous Engine Generating Units that have the following specifications. The combustion rate of the engine is ≥35 liters/hour when calculated in terms of fuel oil consumption.

C2.2.11. Gasoline Engine Generating Unit. Gasoline Engine Generating Units that have the following specifications. The combustion rate of the engine is ≥35 liters/hour when calculated in terms of fuel oil consumption.

C2.2.12. Incinerator. 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.

C2.2.13. 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.

C2.2.14. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (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. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

C2.2.15. Municipal Solid Waste (MSW). Any household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/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), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include 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).

C2.2.16. New Incinerators. Any new Waste or Specified Waste Incinerator built on or after 2 December 1997.

C2.2.17. Ozone-Depleting Substances (ODS). Those substances listed in Table C2.T1.

C2.2.18. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

C2.2.19. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

C2.2.20. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

C2.2.21. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

C2.2.22. Specified Waste Incinerator. A waste incinerator with a hearth area ≥0.5 $m^2$ (5.38 $ft^2$) or an incineration rate ≥50 kg/hr (110 lbs/hr).

C2.2.23. Soot and Dust. Particulate matter generated from combustion.

C2.2.24. Stack. Any point in a source covered by criteria contained in C2.3.1, C2.3.2, C2.3.2.5, C2.3.4, or C2.3.5 designed to emit pollutants.

C2.2.25. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

C2.2.26. Substantially-Modified. Any modification to a facility/building, the cost of which exceeds $1 million, regardless of funding source.

C2.2.27. 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.

C2.2.28. Volatile Organic Compound (VOC). Any organic compound (excluding substances which are not a source for the generation of suspended particulate matter or oxidants) that is emitted into the atmosphere and is in gaseous form at the time when scattered.

C2.2.29. Waste Incinerator. Any incinerator with a grate area ≥2 $m^2$ (21.5 $ft^2$) or an incineration rate ≥200 kg/hr (441 lbs/hr), and which burns solid or liquid waste to reduce volume by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

C2.2.30. Wood Residue. Bark, sawdust, slabs, chips, shavings, mill trim, and other wood products derived from wood processing and forest management operations.

C2.3. CRITERIA

C2.3.1. Steam/Hot Water Generating UnitsSteam/Hot Water Generating Units with a heating area ≥10 $m^2$ (107.6 $ft^2$), or with a burner combustion rate of ≥50 liters (13.2 gallons) per hour when calculated in terms of fuel oil consumption, must comply with the standards provided in Tables C2.T2, C2.T3 and C2.T4.

C2.3.1.1. Air Emission Standards. The following criteria apply to units with a maximum design heat input capacity ≥10 million BTU/hr.

C2.3.1.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards for specific sized units shown in Table C2.T5 at all times, except during periods of start up, shut down, soot blowing, malfunction, or when emergency conditions exist.

C2.3.1.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight percent) and higher heating value will be measured and recorded for each new shipment of fuel. Use these data to calculate sulfur dioxide ($SO_2$) emissions and document compliance with the $SO_2$ limits using the equation in C2.3.10. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for $SO_2$ and either oxygen ($O_2$) or carbon dioxide ($CO_2$).

C2.3.1.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or nitrogen oxides ($NO_X$) standards in C2.T5 must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

C2.3.1.2.1. For units with a maximum design heat input capacity >30 million BTU/hr: Opacity, except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

C2.3.1.2.2. For fossil fuel fired units with a maximum design heat input capacity >100 million BTU/hr: $NO_X$ and either $O_2$ or $CO_2$.

C2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration.

C2.3.2.1. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Table C2.T8 and operating limits in Table C2.T9 (see also paragraph C2.3.2.5).

C2.3.2.2. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table C2.T8 and operating limits in Table C2.T9.

C2.3.2.3. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994 and that burn more than 1 ton per day (tpd) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of start up, shut down, malfunction, or when emergency conditions exist.

C2.3.2.4. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

C2.3.2.4.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

C2.3.2.4.1.1. Unit design: dual chamber.

C2.3.2.4.1.2. Minimum temperature in primary chamber: 760-871°C (1400-1600°F).

C2.3.2.4.1.3. Minimum temperature in secondary chamber: 982-1204°C (1800-2200°F).

C2.3.2.4.1.4. Minimum residence time in the secondary chamber: 2 seconds.

C2.3.2.4.1.5. Incinerator operators must be trained in accordance with applicable Service requirements.

C2.3.2.5. Additional Air Emission Monitoring for Waste and Specified Waste Incinerators. Waste and Specified Waste Incinerators must be monitored for hazardous air pollutants and dioxins in accordance with the standards in Table C2.T2, C2.T3, and C2.T6.

C2.3.2.5.1. Hazardous Air Pollutant Monitoring. Installations that operate Waste Incinerators must monitor the hazardous air pollutants listed in Table C2.T2 twice a year.

C2.3.2.5.2. Dioxin Monitoring. Installations that operate Waste or Specified Waste Incinerators must monitor dioxin emissions listed in Table C2.T6 at least annually. Additionally, ash from Waste and Specified Incinerators must be tested at least annually, and must have dioxin levels of 3.0 ng-TEQ/g or less. Ash not meeting this standard must be disposed of as a hazardous waste in accordance with Chapter 6, "Hazardous Waste."

C2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. These requirements do not apply to coin-operated machines.

C2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than 2,000 gallons per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed. The temperature of the refrigerated condenser must be maintained at ≤7.22°C (45°F). Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 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 ≤7.22°C (45°F). Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that is most appropriate to suit local conditions:

C2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm). Control devices/methods must be operated according to manufacturer recommendations.

C2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

C2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet ($ft^2$); K = a conversion factor, 425 dscm/($ft^2$-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

C2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains more than 5% by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (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.

C2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 1-inch water layer or a freeboard ratio of at least 0.75.

C2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

C2.3.6. Units Containing ODS Listed in Table C2.T1. The following criteria apply to direct atmospheric emissions of ODS, HFCs, and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment.

C2.3.6.1. Refrigerant Recovery/Recycling. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or Japanese equivalent.

C2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant shall 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, HFC, and PFC refrigerants are not subject to this prohibition.

C2.3.6.3. Refrigerant Leak Monitoring and Repair. Monitor and repair refrigeration equipment for ODS leakage in accordance with the following criteria and repair, if found to be leaking.

C2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing >50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35% of the total charge during a 12-month period.

C2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing >50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35% of the total charge during a 12-month period.

C2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing >50 pounds of refrigerant and not covered by paragraphs C2.3.6.3.1 or C2.3.6.3.2 of this chapter must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15% of the total charge during a 12-month period.

C2.3.6.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons shall 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:

C2.3.6.4.1. *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).

C2.3.6.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

C2.3.6.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulant agent cannot be used.

C2.3.7. Motor Vehicles. This criteria applies to DoD-owned motor vehicles as defined in paragraph C2.2.13.

C2.3.7.1. All vehicles shall be inspected every 2 years to ensure that no tampering with factory-installed emission control equipment has occurred.

C2.3.7.2. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

C2.3.8. Stack Heights. $H_g$ is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures.

C2.3.8.1. Stacks shall be designed and constructed to heights at least equal to the largest $H_g$ calculated from either of the following two criteria:

C2.3.8.1.1. $H_g = H + 1.5L$, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but ≤0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest $H_g$.

C2.3.8.1.2. $H_g$ is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum grou nd-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40% in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means <0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height ($H_t$) of the feature, not to exceed 2 miles if such feature achieves a height ($H_t$) 0.8 km from the stack that is at least 40% of the good engineering practice stack height determined by the formulae provided in C2.3.8.1.1 of this part or 26 meters, whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

C2.3.9. Diesel/Gaseous/Gasoline Engine Generating and Gas Turbines Units. These units must comply with the emission standards in Table C2.T3 and C2.T4. The following are exempt from these standards:

C2.3.9.1. Portable or mobile equipment.

C2.3.9.2. Stationary back-up power equipment, such as emergency generators.

C2.3.10. Emission Limits for Sulfur Oxides. Maximum permissible emission limits for the amount of sulfur oxides emitted from an outlet of a facility, q, is calculated as follows:

$$q = K \times 10^{-3} H_e^2$$

where,

$q$ is the hourly volume of $SO_X$ emitted ($Nm^3$/hr). $Nm^3$ represents $m^3$/hour at a normal temperature of 0°C and a pressure of 1 atmosphere.

$K$ is a constant value assigned to each designated region. The most protective value (e.g., the smallest K-value) applicable to the region must be used (See Table C2.T7).

$H_e$ is the effective stack height calculated as follows:

$$H_e = H_o + 0.65(H_m + H_t)$$

$$H_m = \frac{0.795\sqrt{Q \cdot V}}{1 + \frac{2.58}{V}}$$

$$H_t = 2.01 \times 10^{-3} \cdot Q \cdot (T - 288) \cdot (2.30 \log J + \frac{1}{J} - 1)$$

$$J = \frac{1}{\sqrt{Q \cdot V}} (1460 - 296 \times \frac{V}{T - 288}) + 1$$

where,

$H_e$ is the effective stack height, in meters

$H_o$ is the actual stack height, in meters.

$Q$ is the flue gas flow rate at 15°C (59°F) in $m^3$/sec

$V$ is the flue gas speed in m/sec and

$T$ is the flue gas temperature, in absolute temperature

C2.3.11. Volatile Organic Compound (VOC). Operators will incorporate procedures which minimize the direct release of VOCs into the atmosphere at painting facilities, printing facilities, cleaning facilities, storage tanks, drying facilities and/or resin dryer. Emissions from those facilities using organic solvents shall not exceed the threshold values indicated in Table C2.T10.

Table C2.T1. Class I and II Ozone Depleting Substances

| **Class I** | | | |
|---|---|---|---|
| CFC - 11 | CFC - 114 | CFC - 215 | Halon - 1211 |
| CFC - 12 | CFC - 115 | CFC - 216 | Halon - 1301 |
| CFC - 13 | CFC - 211 | CFC - 217 | Halon - 2402 |
| CFC - 111 | CFC - 212 | | Carbon Tetrachloride |
| CFC - 112 | CFC - 213 | | Methyl Chloroform |
| CFC - 113 | CFC - 214 | | Methyl Bromide |
| $CHFBr_2$ | $C_2H_2F_3Br$ | $C_3HF_6Br$ | $C_3H_3F_4Br$ |
| HBFC-2201 ($CHF_2Br$) | $C_2H_3FBr_2$ | $C_3H_2FBr_5$ | $C_3H_4FBr_3$ |
| $CH_2FBr$ | $C_2H_3F_2Br$ | $C_3H_2F_2Br_4$ | $C_3H_4F_2Br_2$ |
| $C_2HFBr_4$ | $C_2H4FBr$ | $C_3H_2F_3Br_3$ | $C_3H_4F_3Br$ |
| $C_2HF_2Br_3$ | $C_3HFBr_6$ | $C_3H_2F_4Br_2$ | $C_3H_5FBr_2$ |
| $C_2HF_3Br_2$ | $C_3HF_2Br_5$ | $C_3H_2F_5Br$ | $C_3H_5F_2Br$ |
| $C_2HF_4Br$ | $C_3HF_3Br_4$ | $C_3H_3FBr_4$ | $C_3H_6FBr$ |
| $C_2H_2FBr_3$ | $C_3HF_4Br_3$ | $C_3H_3F_2Br_3$ | Chlorobromomethane |
| $C_2H_2F_2Br_2$ | $C_3HF_5Br_2$ | $C_3H_3F_3Br_2$ | |
| **Class II** | | | |
| HCFC – 21 | HCFC – 133a | HCFC – 225cb | HCFC – 243 |
| HCFC – 22 | HCFC – 141b | HCFC – 226 | HCFC – 244 |
| HCFC – 31 | HCFC – 142b | HCFC – 231 | HCFC – 251 |
| HCFC – 121 | HCFC – 151 | HCFC – 232 | HCFC – 252 |
| HCFC – 122 | HCFC – 221 | HCFC - 233 | HCFC – 253 |
| HCFC – 123 | HCFC – 222 | HCFC – 234 | HCFC – 261 |
| HCFC – 124 | HCFC – 223 | HCFC – 235 | HCFC – 262 |
| HCFC – 131 | HCFC – 224 | HCFC – 241 | HCFC – 271 |
| HCFC – 132b | HCFC – 225ca | HCFC – 242 | |

**Note:** All isomers of the above chemicals are ODS, except isomers of (1,1,1-trichloroethane (also known as methyl chloroform)) such as 1,1,2-trichloroethane.

Table C2.T2. Emission Standards for Hazardous Air Pollutants

| Substance | Emission Source | Emission Standards | Methods |
|---|---|---|---|
| Sulfur Oxide ($SO_X$) | Combustion of fuel and minerals in boilers and waste incinerators | 1. The standard is set according to the height of the exhaust outlet ($H_e$) and the value of K assigned to each area (see paragraph C2.3.10)<br><br>General emission standards:<br>K = 3.0 to 17.5<br><br>Special emission standards:<br>K = 1.17 to 2.34<br><br>2. Fuel use standard:<br>Sulfur in fuel is set for each area.<br>Sulfur content: <0.5 to 1.2 %<br><br>3. Total emissions:<br>Set for each area/factory based on the total emission reduction plan. | 1. $SO_X$: JIS K0103<br><br>Emission quality: JIS Z8808.<br><br>2. Sulfur content in fuel: JIS K2301, JIS K2541 or JIS M8813<br><br>3. Fuel consumption: JIS Z8762, JIS Z8763 or equivalent. |
| Soot & Dust | Combustion of fuel and minerals in boilers, stationary engines, waste incinerators and the use of an electric furnace | Emission standards for each facility/scale (See Table C2.T3)<br><br>General emission standards:<br>0.04 - 0.3 g/$Nm^3$<br><br>Special emission standards:<br>0.03 - 0.2 g/$Nm^3$ | Soot & Dust: JIS Z8808<br><br>$O_2$: Absorption method using an Orsat gas analyzer (or equivalent) |
| Hydrogen Chloride (HCl) | Combustion or chemical treatment at waste incinerators | Emission standard for Waste Incinerators:<br>700 mg/$Nm^3$<br><br>In Saitama Prefecture, emission standard for waste incinerators with a grate area ≥2 $m^2$ or incineration capacity ≥200 kg/hr:<br><br>Incineration capacity >500 kg/hr, allowable limits are 200 mg/$Nm^3$<br><br>Incineration capacity <500 kg/hr, allowable limits are 500 mg/$Nm^3$ | HCl for waste incinerators: Measuring HCl concentration by the silver nitrate method among the methods stipulated in JIS K0107, and the oxygen concentration in the emission gas by the same method of soot and dust. |
| Nitrogen Oxide ($NO_X$) | Combustion, synthesis or degradation in a boilers, stationary engines, and waste incinerators | 1. Emission standards for each facility/scale (See Table C2.T3)<br>60 - 950 ppm<br><br>2. Total emissions<br>Set for each area/factory based on total emission reduction plan | JIS K0104 for measuring $NO_X$ concentration in the emission gas, and JIS Z8808 for measuring soot and dust for the oxygen concentrations in the emission gas. |

Notes:
Target Facilities:
Boiler: Heating surface area ≥10 $m^2$
Waste Incinerator: Grate area ≥2 $m^2$, or burning capacity ≥200 kg/hr.
Monitoring Frequency: Twice a year

Table C2.T3. Emission Standards for Soot and Dust and $NO_X$

| Type of Facility | Specification | Types | Soot and Dust | | | $NO_X$ | |
|---|---|---|---|---|---|---|---|
| | | | Total Emission ($Nm^3$/hour) | General Area[#1] (g/$Nm^3$) | Special Area[#2] (g/$Nm^3$) | Total Emission ($Nm^3$/hour) | Standard (ppm) |
| Boiler [1] | Heating area [2] ≥10 $m^2$, or<br>Burner combustion rate ≥50 L/hr [3] | Gas boiler heating area ≥10 $m^2$<br>burner combustion rate: ≥50 L/hr [2] | ≥40,000 | 0.05 | 0.03 | ≥500,000 | 60 |
| | | | | | | ≥40,000 but <500,000 | 100 |
| | | | <40,000 | 0.10 | 0.05 | ≥10,000 but <40.000 | 130 |
| | | | | | | <10,000 | 150 |
| | | Liquid boiler or gas and liquid boiler burner combustion rate: ≥50 L/hr [2] | ≥200,000 | 0.05 | 0.04 | ≥500,000 | 130 |
| | | | ≥40,000 but <200,000 | 0.15 | 0.05 | ≥10,000 but <500,000 | 150 |
| | | | ≥10,000 but <40,000 | 0.25 | 0.15 | | |
| | | | <10,000 | 0.30 | 0.15 | <10,000 | 180 |
| | | Black liquid boiler or black liquid and gas or liquid fuel boiler | ≥200,000 | 0.15 | 0.10 | ≥500,000 | 130 |
| | | | ≥40,000 but <200,000 | 0.25 | 0.15 | ≥10,000 but <500,000 | 150 |
| | | | <40,000 | 0.30 | 0.15 | | |
| | | | | | | <10,000 | 180 |
| | | Liquid fuel boiler (heating area <10 $m^2$) | -- | 0.30 | 0.15 | -- | 260 |
| | | Coal boiler (heating area ≥10 $m^2$) | ≥200,000 | 0.10 | 0.05 | ≥700,000 | 200 |
| | | | ≥40,000 but <200,000 | 0.20 | 0.10 | ≥40,000 but <700,000 | 250 |
| | | | <40,000 | 0.30 | 0.15 | <40,000 | 300 |
| | | Coal boiler (heating area <10 $m^2$) | -- | 0.30 | 0.15 | -- | 350 |
| | | Solid fuel boiler (others whose heating area is ≥10 $m^2$) | ≥40,000 | 0.30 | 0.15 | ≥700,000 | 200 |
| | | | | | | ≥40,000 but <700,000 | 250 |
| | | | <40,000 | 0.30 | 0.20 | <40,000 | 300 |
| | | Solid fuel boiler (others whose heating area is <10 $m^2$) | -- | 0.30 | 0.20 | -- | 350 |
| | | Boilers (others) | ≥40,000 | 0.30 | 0.15 | ≥500,000 | 130 |
| | | | <40,000 | 0.30 | 0.20 | ≥10,000 but <500,000 | 150 |
| | | | | | | <10,000 | 180 |

Table C2.T3. Emission Standards for Soot and Dust and $NO_X$ (continued)

| Type of Facility | Specification | Type | Soot and Dust | | | $NO_X$ | |
|---|---|---|---|---|---|---|---|
| | | | Size (metric tons) | General Area[#1] (g) | Special Area[#2] (g) | Size ($Nm^3$) | Standard (ppm) |
| Gas Turbine Engine | Fuel Combustion Rate: ≥50 L/hr | -- | -- | 0.05 | 0.04 | -- | 70 |
| Diesel Engine | | | | 0.10 | 0.08 | | 950 |
| Gaseous Engine | Fuel Combustion Rate: ≥35 L/hr | | | 0.05 | 0.04 | | 600 |
| Gasoline Engine | | | | 0.05 | 0.04 | | 600 |
| Waste material incinerator | Grate area: [3] ≥2 $m^2$<br>Incineration rate: ≥200 kg/hr | Waste material continuous incinerator (by vortex combustion method) | ≥4 | 0.04 | | All | 450 |
| | | | ≥2 but <4 | 0.08 | | | |
| | | Peculiar [4] waste continuous material incinerator | ≥4 | 0.04 | | ≥40,000 | 250 |
| | | | ≥2 but <4 | 0.08 | | <40,000 | 700 |
| | | Waste material continuous incinerator (others) | ≥4 | 0.04 | | All | 250 |
| | | | ≥2 but <4 | 0.08 | | | |
| | | Waste material incinerator (others) | <2 | 0.15 | | ≥40,000 | 250 |
| | | | | | | <40,000 | -- |

Notes:

#1. Soot and dust emission standard per $Nm^3$ of emitting gas in general area (see Table C2.T7).

#2. Soot and dust emission standard per $Nm^3$ of emitting gas in special area (see Table C2.T7). These standards apply for facilities built after 1 June 1982 in Tokyo Metropolitan area (special wards), Yokohama and Yokosuka.

1. Hot blast boilers are included. Boilers which use electricity or waste heat alone are excluded.
2. Calculated in terms of heavy oil.
3. Horizontal projected area.
4. A "peculiar" incinerator refers to an incinerator that burns waste generated from a process that produces or uses nitro-, amino-, or cyano-compounds or their derivatives, or from a process that treats wastewater using ammonia.
5. Monitoring Frequency: Twice a year.

($Nm^3$ = Normal cubic meters)

Table C2.T4 Emission Standard for NOx (applies to facilties located in Tokyo Prefecture)

| Type of Facility | Type | Scale | Date Facility Installed | Emission Standard (ppm) | |
|---|---|---|---|---|---|
| | | | | Class 1 Area[1] | Class 2 Area[1] |
| Boiler | Gas Boiler | Fuel combustion capacity ≥100 L/hr | Prior to 15 Mar 1991 | 80 | 85 |
| | | | On or After 15 Mar 1991 | 45 | 45 |
| | | Fuel combustion capacity >100 L/hr | Prior to 15 Mar 1991 | 85 | 95 |
| | | | On or After 15 Mar 1991 | 45 | 55 |
| | Liquid Boiler | Fuel combustion capacity ≥100 L/hr | Prior to 15 Mar 1991 | 90 | 100 |
| | | | 15 Mar 1991 to 31 Mar 2001 | 65 | 65 |
| | | | On or After 1 Apr 2001 | 50 | 65 |
| | | Fuel combustion capacity >100 L/hr | Prior to 15 Mar 1991 | 100 | 110 |
| | | | On or After 15 Mar 1991 | 65 | 75 |
| Gas Turbine | Gas Turbine (gaseous fuel) | Rated output: ≥50,000 kw | Prior to 1 Apr 2001 | 25 | 35 |
| | | | On or After 1 Apr 2001 | 10 | 10 |
| | | Rated output: 2,000-50,000 kw | Prior to 1 Apr 1992 | 35 | 35 |
| | | | On or After 1 Apr 1992 | 25 | 35 |
| | | Rated output: < 2,000 kw | Prior to 1 Apr 1992 | 50 | 50 |
| | | | On or After 1 Apr 1992 | 35 | 50 |
| | Gas turbine (liquid fuel) | Rated output: ≥50,000 kw | Prior to 1 Apr 2001 | 25 | 50 |
| | | | On or After 1 Apr 2001 | 10 | 10 |
| | | Rated output: 2,000-50,000 kw | Prior to 1 Apr 1992 | 50 | 50 |
| | | | On or After 1 Apr 1992 | 25 | 50 |
| | | Rated output: < 2,000 kw | Prior to 1 Apr 1992 | 60 | 60 |
| | | | On or After 1 Apr 1992 | 35 | 60 |
| Diesel Engine | Fuel combustion ≥ 25 L/hr, and rated output ≥ 2,000 kw | | Prior to 1 Apr 1992 | 190 | 380 |
| | | | On or After 1 Apr 1992 | 110 | 270 |
| | Fuel combustion ≥ 25 L/hr, and rated output < 2,000 kw | | Prior to 1 Apr 1992 | 190 | 610 |
| | | | On or After 1 Apr 1992 | 110 | 500 |
| | Fuel combustion < 25 L/hr | | Prior to 1 Apr 1992 | 500 | 610 |
| | | | On or After 1 Apr 1992 | 380 | 500 |
| Gas Engine | Fuel combustion ≥ 50 L/hr | | Prior to 1 Apr 1992 | 300 | 500 |
| | | | On or After 1 Apr 1992 | 200 | 500 |
| | Fuel combustion < 50 L/hr | | Prior to 1 Apr 1992 | 500 | 500 |
| | | | On or After 1 Apr 1992 | 300 | 500 |
| Gasoline Engine | Fuel combustion ≥ 50 L/hr | | Prior to 1 Apr 1992 | 300 | 500 |
| | | | On or After 1 Apr 1992 | 200 | 500 |
| | Fuel combustion < 50 L/hr | | Prior to 1 Apr 1992 | 500 | 500 |
| | | | On or After 1 Apr 1992 | 300 | 500 |

**Notes:**

1. Class 1 Areas: Areas which is designated as Special District, Musashino City, Mitaka City, Chofu City, Komae City, Nishitokyo City (limited to the area of former Hoya City).
   Class 2 Areas: All areas other than those defined as Class 1 Area.

Table C2.T5. Emission Standards for Steam Generating Units [1]

| | Maximum Design Heat Input Capacity | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 – 100 million BTU/hr | | | Size >100 million BTU/hr | | | |
| Fuel Type | PM | Opacity [2] | $SO_2$ [3] | PM | Opacity [2] | $SO_2$ [3] | $NO_X$ [4] |
| Gaseous | N/A | N/A | N/A | N/A | N/A | N/A | 0.20 |
| Gaseous - Coal Derived | N/A | N/A | N/A | N/A | N/A | N/A | 0.50 |
| Liquid Fossil Fuel | N/A | 20% | 0.50 [5] | 0.10 | 20% | 0.80 | 0.30 |
| Solid Fossil Fuel | 0.10 | 20% | 1.20 | 0.10 | 20% | 1.20 | 0.70 |
| Other Solid Fuel [6] | 0.30 | 20% | N/A | 0.20 | 20% | N/A | N/A |

N/A = Not applicable.

1. Standards apply to units constructed or substantially modified after 1 October 1994. Standards do not apply during periods of startup, shutdown, malfunction, soot blowing, or when emergency conditions exist. Unless specified otherwise, emission standards are in lb/million BTU.
2. The opacity standards do not apply to units <30 million BTU/hr. The 20% standard applies to the average opacity over a 6-minute period. A 30% opacity value is allowed for one 6-minute period per hour.
3. $SO_2$ is best controlled and compliance documented by limiting fuel sulfur content. $SO_2$ emissions (lb/million BTU) = 0.02 X sulfur content of fuel (%) / heat content of fuel (HHV, million BTU/lb fuel). [e.g., for fuel oil with 0.5% sulfur, $SO_2$ = 0.02 X 0.5 / 0.019 = 0.53 lb/million BTU].
4. Emission limitation for $NO_X$ is based on a 30-day rolling average. $NO_X$ standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.
5. Instead of 0.5 lb/ million BTU of $SO_2$, fuel oil combustion units may comply with a 0.5% average fuel sulfur content limit (weight percent) which is statistically equivalent to 0.5 lb/million BTU.
6. Other solid fuels include wood or waste derived fuels.

Table C2.T6. Dioxin Standards for Waste and Specified Waste Incinerators

| Incinerating Capacity (metric tons/hour) | Emission Standards for New Waste Incinerators | Emission Standards for Existing Waste Incinerators [1] |
|---|---|---|
| ≥4 | 0.1 ng-TEQ/$Nm^3$ | 1 ng-TEQ/$Nm^3$ |
| ≥2 but <4 | 1 ng-TEQ/$Nm^3$ | 5 ng-TEQ/$Nm^3$ |
| <2 [2] | 5 ng-TEQ/$Nm^3$ | 10 ng-TEQ/$Nm^3$ |

TEQ = Toxic Equivalent

Notes:

1. New Waste Incinerators: Specified waste incinerator (hearth area ≥0.5 $m^2$ or an incinerating capacity ≥50 kg/hr, built on or after 16 January 2000) and new waste incinerator (grate area ≥2 $m^2$ or an incinerating capacity ≥200 kg/hr, built on or after 2 December 1997).
2. Existing Waste Incinerators: Grate area ≥2 $m^2$ or an incinerating capacity ≥200 kg/hr, built on or before 1 December 1997.

Monitoring Frequency: Once a year

Analytical Method: JIS K0311 (2008)

Table C2.T7. Sulfur Oxide ($SO_X$) K-Values (see paragraph C2.3.10 for application)

| | Area | K-Value |
|---|---|---|
| Special | Yokohama, Yokosuka, Wards of Tokyo | 1.17 |
| | Kisarazu | 1.75 |
| | Iwakuni, Otake | 2.34 |
| General | Kure | 5.0 |
| | Hachinohe | 6.0 |
| | Fussa, Musashimurayama, Kiyose, Tachikawa, Akishima, Hamura, Fuchu, Inagi, Tama, Hachioji, Mizuho | 6.42 |
| | Fukuoka | 8.76 |
| | Wako, Tokorozawa, Niiza, Sayama, Kin, Naha, Urasoe, Ishikawa Region of Uruma, Ginowan, Chatan, Kitanakagusuku | 9.0 |
| | Sasebo | 10.0 |
| | Ayase, Sagamihara, Yamato, Ebina, Zushi, Zama | 11.5 |
| | Kadena, Numazu, Ginoza, Onna, Yomitan, Katsuren Region of Uruma, Itoman, Okinawa City | 13.0 |
| | Misawa, Gushikawa Region of Uruma, Nago, Motobu, Higashi, Kunigami, Ie, Gotenba | 17.5 |

Table C2.T8. Emission Standards for Incinerators

| Pollutant | Emission Standards [1] | | | | |
|---|---|---|---|---|---|
| Incinerator Type | Existing MWC units [2] | | MWC units that begin new construction or undergo substantial modification [2] | | CISWI units |
| Rated Capacity | 35-250 tpd | >250 tpd | 35-250 tpd | >250tpd | All units |
| Particulate | 70 mg/dscm | 27 mg/dscm | 24 mg/dscm | | 70 mg/dscm |
| Opacity | 10% | | 10% | | 10% |
| $NO_X$ | N/A | See Note 3 | 500 ppmv | 150 ppmv | 388 ppmv |
| $SO_2$ | 50% reduction or 77 ppmv | 75% reduction or 29 ppmv | 80% reduction or 30 ppmv | | 20 ppmv |
| Dioxins/furans | 125 ng/dscm | See Note 4 | 13 ng/dscm | | 0.41 ng/dscm |
| Cadmium | 0.10 mg/dscm | 0.040 mg/dscm | 0.020 mg/dscm | | 0.004 mg/dscm |
| Lead | 1.6 mg/dscm | 0.44 mg/dscm | 0.20 mg/dscm | | 0.04 mg/dscm |
| Mercury | 85% reduction or 0.080 mg/dscm | | 85% reduction or 0.080 mg/dscm | | 0.47 mg/dscm |
| HCl | 50% reduction or 250 ppmv | 95% reduction or 29 ppmv | 80% reduction or 30 ppmv | 95% reduction or 25 ppmv | 62 ppmv |
| Fugitive ash | 5% of hourly observation period | | 5% of hourly observation period | | N/A |

Notes:

1. Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.
2. Construction or modifications that were undertaken pursuant to previous JEGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.
3. $NO_X$ limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.
4. Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

Table C2.T9. Carbon Monoxide Operating Limits for Incinerators [1]

| Incinerator Type | Existing MWC units [2] | | MWC units that begin new construction or undergo substantial modification [2] | | CISWI units |
|---|---|---|---|---|---|
| Rated Capacity | 35-250 tpd | >250 tpd | 35-250 tpd | >250tpd | All units |
| Fluidized bed | 100 ppmv (4-hr avg) | | | | 157 ppmv |
| Fluidized bed, mixed fuel (wood/refuse-derived fuel) | 200 ppmv (24-hr avg) | | 200 ppmv (24-hr avg) | 100 ppmv (4-hr avg) | |
| Mass burn rotary refractory | 100 ppmv (4-hr avg) | | 100 ppmv (24-hr avg) | | |
| Mass burn rotary waterfall | 250 ppmv (24-hr avg) | | | | |
| Mass burn waterfall and refractory | 100 ppmv (4-hr avg) | | 100 ppmv (4-hr avg) | | |
| Mixed fuel-fired (pulverized coal/refuse-derived fuel) | 150 ppmv (4-hr avg) | | 150 ppmv (4-hr avg) | | |
| Modular starved-air and excess air | 50 ppmv (4-hr avg) | | 50 ppmv (4-hr avg) | | |
| Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel) | 200 ppmv (24-hr avg) | | 150 ppmv (24-hr avg) | | |
| Stoker, refuse-derived fuel | | | | | |

Notes:
1 Compliance is determined by continuous emission monitoring systems.
2 Construction or modifications that were undertaken pursuant to previous JEGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units

Table C2.T10 Emission Standards for VOCs

| Facility | Blast volume ($m^3$/hour) | Area[1] ($m^2$) | Size (1,000 liters) | Emission Standard[2] (ppmC) | |
|---|---|---|---|---|---|
| Facilities for chemical production | ≥ 3,000 | | | 600 | |
| Painting facilities for spray coating | ≥ 100,000 | | | 700 | |
| Other painting facilities | ≥ 10,000 | | | Wood products manufacturing | 1,000 |
| | | | | Others | 600 |
| Facilities for adhesive bonding of copper-clad laminate for printed-circuit board, adhesive tape or sheet, release coated paper or wrapping material | ≥ 5,000 | | | 1,400 | |
| Other facilities for adhesive bonding | ≥ 15,000 | | | 1,400 | |
| Facilities using rotary offset printing | ≥ 7,000 | | | 400 | |
| Facilities using gravure printing | ≥ 27,000 | | | 700 | |
| VOC cleaning facilities | | ≥ 5 | | 400 | |
| VOC storage tanks[3] | | | ≥ 1,000 | 60,000 | |

**Notes:**
1. Area is the VOC accessible surface area exposed to the air.
2. Emission standards are calculated in terms cubic centimeters per cubic meter (parts per million by volume) and converted as carbon, i.e., ppmC. Sampling method is JIS K0095. Analysis is by JIS K0114 or JIS K0151, with correction for non-VOC compounds.
3. VOC storage tanks include: gasoline, crude oil, naphtha, or the like with a vapor pressure of more than 20 kilopascals at a temperature of 37.8°C (except enclosed type and floating roof type (including internal floating roof)).
4. Monitoring Frequency: Twice a year.

# C3. CHAPTER 3

# DRINKING WATER

## C3.1. SCOPE

This Chapter contains criteria for providing potable water.

## C3.2. DEFINITIONS

C3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

C3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater DoD Component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the DoD Component's installations.

C3.2.3. Concentration/Time (CT). The product of residual disinfectant concentration (C) in mg/L determined before or at the first customer, and the corresponding disinfectant contact time (T) in minutes. CT values appear in Tables C3.T11 through C3.T24.

C3.2.4. Conventional Treatment. Water treatment, including chemical coagulation, flocculation, sedimentation, and filtration.

C3.2.5. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited onto a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.

C3.2.6. Direct Filtration. Water treatment, including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

C3.2.7. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

C3.2.8. DoD Water System. A public or non-public water system.

C3.2.9. Emergency Assessment. Evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service caused by natural disasters, accidents, and sabotage.

C3.2.10. First Draw Sample. A 1-liter sample of tap water that has been standing in plumbing at least 6 hours and is collected without flushing the tap.

C3.2.11. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and

relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

C3.2.12. Haloacetic Acids (HAA5). The sum of the concentrations in mg/L of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to 2 significant figures after addition.

C3.2.13. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

C3.2.14. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

C3.2.15. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

C3.2.16. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

C3.2.17. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

C3.2.18. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

C3.2.19. Potable Water. Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

C3.2.20. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

C3.2.20.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

C3.2.20.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

C3.2.20.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least 6 months per year, but not year round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

C3.2.20.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least 6 months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

C3.2.21. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

C3.2.22. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (1.2 ft/hr), resulting in particulate removal by physical and biological mechanisms.

C3.2.23. Total Trihalomethanes. The sum of the concentration in mg/L of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

C3.2.24. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever the principal function of the well is emplacement of any fluid.

C3.2.25. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities, which provide a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

## C3.3. CRITERIA

C3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:

C3.3.1.1. Maintain a map/drawing of the complete potable water system.

C3.3.1.2. Update the potable water system master plan at least every 5 years.

C3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintaining septic systems and onsite treatment units, and by appropriate land use management on DoD installations.

C3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years for systems using surface water, and every 5 years for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with the appropriate GoJ authorities.

C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, at a minimum, must be disinfected.

C3.3.1.6. Maintain a continuous positive pressure of at least 20 pounds per square inch (psi) in the water distribution system.

C3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

C3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority);

C3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing);

C3.3.1.7.3. An effective annual water main flushing program;

C3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs; and

C3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

C3.3.1.8. Establish an effective cross connection control and backflow prevention program.

C3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

C3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

C3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption:

C3.3.1.10.2. Identification of key personnel;

C3.3.1.10.3. Procedures to restore service;

C3.3.1.10.4. Procedures to isolate damaged lines;

C3.3.1.10.5. Identification of alternative water supplies; and

C3.3.1.10.6. Installation public notification procedures.

C3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years.

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least 3 years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

C3.3.1.14. Conduct vulnerability assessments, which include, but are not limited to, a review of:

C3.3.1.14.1. Pipes and constructed conveyances, physical barriers, water collection, pretreatment, treatment, storage, and distribution facilities, electronic, computer, or other automated systems utilized by the PWS;

C3.3.1.14.2. Use, storage, or handling of various chemicals; and

C3.3.1.14.3. Operation and maintenance of the water storage, treatment, and distribution systems.

C3.3.2. Regardless of whether a DoD water system produces or purchases water, it will, by independent testing or validated supplier testing, ensure conformance with the following:

C3.3.2.1. Total Coliform Bacteria Requirements

C3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining 40 or more samples a month, and no more than 1 positive sample per month when a system analyzes less than 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms or *E. coli* or any repeat sample is positive for total coliforms.

C3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table C3.T2, “Total Coliform Monitoring Frequency.”

C3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and downstream sample, each within 5 service connections of the original tap. Any additional repeat sampling which may be

required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

C3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

C3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection C3.3.3 to:

C3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

C3.3.2.2. Inorganic Chemical Requirements

C3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed for human consumption does not exceed applicable limitations set out in Table C3.T3. Except for nitrate, nitrite, and total nitrate/nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For nitrate, nitrite, and total nitrate/nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

C3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table C3.T4., “Inorganics Monitoring Requirements.”

C3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph C3.3.3 as soon as possible. If the nitrate, nitrite, or total nitrate and nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

C3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table C3.T4, "Inorganics Monitoring Requirements," until remedial actions are completed and authorities determine the system is reliable and consistent.

C3.3.2.2.4. The MCL for arsenic applies to CWS and NTNCWS.

C3.3.2.3. Fluoride Requirements

C3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L, as stated in Table C3.T3, "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting 1 treated water sample annually at the entry point to the distribution system for surface water systems, and once every 3 years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table C3.T5, "Recommended Fluoride Concentrations at Different Temperatures."

C3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.4. Lead and Copper Requirements

C3.3.2.4.1. DoD CWS and NTNCWS will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead or copper levels are exceeded in more than 10% of all sampled taps.

C3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table C3.T6, "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table C3.T6.

C3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table C3.T6, "Monitoring Requirements for Lead and Copper Water Quality Parameters." Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and Japanese) within 60 days and will complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.5. Synthetic Organics Requirements

C3.3.2.5.1. An installation responsible for CWS and NTNCWS will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table C3.T7, "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

C3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table C3.T8, "Synthetic Organic Chemical Monitoring Requirements."

C3.3.2.5.3. If a system is out of compliance, the notification set out in paragraph C3.3.3 shall be completed as soon as possible, but in no case later than 14 days after the violation. The installation will immediately begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL, as noted in Table C3.T8, "Synthetic Organic Chemical Monitoring Requirements," and will continue until the installation commander determines the system is back in compliance, and all necessary remedial measures have been implemented.

C3.3.2.6. Disinfectant/Disinfection Byproducts (DDBP) Requirements

C3.3.2.6.1. An installation responsible for a CWS and NTNCWS that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

C3.3.2.6.1.1. Ensure that the MCL of 0.08 mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of 1.0 mg/L for chlorite, and the MCL of 0.01 mg/L for bromate are not exceeded in drinking water.

C3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of 4.0 mg/L for chlorine, the MRDL of 4.0 mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are not exceeded in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

C3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table C3.T9, "Disinfectant/Disinfection Byproducts Monitoring Requirements." Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone are also included in Table C3.T9.

C3.3.2.6.3. For TTHM and HAA5, a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table C3.T9 for chlorine, chloramine, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table C3.T9, the installation will accomplish the notification requirements outlined in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

C3.3.2.7. Radionuclide Requirements

C3.3.2.7.1. An installation responsible for a CWS will test the system for conformance with the applicable radionuclide limits contained in Table C3.T10, "Radionuclide MCLs and Monitoring Requirements."

C3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table C3.T10.

C3.3.2.7.3. If the average annual MCL for gross alpha activity is exceeded, the installation will complete the notification according to the procedures in paragraph C3.3.3 within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

C3.3.2.8. Surface Water Treatment Requirements. DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table C3.T1. If the turbidity readings in Table C3.T1 are exceeded, the installation will complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DDBP requirements (paragraph C3.3.2.6), will ensure that protection from microbial pathogens is not compromised.

C3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored for total coliforms, at a minimum, and disinfectant residuals periodically.

C3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources, including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

C3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct and conventional filtration processes. This requirement only applies to DoD PWSs that:

C3.3.2.11.1. Use surface water or GWUDISW;

C3.3.2.11.2. Use direct or conventional filtration processes; and

C3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

C3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and Japanese) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps being taken to correct the violation, the necessity for seeking an alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of the appropriate GoJ authorities in cases where off-installation populations are at risk.

C3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

Table C3.T1. Surface Water Treatment Requirements

**1. Unfiltered Systems**

a. Systems which use unfiltered surface water or GUDISW will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily, and must continue as long as the unfiltered system is in operation. If the total coliforms and/or fecal coliforms exceed 100/100 milliliters (mL) and 20/100 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU).

b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T11 through C3.T24.

c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.

d. Disinfectant residual monitoring immediately after disinfection is required once every 4 hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made at the same times as total coliforms are sampled.

e. Disinfectant residual of water entering the distribution system cannot be < 0.2 mg/L for more than 4 hours.

f. Water in a distribution system with a heterotrophic bacteria concentration ≤ 500/mL measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.

g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

**2. Filtered Systems**

a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.

b. The turbidity of filtered water will be monitored at least once every 4 hours. The turbidity of filtered water for direct and conventional filtration systems will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.

c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

*Proper conventional treatment typically removes 2.5-log *Giardia*/ 2.0-log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0-log *Giardia*/ 1.0-log viruses. Slow sand filtration removes typically removes 2.0-log *Giardia*/ 2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.

**3. SW or GWUDISW systems** will provide at least 99% (2-log) removal of *Cryptosporidium*. A system is considered to be compliant with the *Cryptosporidium* removal requirements if:

a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU.

b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs.

c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of *Giardia lamblia* cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of *Cryptosporidium* oocysts.

d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1a above to remain unfiltered.

**4. Individual Filter Effluent Monitoring**. Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for 3 months in a row (for the same filter), the installation must conduct a self assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.

**5. Covers for Finished Water Storage Facilities**. Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table C3.T2. Total Coliform Monitoring Frequency

| Population Served | Number of Samples [1] | Population Served | Number of Samples [1] |
|---|---|---|---|
| 25 to 1,000 [2] | 1 | 59,001 to 70,000 | 70 |
| 1,001 to 2,500 | 2 | 70,001 to 83,000 | 80 |
| 2,501 to 3,300 | 3 | 83,001 to 96,000 | 90 |
| 3,301 to 4,100 | 4 | 96,001 to 130,000 | 100 |
| 4,101 to 4,900 | 5 | 130,001 to 220,000 | 120 |
| 4,901 to 5,800 | 6 | 220,001 to 320,000 | 150 |
| 5,801 to 6,700 | 7 | 320,001 to 450,000 | 180 |
| 6,701 to 7,600 | 8 | 450,001 to 600,000 | 210 |
| 7,601 to 8,500 | 9 | 600,001 to 780,000 | 240 |
| 8,501 to 12,900 | 10 | 780,001 to 970,000 | 270 |
| 12,901 to 17,200 | 15 | 970,001 to 1,230,000 | 300 |
| 17,201 to 21,500 | 20 | 1,230,001 to 1,520,000 | 330 |
| 21,501 to 25,000 | 25 | 1,520,001 to 1,850,000 | 360 |
| 25,001 to 33,000 | 30 | 1,850,001 to 2,270,000 | 390 |
| 33,001 to 41,000 | 40 | 2,270,001 to 3,020,000 | 420 |
| 41,001 to 50,000 | 50 | 3,020,001 to 3,960,000 | 450 |
| 50,001 to 59,000 | 60 | 3,960,001 or more | 480 |

**Notes:**

1. Minimum Number of Routine Samples Per Month
2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve < 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table C3.T3. Inorganic Chemical MCLs

| Contaminant | MCL | |
|---|---|---|
| Arsenic [1] | 0.010 | mg/L |
| Antimony [1] | 0.006 | mg/L |
| Asbestos [1] | $7 \times 10^6$ | fibers/L (longer than 10 um) |
| Barium | 2.0 | mg/L |
| Beryllium [1] | 0.004 | mg/L |
| Cadmium [1] | 0.003 | mg/L |
| Chromium [1] | 0.05 | mg/L |
| Cyanide [1] | 0.01 | mg/L (as free cyanide) |
| Fluoride [2] | 4.0 | mg/L |
| Mercury [1] | 0.0005 | mg/L |
| Nickel [1] | 0.1 | mg/L |
| Nitrate [3] | 10 | mg/L (as N) |
| Nitrite [3] | 1 | mg/L (as N) |
| Total Nitrite and Nitrate [3] | 10 | mg/L (as N) |
| Selenium [1] | 0.01 | mg/L |
| Sodium | 200 | mg/L |
| Thallium | 0.002 | mg/L |

**Notes:**
1. MCLs apply to CWS and NTNCWS.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNCWS, and TNCWS.

Table C3.T4. Inorganics Monitoring Requirements

| Contaminant | Groundwater Baseline Requirement [1] | Surface Water Baseline Requirement | Trigger That Increases Monitoring [2] | Reduced Monitoring |
|---|---|---|---|---|
| Arsenic | 1 sample / 3 yr | Annual sample | >MCL | --- |
| Antimony | | | | --- |
| Barium | | | | --- |
| Beryllium | | | | --- |
| Cadmium | | | | --- |
| Chromium | | | | --- |
| Cyanide | | | | --- |
| Fluoride | | | | --- |
| Mercury | | | | --- |
| Nickel | | | | --- |
| Selenium | | | | --- |
| Thallium | | | | --- |
| Sodium | | | --- | --- |
| Asbestos [3] | 1 sample every 9 years | 1 sample every 9 years | >MCL | Yes |
| Total Nitrate/Nitrite | Annual sample | Quarterly | >50% Nitrite MCL | --- |
| Nitrate | Annual sample [4] | Quarterly [4] | >50% MCL [5] | Yes [6] |
| Nitrite | Annual sample [4] | Quarterly [4] | >50% MCL [5] | Yes [7] |
| Corrosivity [8] | Once | Once | --- | --- |

**Notes:**

1. Samples shall be taken as follows: groundwater systems shall take a minimum of 1 sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least 1 sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a sanitary survey conducted by the PWS.
4. Any sampling point with an analytical value ≥ 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50% of MCL.
8. Two samples (1 mid-winter and 1 mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Saturation Index.

Table C3.T5. Recommended Fluoride Concentrations at Different Temperatures

| Annual Average of Maximum Daily Air Temperatures (°F) | Control Limits (mg/L) | | |
|---|---|---|---|
| | Lower | Optimum | Upper |
| 50.0 - 53.7 | 0.9 | 1.2 | 1.7 |
| 53.8 - 58.3 | 0.8 | 1.1 | 1.5 |
| 58.4 - 63.8 | 0.8 | 1.0 | 1.3 |
| 63.9 - 70.6 | 0.7 | 0.9 | 1.2 |
| 70.7 - 79.2 | 0.7 | 0.8 | 1.0 |
| 79.3 - 90.5 | 0.6 | 0.7 | 0.8 |

Table C3.T6. Monitoring Requirements for Lead and Copper Water Quality Parameters

| Population Served | No. of Sites for Standard Monitoring [1, 2] | No. of Sites for Reduced Monitoring [3] | No. of Sites for Water Quality Parameters [4] |
|---|---|---|---|
| >100,000 | 100 | 50 | 25 |
| 10,001 - 100,000 | 60 | 30 | 10 |
| 3,301 - 10,000 | 40 | 20 | 3 |
| 501 - 3,300 | 20 | 10 | 2 |
| 101 - 500 | 10 | 5 | 1 |
| <100 | 5 | 5 | 1 |

**Notes:**

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multi-family residences with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNCWS, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6-month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during 3 consecutive years may reduce the monitoring for lead and copper from annually to once every 3 years. Annual or triennial sampling will be conducted during the 4 warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table C3.T7. Synthetic Organic Chemical MCLs

| Synthetic Organic Chemical | mg/L | Detection limit, mg/L |
|---|---|---|
| **Pesticides/PCBs** | | |
| Alachlor | 0.002 | 0.0002 |
| Aldicarb | 0.003 | 0.0005 |
| Aldicarb sulfone | 0.003 | 0.0008 |
| Aldicarb sulfoxide | 0.004 | 0.0005 |
| Atrazine | 0.003 | 0.0001 |
| Benzo[a]pyrene | 0.0002 | |
| Carbofuran | 0.04 | 0.0009 |
| Chlordane | 0.002 | 0.0002 |
| Dalapon | 0.2 | |
| 2,4-D | 0.07 | 0.0001 |
| 1,2-Dibromo-3-chloropropane (DBCP) | 0.0002 | 0.00002 |
| Di (2-ethylhexyl) adipate | 0.4 | |
| Di (2-ethylhexyl) phthalate | 0.006 | |
| Dinoseb | 0.007 | |
| Diquat | 0.02 | |
| Endrin | 0.002 | 0.00002 |
| Endothall | 0.1 | |
| Ethylene dibromide (EDB) | 0.00005 | 0.00001 |
| Glyphosphate | 0.7 | |
| Heptachlor | 0.0004 | 0.00004 |
| Heptachlorepoxide | 0.0002 | 0.00002 |
| Hexachlorobenzene | 0.001 | |
| Hexachlorocyclopentadiene | 0.05 | |
| Lindane | 0.0002 | 0.00002 |
| Methoxychlor | 0.04 | 0.0001 |
| Oxamyl (Vydate) | 0.2 | |
| PCBs (as decachlorobiphenyls) | 0.0005 | 0.0001 |
| Pentachlorophenol | 0.001 | 0.00004 |
| Picloram | 0.5 | |
| Simazine | 0.004 | |
| 2,3,7,8-TCDD (Dioxin) | 0.00000003 | |
| Toxaphene | 0.003 | 0.001 |
| 2,4,5-TP (Silvex) | 0.05 | 0.0002 |
| **Volatile Organic Chemicals** | | |
| Benzene | 0.005 | 0.0005 |
| Carbon tetrachloride | 0.005 | 0.0005 |
| o-Dichlorobenzene | 0.6 | 0.0005 |
| cis-1,2-Dichloroethylene | 0.07 | 0.0005 |
| trans-1,2-Dichloroethylene | 0.1 | 0.0005 |
| 1,1-Dichloroethylene | 0.007 | 0.0005 |
| 1,1,1-Trichloroethane | 0.20 | 0.0005 |
| 1,2-Dichloroethane | 0.005 | 0.0005 |
| Dichloromethane | 0.005 | |
| 1,1,2-Trichloroethane | 0.005 | |
| 1,2,4-Trichloro-benzene | 0.07 | |
| 1,2-Dichloropropane | 0.005 | 0.0005 |
| Ethylbenzene | 0.7 | 0.0005 |
| Monochlorobenzene | 0.1 | 0.0005 |
| para-Dichlorobenzene | 0.075 | 0.0005 |

Table C3.T7. Synthetic Organic Chemical MCLs

| Synthetic Organic Chemical | mg/L | Detection limit, mg/L |
|---|---|---|
| Styrene | 0.1 | 0.0005 |
| Tetrachloroethylene | 0.005 | 0.0005 |
| Trichloroethylene | 0.005 | 0.0005 |
| Toluene | 1.0 | 0.0005 |
| Vinyl chloride | 0.002 | 0.0005 |
| Xylene (total) | 10 | 0.0005 |
| **Other Organics** | | |
| Acrylamide | 0.05% dosed at 1 ppm [1] | |
| Epihydrochlorin | treatment technique 0.01% dosed at 20 ppm [1] | |

**Note:**

1. Only applies when adding these polymer flocculants to the treatment process. No sampling is required, the system certifies that dosing is within specified limits.

Table C3.T8. Synthetic Organic Chemical Monitoring Requirements

| Contaminant | Base Requirement [1] | | Trigger for more monitoring [2] | Reduced monitoring |
|---|---|---|---|---|
| | Groundwater | Surface water | | |
| VOCs | Quarterly | Quarterly | >0.0005 mg/L | Yes [3, 4] |
| Pesticides/PCBs | 4 quarterly samples/3 years during most likely period for their presence | | >Detection limit [5] | Yes [4, 6] |

**Notes:**

1. Groundwater systems shall take a minimum of 1 sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of 1 sample at every entry point to the distribution system at a point which is representative of each source after treatment. (4 quarterly samples/ 3 years equates to 1 sample per quarter over 4 consecutive quarters within a period of 3 years (4 samples every 3 years))
2. Increased monitoring requires a minimum of 2 quarterly samples (1 sample per quarter for 2 consecutive quarters) for groundwater systems, and at least 4 quarterly samples (1 sample per quarter for 4 consecutive quarters) for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after 3 rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a sanitary survey of the PWS.
5. Detection limits noted in Table C3.T7, or as determined by the best available testing methods.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection: systems >3,300 reduce to a minimum of 2 quarterly samples in 1 year during each repeat compliance period (1 sample per quarter over 2 consecutive quarters within 1 year during a period of 3 years), or systems <3,300 reduce to a minimum of 1 sample every 3 years.
7. Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements

| Source Water Type | Population Served by System | Analyte & Frequency of Samples | Number of Samples |
|---|---|---|---|
| Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW) | 10,000 or more | TTHM & HAA5 – Quarterly[1,2] | 4[1,2,3] |
| | Serving 500 to 9,999 | TTHM & HAA5 - Quarterly[4] | 1[5,6] |
| | 499 or less | TTHM & HAA5 - Yearly | 1[7,8] |
| Ground Water (GW) | 10,000 or more | TTHM & HAA5 - Quarterly[9] | 1[10,11] |
| | 9,999 or less | TTHM & HAA5 - Yearly[12] | 1[13,14] |
| ALL | | Chlorite - Daily & Monthly[15,16,17,18] | |
| | | Bromate - Monthly[19,20] | |
| | | Chlorine[21,22] | |
| | | Chloramines[23,24] | |
| | | Chlorine Dioxide[25,26,27] | |
| | | TOC[28] | |

**Notes:**

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.
2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least 1 year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to 1 sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.
5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to 1 sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.
6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to 1 sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HAA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

10. System may reduce monitoring to 1 sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least 1 year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HAA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to 1 sample per 3-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least 1 year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HAA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A 3-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.
17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of 1 year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any 3-sample set (i.e., 1 monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least 1 sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is <0.05 mg/L based upon monthly measurements for 1 year.
20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, 3 additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take 3 samples in the distribution system as close as possible to the first customer at intervals of not less than 6 hours.
26. If any daily sample from the distribution system exceeds the MRDL and if 1 or more of the 3 samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any 2 consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following an exceedance of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of <2.0 mg/L for 2 consecutive years, or <1.0 mg/L for 1 year, may reduce TOC and alkalinity to 1 paired sample per plant per quarter.

Table C3.T10. Radionuclide MCLs and Monitoring Requirements

| Contaminant | MCL |
|---|---|
| Gross Alpha[1] | 15 pCi/L |
| Combined Radium-226 and -228 | 5 pCi/L |
| Uranium | 30 $\mu$g/L |
| Beta Particle and Photon Radioactivity[2] | 4 mrem/year |

**Notes:**

1. Gross alpha activity includes radium-226, but excludes radon and uranium.
2. Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides. The installation is only required to sample for beta and photon radioactivity when the water system has been designated as vulnerable. The determination on whether the water system is vulnerable is based on the vulnerability assessment as required by JEGS C3.3.1.14.

**Monitoring Requirements:**

All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, and uranium systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of 4 samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha activity may be analyzed alone if activity is <5 picocuries per liter (pCi/L). Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the MCL, analysis of a single sample (1 sample every 4 years) may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Monitoring for beta particle and photon radioactivity is only required when the water system has been designated as vulnerable. Systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system. The MCL is an annual dose equivalent to the total body or any internal organ from manmade radionuclides. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate screening level (50 pCi/L), an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate dose must be calculated and summed to determine compliance with MCL. Dose must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

Table C3.T11. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 0.5°C or Lower*

| Chlorine Concentration (mg/L) | pH ≤ 6 Log Inactivations | | | | | | pH = 6.5 Log Inactivations | | | | | | pH = 7.0 Log Inactivations | | | | | | pH = 7.5 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 23 | 46 | 69 | 91 | 114 | 137 | 27 | 54 | 82 | 109 | 136 | 163 | 33 | 65 | 98 | 130 | 163 | 195 | 40 | 79 | 119 | 158 | 198 | 237 |
| **0.6** | 24 | 47 | 71 | 94 | 118 | 141 | 28 | 56 | 84 | 112 | 140 | 168 | 33 | 67 | 100 | 133 | 167 | 200 | 40 | 80 | 120 | 159 | 199 | 239 |
| **0.8** | 24 | 48 | 73 | 97 | 121 | 145 | 29 | 57 | 86 | 115 | 143 | 172 | 34 | 68 | 103 | 137 | 171 | 205 | 41 | 82 | 123 | 164 | 205 | 246 |
| **1** | 25 | 49 | 74 | 99 | 123 | 148 | 29 | 59 | 88 | 117 | 147 | 176 | 35 | 70 | 105 | 140 | 175 | 210 | 42 | 84 | 127 | 169 | 211 | 253 |
| **1.2** | 25 | 51 | 76 | 101 | 127 | 152 | 30 | 60 | 90 | 120 | 150 | 180 | 36 | 72 | 108 | 143 | 179 | 215 | 43 | 86 | 130 | 173 | 216 | 259 |
| **1.4** | 26 | 52 | 78 | 103 | 129 | 155 | 31 | 61 | 92 | 123 | 153 | 184 | 37 | 74 | 111 | 147 | 184 | 221 | 44 | 89 | 133 | 177 | 222 | 266 |
| **1.6** | 26 | 52 | 79 | 105 | 131 | 157 | 32 | 63 | 95 | 126 | 158 | 189 | 38 | 75 | 113 | 151 | 188 | 226 | 46 | 91 | 137 | 182 | 228 | 273 |
| **1.8** | 27 | 54 | 81 | 108 | 135 | 162 | 32 | 64 | 97 | 129 | 161 | 193 | 39 | 77 | 116 | 154 | 193 | 231 | 47 | 93 | 140 | 186 | 233 | 279 |
| **2** | 28 | 55 | 83 | 110 | 138 | 165 | 33 | 66 | 99 | 131 | 164 | 197 | 39 | 79 | 118 | 157 | 197 | 236 | 48 | 95 | 143 | 191 | 238 | 286 |
| **2.2** | 28 | 56 | 85 | 113 | 141 | 169 | 34 | 67 | 101 | 134 | 168 | 201 | 40 | 81 | 121 | 161 | 202 | 242 | 50 | 99 | 149 | 198 | 248 | 297 |
| **2.4** | 29 | 57 | 86 | 115 | 143 | 172 | 34 | 68 | 103 | 137 | 171 | 205 | 41 | 82 | 124 | 165 | 206 | 247 | 50 | 99 | 149 | 199 | 248 | 298 |
| **2.6** | 29 | 58 | 88 | 117 | 146 | 175 | 35 | 70 | 105 | 139 | 174 | 209 | 42 | 84 | 126 | 168 | 210 | 252 | 51 | 101 | 152 | 203 | 253 | 304 |
| **2.8** | 30 | 59 | 89 | 119 | 148 | 178 | 36 | 71 | 107 | 142 | 178 | 213 | 43 | 86 | 129 | 171 | 214 | 257 | 52 | 103 | 155 | 207 | 258 | 310 |
| **3** | 30 | 60 | 91 | 121 | 151 | 181 | 36 | 72 | 109 | 145 | 181 | 217 | 44 | 87 | 131 | 174 | 218 | 261 | 53 | 105 | 158 | 211 | 263 | 316 |
| **Chlorine Concentration (mg/L)** | **pH= 8 Log Inactivations** | | | | | | **pH = 8.5 Log Inactivations** | | | | | | **pH = 9.0 Log Inactivations** | | | | | | | | | | | |
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | | | | | | |
| **≤0.4** | 46 | 92 | 139 | 185 | 231 | 277 | 55 | 110 | 165 | 219 | 274 | 329 | 65 | 130 | 195 | 260 | 325 | 390 | | | | | | |
| **0.6** | 48 | 95 | 143 | 191 | 238 | 286 | 57 | 114 | 171 | 228 | 285 | 342 | 68 | 136 | 204 | 271 | 339 | 407 | | | | | | |
| **0.8** | 49 | 98 | 148 | 197 | 246 | 295 | 59 | 118 | 177 | 236 | 295 | 354 | 70 | 141 | 211 | 281 | 352 | 422 | | | | | | |
| **1** | 51 | 101 | 152 | 203 | 253 | 304 | 61 | 122 | 183 | 243 | 304 | 365 | 73 | 146 | 219 | 291 | 364 | 437 | | | | | | |
| **1.2** | 52 | 104 | 157 | 209 | 261 | 313 | 63 | 125 | 188 | 251 | 313 | 376 | 75 | 150 | 226 | 301 | 376 | 451 | | | | | | |
| **1.4** | 54 | 107 | 161 | 214 | 268 | 321 | 65 | 129 | 194 | 258 | 323 | 387 | 77 | 155 | 232 | 309 | 387 | 464 | | | | | | |
| **1.6** | 55 | 110 | 165 | 219 | 274 | 329 | 66 | 132 | 199 | 265 | 331 | 397 | 80 | 159 | 239 | 318 | 398 | 477 | | | | | | |
| **1.8** | 56 | 113 | 169 | 225 | 282 | 338 | 68 | 136 | 204 | 271 | 339 | 407 | 82 | 163 | 245 | 326 | 408 | 489 | | | | | | |
| **2** | 58 | 115 | 173 | 231 | 288 | 346 | 70 | 139 | 209 | 278 | 348 | 417 | 83 | 167 | 250 | 333 | 417 | 500 | | | | | | |
| **2.2** | 59 | 118 | 177 | 235 | 294 | 353 | 71 | 142 | 213 | 284 | 355 | 426 | 85 | 170 | 256 | 341 | 426 | 511 | | | | | | |
| **2.4** | 60 | 120 | 181 | 241 | 301 | 361 | 73 | 145 | 218 | 290 | 363 | 435 | 87 | 174 | 261 | 348 | 435 | 522 | | | | | | |
| **2.6** | 61 | 123 | 184 | 245 | 307 | 368 | 74 | 148 | 222 | 296 | 370 | 444 | 89 | 178 | 267 | 355 | 444 | 533 | | | | | | |
| **2.8** | 63 | 125 | 188 | 250 | 313 | 375 | 75 | 151 | 226 | 301 | 377 | 452 | 91 | 181 | 272 | 362 | 453 | 543 | | | | | | |
| **3** | 64 | 127 | 191 | 255 | 318 | 382 | 77 | 153 | 230 | 307 | 383 | 460 | 92 | 184 | 276 | 368 | 460 | 552 | | | | | | |

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T12. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 5.0°C*

| Chlorine Concentration (mg/L) | pH ≤ 6 Log Inactivations | | | | | | pH = 6.5 Log Inactivations | | | | | | pH = 7.0 Log Inactivations | | | | | | pH = 7.5 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 16 | 32 | 49 | 65 | 81 | 97 | 20 | 39 | 59 | 78 | 98 | 117 | 23 | 46 | 70 | 93 | 116 | 139 | 28 | 55 | 83 | 111 | 138 | 166 |
| **0.6** | 17 | 33 | 50 | 67 | 83 | 100 | 20 | 40 | 60 | 80 | 100 | 120 | 24 | 48 | 72 | 95 | 119 | 143 | 29 | 57 | 86 | 114 | 143 | 171 |
| **0.8** | 17 | 34 | 52 | 69 | 86 | 103 | 20 | 41 | 61 | 81 | 102 | 122 | 24 | 49 | 73 | 97 | 122 | 146 | 29 | 58 | 88 | 117 | 146 | 175 |
| **1** | 18 | 35 | 53 | 70 | 88 | 105 | 21 | 42 | 63 | 83 | 104 | 125 | 25 | 50 | 75 | 99 | 124 | 149 | 30 | 60 | 90 | 119 | 149 | 179 |
| **1.2** | 18 | 36 | 54 | 71 | 89 | 107 | 21 | 42 | 64 | 85 | 106 | 127 | 25 | 51 | 76 | 101 | 127 | 152 | 31 | 61 | 92 | 122 | 153 | 183 |
| **1.4** | 18 | 36 | 55 | 73 | 91 | 109 | 22 | 43 | 65 | 87 | 108 | 130 | 26 | 52 | 78 | 103 | 129 | 155 | 31 | 62 | 94 | 125 | 156 | 187 |
| **1.6** | 19 | 37 | 56 | 74 | 93 | 111 | 22 | 44 | 66 | 88 | 110 | 132 | 26 | 53 | 79 | 105 | 132 | 158 | 32 | 64 | 96 | 128 | 160 | 192 |
| **1.8** | 19 | 38 | 57 | 76 | 95 | 114 | 23 | 45 | 68 | 90 | 113 | 135 | 27 | 54 | 81 | 108 | 135 | 162 | 33 | 65 | 98 | 131 | 163 | 196 |
| **2** | 19 | 39 | 58 | 77 | 97 | 116 | 23 | 46 | 69 | 92 | 115 | 138 | 28 | 55 | 83 | 110 | 138 | 165 | 33 | 67 | 100 | 133 | 167 | 200 |
| **2.2** | 20 | 39 | 59 | 79 | 98 | 118 | 23 | 47 | 70 | 93 | 117 | 140 | 28 | 56 | 85 | 113 | 141 | 169 | 34 | 68 | 102 | 136 | 170 | 204 |
| **2.4** | 20 | 40 | 60 | 80 | 100 | 120 | 24 | 48 | 72 | 95 | 119 | 143 | 29 | 57 | 86 | 115 | 143 | 172 | 35 | 70 | 105 | 139 | 174 | 209 |
| **2.6** | 20 | 41 | 61 | 81 | 102 | 122 | 24 | 49 | 73 | 97 | 122 | 146 | 29 | 58 | 88 | 117 | 146 | 175 | 36 | 71 | 107 | 142 | 178 | 213 |
| **2.8** | 21 | 41 | 62 | 83 | 103 | 124 | 25 | 49 | 74 | 99 | 123 | 148 | 30 | 59 | 89 | 119 | 148 | 178 | 36 | 72 | 109 | 145 | 181 | 217 |
| **3** | 21 | 42 | 63 | 84 | 105 | 126 | 25 | 50 | 76 | 101 | 126 | 151 | 30 | 61 | 91 | 121 | 152 | 182 | 37 | 74 | 111 | 147 | 184 | 221 |

| Chlorine Concentration (mg/L) | pH= 8 Log Inactivations | | | | | | pH = 8.5 Log Inactivations | | | | | | pH = 9.0 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 33 | 66 | 99 | 132 | 165 | 198 | 39 | 79 | 118 | 157 | 197 | 236 | 47 | 93 | 140 | 186 | 233 | 279 |
| **0.6** | 34 | 68 | 102 | 136 | 170 | 204 | 41 | 81 | 122 | 163 | 203 | 244 | 49 | 97 | 146 | 194 | 243 | 291 |
| **0.8** | 35 | 70 | 105 | 140 | 175 | 210 | 42 | 84 | 126 | 168 | 210 | 252 | 50 | 100 | 151 | 201 | 251 | 301 |
| **1** | 36 | 72 | 108 | 144 | 180 | 216 | 43 | 87 | 130 | 173 | 217 | 260 | 52 | 104 | 156 | 208 | 260 | 312 |
| **1.2** | 37 | 74 | 111 | 147 | 184 | 221 | 45 | 89 | 134 | 178 | 223 | 267 | 53 | 107 | 160 | 213 | 267 | 320 |
| **1.4** | 38 | 76 | 114 | 151 | 189 | 227 | 46 | 91 | 137 | 183 | 228 | 274 | 55 | 110 | 165 | 219 | 274 | 329 |
| **1.6** | 39 | 77 | 116 | 155 | 193 | 232 | 47 | 94 | 141 | 187 | 234 | 281 | 56 | 112 | 169 | 225 | 281 | 337 |
| **1.8** | 40 | 79 | 119 | 159 | 198 | 238 | 48 | 96 | 144 | 191 | 239 | 287 | 58 | 115 | 173 | 230 | 288 | 345 |
| **2** | 41 | 81 | 122 | 162 | 203 | 243 | 49 | 98 | 147 | 196 | 245 | 294 | 59 | 118 | 177 | 235 | 294 | 353 |
| **2.2** | 41 | 83 | 124 | 165 | 207 | 248 | 50 | 100 | 150 | 200 | 250 | 300 | 60 | 120 | 181 | 241 | 301 | 361 |
| **2.4** | 42 | 84 | 127 | 169 | 211 | 253 | 51 | 102 | 153 | 204 | 255 | 306 | 61 | 123 | 184 | 245 | 307 | 368 |
| **2.6** | 43 | 86 | 129 | 172 | 215 | 258 | 52 | 104 | 156 | 208 | 260 | 312 | 63 | 125 | 188 | 250 | 313 | 375 |
| **2.8** | 44 | 88 | 132 | 175 | 219 | 263 | 53 | 106 | 159 | 212 | 265 | 318 | 64 | 127 | 191 | 255 | 318 | 382 |
| **3** | 45 | 89 | 134 | 179 | 223 | 268 | 54 | 108 | 162 | 216 | 270 | 324 | 65 | 130 | 195 | 259 | 324 | 389 |

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T13. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 10°C*

| Chlorine Concentration (mg/L) | pH ≤ 6 Log Inactivations | | | | | | pH = 6.5 Log Inactivations | | | | | | pH = 7.0 Log Inactivations | | | | | | pH = 7.5 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 12 | 24 | 37 | 49 | 61 | 73 | 15 | 29 | 44 | 59 | 73 | 88 | 17 | 35 | 52 | 69 | 87 | 104 | 21 | 42 | 63 | 83 | 104 | 125 |
| **0.6** | 13 | 25 | 38 | 50 | 63 | 75 | 15 | 30 | 45 | 60 | 75 | 90 | 18 | 36 | 54 | 71 | 89 | 107 | 21 | 43 | 64 | 85 | 107 | 128 |
| **0.8** | 13 | 26 | 39 | 52 | 65 | 78 | 15 | 31 | 46 | 61 | 77 | 92 | 18 | 37 | 55 | 73 | 92 | 110 | 22 | 44 | 66 | 87 | 109 | 131 |
| **1** | 13 | 26 | 40 | 53 | 66 | 79 | 16 | 31 | 47 | 63 | 78 | 94 | 19 | 37 | 56 | 75 | 93 | 112 | 22 | 45 | 67 | 89 | 112 | 134 |
| **1.2** | 13 | 27 | 40 | 53 | 67 | 80 | 16 | 32 | 48 | 63 | 79 | 95 | 19 | 38 | 57 | 76 | 95 | 114 | 23 | 46 | 69 | 91 | 114 | 137 |
| **1.4** | 14 | 27 | 41 | 55 | 68 | 82 | 16 | 33 | 49 | 65 | 82 | 98 | 19 | 39 | 58 | 77 | 97 | 116 | 23 | 47 | 70 | 93 | 117 | 140 |
| **1.6** | 14 | 28 | 42 | 55 | 69 | 83 | 17 | 33 | 50 | 66 | 83 | 99 | 20 | 40 | 60 | 79 | 99 | 119 | 24 | 48 | 72 | 96 | 120 | 144 |
| **1.8** | 14 | 29 | 43 | 57 | 72 | 86 | 17 | 34 | 51 | 67 | 84 | 101 | 20 | 41 | 61 | 81 | 102 | 122 | 25 | 49 | 74 | 98 | 123 | 147 |
| **2** | 15 | 29 | 44 | 58 | 73 | 87 | 17 | 35 | 52 | 69 | 87 | 104 | 21 | 41 | 62 | 83 | 103 | 124 | 25 | 50 | 75 | 100 | 125 | 150 |
| **2.2** | 15 | 30 | 45 | 59 | 74 | 89 | 18 | 35 | 53 | 70 | 88 | 105 | 21 | 42 | 64 | 85 | 106 | 127 | 26 | 51 | 77 | 102 | 128 | 153 |
| **2.4** | 15 | 30 | 45 | 60 | 75 | 90 | 18 | 36 | 54 | 71 | 89 | 107 | 22 | 43 | 65 | 86 | 108 | 129 | 26 | 52 | 79 | 105 | 131 | 157 |
| **2.6** | 15 | 31 | 46 | 61 | 77 | 92 | 18 | 37 | 55 | 73 | 92 | 110 | 22 | 44 | 66 | 87 | 109 | 131 | 27 | 53 | 80 | 107 | 133 | 160 |
| **2.8** | 16 | 31 | 47 | 62 | 78 | 93 | 19 | 37 | 56 | 74 | 93 | 111 | 22 | 45 | 67 | 89 | 112 | 134 | 27 | 54 | 82 | 109 | 136 | 163 |
| **3** | 16 | 32 | 48 | 63 | 79 | 95 | 19 | 38 | 57 | 75 | 94 | 113 | 23 | 46 | 69 | 91 | 114 | 137 | 28 | 55 | 83 | 111 | 138 | 166 |
| **Chlorine Concentration (mg/L)** | **pH= 8 Log Inactivations** | | | | | | **pH = 8.5 Log Inactivations** | | | | | | **pH = 9.0 Log Inactivations** | | | | | |
| | **0.5** | **1.0** | **1.5** | **2.0** | **2.5** | **3.0** | **0.5** | **1.0** | **1.5** | **2.0** | **2.5** | **3.0** | **0.5** | **1.0** | **1.5** | **2.0** | **2.5** | **3.0** |
| **≤0.4** | 25 | 50 | 75 | 99 | 124 | 149 | 30 | 59 | 89 | 118 | 148 | 177 | 35 | 70 | 105 | 139 | 174 | 209 |
| **0.6** | 26 | 51 | 77 | 102 | 128 | 153 | 31 | 61 | 92 | 122 | 153 | 183 | 36 | 73 | 109 | 145 | 182 | 218 |
| **0.8** | 26 | 53 | 79 | 105 | 132 | 158 | 32 | 63 | 95 | 126 | 158 | 189 | 38 | 75 | 113 | 151 | 188 | 226 |
| **1** | 27 | 54 | 81 | 108 | 135 | 162 | 33 | 65 | 98 | 130 | 163 | 195 | 39 | 78 | 117 | 156 | 195 | 234 |
| **1.2** | 28 | 55 | 83 | 111 | 138 | 166 | 33 | 67 | 100 | 133 | 167 | 200 | 40 | 80 | 120 | 160 | 200 | 240 |
| **1.4** | 28 | 57 | 85 | 113 | 142 | 170 | 34 | 69 | 103 | 137 | 172 | 206 | 41 | 82 | 124 | 165 | 206 | 247 |
| **1.6** | 29 | 58 | 87 | 116 | 145 | 174 | 35 | 70 | 106 | 141 | 176 | 211 | 42 | 84 | 127 | 169 | 211 | 253 |
| **1.8** | 30 | 60 | 90 | 119 | 149 | 179 | 36 | 72 | 108 | 143 | 179 | 215 | 43 | 86 | 130 | 173 | 216 | 259 |
| **2** | 30 | 61 | 91 | 121 | 152 | 182 | 37 | 74 | 111 | 147 | 184 | 221 | 44 | 88 | 133 | 177 | 221 | 265 |
| **2.2** | 31 | 62 | 93 | 124 | 155 | 186 | 38 | 75 | 113 | 150 | 188 | 225 | 45 | 90 | 136 | 181 | 226 | 271 |
| **2.4** | 32 | 63 | 95 | 127 | 158 | 190 | 38 | 77 | 115 | 153 | 192 | 230 | 46 | 92 | 138 | 184 | 230 | 276 |
| **2.6** | 32 | 65 | 97 | 129 | 162 | 194 | 39 | 78 | 117 | 156 | 195 | 234 | 47 | 94 | 141 | 187 | 234 | 281 |
| **2.8** | 33 | 66 | 99 | 131 | 164 | 197 | 40 | 80 | 120 | 159 | 199 | 239 | 48 | 96 | 144 | 191 | 239 | 287 |
| **3** | 34 | 67 | 101 | 134 | 168 | 201 | 41 | 81 | 122 | 162 | 203 | 243 | 49 | 97 | 146 | 195 | 243 | 292 |

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T14. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 15°C*

| Chlorine Concentration (mg/L) | pH ≤ 6 Log Inactivations | | | | | | pH = 6.5 Log Inactivations | | | | | | pH = 7.0 Log Inactivations | | | | | | pH = 7.5 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 8 | 16 | 25 | 33 | 41 | 49 | 10 | 20 | 30 | 39 | 49 | 59 | 12 | 23 | 35 | 47 | 58 | 70 | 14 | 28 | 42 | 55 | 69 | 83 |
| **0.6** | 8 | 17 | 25 | 33 | 42 | 50 | 10 | 20 | 30 | 40 | 50 | 60 | 12 | 24 | 36 | 48 | 60 | 72 | 14 | 29 | 43 | 57 | 72 | 86 |
| **0.8** | 9 | 17 | 26 | 35 | 43 | 52 | 10 | 20 | 31 | 41 | 51 | 61 | 12 | 24 | 37 | 49 | 61 | 73 | 15 | 29 | 44 | 59 | 73 | 88 |
| **1** | 9 | 18 | 27 | 35 | 44 | 53 | 11 | 21 | 32 | 42 | 53 | 63 | 13 | 25 | 38 | 50 | 63 | 75 | 15 | 30 | 45 | 60 | 75 | 90 |
| **1.2** | 9 | 18 | 27 | 36 | 45 | 54 | 11 | 21 | 32 | 43 | 53 | 64 | 13 | 25 | 38 | 51 | 63 | 76 | 15 | 31 | 46 | 61 | 77 | 92 |
| **1.4** | 9 | 18 | 28 | 37 | 46 | 55 | 11 | 22 | 33 | 43 | 54 | 65 | 13 | 26 | 39 | 52 | 65 | 78 | 16 | 31 | 47 | 63 | 78 | 94 |
| **1.6** | 9 | 19 | 28 | 37 | 47 | 56 | 11 | 22 | 33 | 44 | 55 | 66 | 13 | 26 | 40 | 53 | 66 | 79 | 16 | 32 | 48 | 64 | 80 | 96 |
| **1.8** | 10 | 19 | 29 | 38 | 48 | 57 | 11 | 23 | 34 | 45 | 57 | 68 | 14 | 27 | 41 | 54 | 68 | 81 | 16 | 33 | 49 | 65 | 82 | 98 |
| **2** | 10 | 19 | 29 | 39 | 48 | 58 | 12 | 23 | 35 | 46 | 58 | 69 | 14 | 28 | 42 | 55 | 69 | 83 | 17 | 33 | 50 | 67 | 83 | 100 |
| **2.2** | 10 | 20 | 30 | 39 | 49 | 59 | 12 | 23 | 35 | 47 | 58 | 70 | 14 | 28 | 43 | 57 | 71 | 85 | 17 | 34 | 51 | 68 | 85 | 102 |
| **2.4** | 10 | 20 | 30 | 40 | 50 | 60 | 12 | 24 | 36 | 48 | 60 | 72 | 14 | 29 | 43 | 57 | 72 | 86 | 18 | 35 | 53 | 70 | 88 | 105 |
| **2.6** | 10 | 20 | 31 | 41 | 51 | 61 | 12 | 24 | 37 | 49 | 61 | 73 | 15 | 29 | 44 | 59 | 73 | 88 | 18 | 36 | 54 | 71 | 89 | 107 |
| **2.8** | 10 | 21 | 31 | 41 | 52 | 62 | 12 | 25 | 37 | 49 | 62 | 74 | 15 | 30 | 45 | 59 | 74 | 89 | 18 | 36 | 55 | 73 | 91 | 109 |
| **3** | 11 | 21 | 32 | 42 | 53 | 63 | 13 | 25 | 38 | 51 | 63 | 76 | 15 | 30 | 46 | 61 | 76 | 91 | 19 | 37 | 56 | 74 | 93 | 111 |

| Chlorine Concentration (mg/L) | pH= 8 Log Inactivations | | | | | | pH = 8.5 Log Inactivations | | | | | | pH = 9.0 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 17 | 33 | 50 | 66 | 83 | 99 | 20 | 39 | 59 | 79 | 98 | 118 | 23 | 47 | 70 | 93 | 117 | 140 |
| **0.6** | 17 | 34 | 51 | 68 | 85 | 102 | 20 | 41 | 61 | 81 | 102 | 122 | 24 | 49 | 73 | 97 | 122 | 146 |
| **0.8** | 18 | 35 | 53 | 70 | 88 | 105 | 21 | 42 | 63 | 84 | 105 | 126 | 25 | 50 | 76 | 101 | 126 | 151 |
| **1** | 18 | 36 | 54 | 72 | 90 | 108 | 22 | 43 | 65 | 87 | 108 | 130 | 26 | 52 | 78 | 104 | 130 | 156 |
| **1.2** | 19 | 37 | 56 | 74 | 93 | 111 | 22 | 45 | 67 | 89 | 112 | 134 | 27 | 53 | 80 | 107 | 133 | 160 |
| **1.4** | 19 | 38 | 57 | 76 | 95 | 114 | 23 | 46 | 69 | 91 | 114 | 137 | 28 | 55 | 83 | 110 | 138 | 165 |
| **1.6** | 19 | 39 | 58 | 77 | 97 | 116 | 24 | 47 | 71 | 94 | 118 | 141 | 28 | 56 | 85 | 113 | 141 | 169 |
| **1.8** | 20 | 40 | 60 | 79 | 99 | 119 | 24 | 48 | 72 | 96 | 120 | 144 | 29 | 58 | 87 | 115 | 144 | 173 |
| **2** | 20 | 41 | 61 | 81 | 102 | 122 | 25 | 49 | 74 | 98 | 123 | 147 | 30 | 59 | 89 | 118 | 148 | 177 |
| **2.2** | 21 | 41 | 62 | 83 | 103 | 124 | 25 | 50 | 75 | 100 | 125 | 150 | 30 | 60 | 91 | 121 | 151 | 181 |
| **2.4** | 21 | 42 | 64 | 85 | 106 | 127 | 26 | 51 | 77 | 102 | 128 | 153 | 31 | 61 | 92 | 123 | 153 | 184 |
| **2.6** | 22 | 43 | 65 | 86 | 108 | 129 | 26 | 52 | 78 | 104 | 130 | 156 | 31 | 63 | 94 | 125 | 157 | 188 |
| **2.8** | 22 | 44 | 66 | 88 | 110 | 132 | 27 | 53 | 80 | 106 | 133 | 159 | 32 | 64 | 96 | 127 | 159 | 191 |
| **3** | 22 | 45 | 67 | 89 | 112 | 134 | 27 | 54 | 81 | 108 | 135 | 162 | 33 | 65 | 98 | 130 | 163 | 195 |

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T15. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 20°C*

| Chlorine Concentration (mg/L) | pH ≤ 6 Log Inactivations | | | | | | pH = 6.5 Log Inactivations | | | | | | pH = 7.0 Log Inactivations | | | | | | pH = 7.5 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 6 | 12 | 18 | 24 | 30 | 36 | 7 | 15 | 22 | 29 | 37 | 44 | 9 | 17 | 26 | 35 | 43 | 52 | 10 | 21 | 31 | 41 | 52 | 62 |
| **0.6** | 6 | 13 | 19 | 25 | 32 | 38 | 8 | 15 | 23 | 30 | 38 | 45 | 9 | 18 | 27 | 36 | 45 | 54 | 11 | 21 | 32 | 43 | 53 | 64 |
| **0.8** | 7 | 13 | 20 | 26 | 33 | 39 | 8 | 15 | 23 | 31 | 38 | 46 | 9 | 18 | 28 | 37 | 46 | 55 | 11 | 22 | 33 | 44 | 55 | 66 |
| **1** | 7 | 13 | 20 | 26 | 33 | 39 | 8 | 16 | 24 | 31 | 39 | 47 | 9 | 19 | 28 | 37 | 47 | 56 | 11 | 22 | 34 | 45 | 56 | 67 |
| **1.2** | 7 | 13 | 20 | 27 | 33 | 40 | 8 | 16 | 24 | 32 | 40 | 48 | 10 | 19 | 29 | 38 | 48 | 57 | 12 | 23 | 35 | 46 | 58 | 69 |
| **1.4** | 7 | 14 | 21 | 27 | 34 | 41 | 8 | 16 | 25 | 33 | 41 | 49 | 10 | 19 | 29 | 39 | 48 | 58 | 12 | 23 | 35 | 47 | 58 | 70 |
| **1.6** | 7 | 14 | 21 | 28 | 35 | 42 | 8 | 17 | 25 | 33 | 42 | 50 | 10 | 20 | 30 | 39 | 49 | 59 | 12 | 24 | 36 | 48 | 60 | 72 |
| **1.8** | 7 | 14 | 22 | 29 | 36 | 43 | 9 | 17 | 26 | 34 | 43 | 51 | 10 | 20 | 31 | 41 | 51 | 61 | 12 | 25 | 37 | 49 | 62 | 74 |
| **2** | 7 | 15 | 22 | 29 | 37 | 44 | 9 | 17 | 26 | 35 | 43 | 52 | 10 | 21 | 31 | 41 | 52 | 62 | 13 | 25 | 38 | 50 | 63 | 75 |
| **2.2** | 7 | 15 | 22 | 29 | 37 | 44 | 9 | 18 | 27 | 35 | 44 | 53 | 11 | 21 | 32 | 42 | 53 | 63 | 13 | 26 | 39 | 51 | 64 | 77 |
| **2.4** | 8 | 15 | 23 | 30 | 38 | 45 | 9 | 18 | 27 | 36 | 45 | 54 | 11 | 22 | 33 | 43 | 54 | 65 | 13 | 26 | 39 | 52 | 65 | 78 |
| **2.6** | 8 | 15 | 23 | 31 | 38 | 46 | 9 | 18 | 28 | 37 | 46 | 55 | 11 | 22 | 33 | 44 | 55 | 66 | 13 | 27 | 40 | 53 | 67 | 80 |
| **2.8** | 8 | 16 | 24 | 31 | 39 | 47 | 9 | 19 | 28 | 37 | 47 | 56 | 11 | 22 | 34 | 45 | 56 | 67 | 14 | 27 | 41 | 54 | 68 | 81 |
| **3** | 8 | 16 | 24 | 31 | 39 | 47 | 10 | 19 | 29 | 38 | 48 | 57 | 11 | 23 | 34 | 45 | 57 | 68 | 14 | 28 | 42 | 55 | 69 | 83 |
| **Chlorine Concentration (mg/L)** | **pH= 8 Log Inactivations** | | | | | | **pH = 8.5 Log Inactivations** | | | | | | **pH = 9.0 Log Inactivations** | | | | | |
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 12 | 25 | 37 | 49 | 62 | 74 | 15 | 30 | 45 | 59 | 74 | 89 | 18 | 35 | 53 | 70 | 88 | 105 |
| **0.6** | 13 | 26 | 39 | 51 | 64 | 77 | 15 | 31 | 46 | 61 | 77 | 92 | 18 | 36 | 55 | 73 | 91 | 109 |
| **0.8** | 13 | 26 | 40 | 53 | 66 | 79 | 16 | 32 | 48 | 63 | 79 | 95 | 19 | 38 | 57 | 75 | 94 | 113 |
| **1** | 14 | 27 | 41 | 54 | 68 | 81 | 16 | 33 | 49 | 65 | 82 | 98 | 20 | 39 | 59 | 78 | 98 | 117 |
| **1.2** | 14 | 28 | 42 | 55 | 69 | 83 | 17 | 33 | 50 | 67 | 83 | 100 | 20 | 40 | 60 | 80 | 100 | 120 |
| **1.4** | 14 | 28 | 43 | 57 | 71 | 85 | 17 | 34 | 52 | 69 | 86 | 103 | 21 | 41 | 62 | 82 | 103 | 123 |
| **1.6** | 15 | 29 | 44 | 58 | 73 | 87 | 18 | 35 | 53 | 70 | 88 | 105 | 21 | 42 | 63 | 84 | 105 | 126 |
| **1.8** | 15 | 30 | 45 | 59 | 74 | 89 | 18 | 36 | 54 | 72 | 90 | 108 | 22 | 43 | 65 | 86 | 108 | 129 |
| **2** | 15 | 30 | 46 | 61 | 76 | 91 | 18 | 37 | 55 | 73 | 92 | 110 | 22 | 44 | 66 | 88 | 110 | 132 |
| **2.2** | 16 | 31 | 47 | 62 | 78 | 93 | 19 | 38 | 57 | 75 | 94 | 113 | 23 | 45 | 68 | 90 | 113 | 135 |
| **2.4** | 16 | 32 | 48 | 63 | 79 | 95 | 19 | 38 | 58 | 77 | 96 | 115 | 23 | 46 | 69 | 92 | 115 | 138 |
| **2.6** | 16 | 32 | 49 | 65 | 81 | 97 | 20 | 39 | 59 | 78 | 98 | 117 | 24 | 47 | 71 | 94 | 118 | 141 |
| **2.8** | 17 | 33 | 50 | 66 | 83 | 99 | 20 | 40 | 60 | 79 | 99 | 119 | 24 | 48 | 72 | 95 | 119 | 143 |
| **3** | 17 | 34 | 51 | 67 | 84 | 101 | 20 | 41 | 61 | 81 | 102 | 122 | 24 | 49 | 73 | 97 | 122 | 146 |

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T16. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 25°C*

| Chlorine Concentration (mg/L) | pH ≤ 6 Log Inactivations | | | | | | pH = 6.5 Log Inactivations | | | | | | pH = 7.0 Log Inactivations | | | | | | pH = 7.5 Log Inactivations | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
| **≤0.4** | 4 | 8 | 12 | 16 | 20 | 24 | 5 | 10 | 15 | 19 | 24 | 29 | 6 | 12 | 18 | 23 | 29 | 35 | 7 | 14 | 21 | 28 | 35 | 42 |
| **0.6** | 4 | 8 | 13 | 17 | 21 | 25 | 5 | 10 | 15 | 20 | 25 | 30 | 6 | 12 | 18 | 24 | 30 | 36 | 7 | 14 | 22 | 29 | 36 | 43 |
| **0.8** | 4 | 9 | 13 | 17 | 22 | 26 | 5 | 10 | 16 | 21 | 26 | 31 | 6 | 12 | 19 | 25 | 31 | 37 | 7 | 15 | 22 | 29 | 37 | 44 |
| **1** | 4 | 9 | 13 | 17 | 22 | 26 | 5 | 10 | 16 | 21 | 26 | 31 | 6 | 12 | 19 | 25 | 31 | 37 | 8 | 15 | 23 | 30 | 38 | 45 |
| **1.2** | 5 | 9 | 14 | 18 | 23 | 27 | 5 | 11 | 16 | 21 | 27 | 32 | 6 | 13 | 19 | 25 | 32 | 38 | 8 | 15 | 23 | 31 | 38 | 46 |
| **1.4** | 5 | 9 | 14 | 18 | 23 | 27 | 6 | 11 | 17 | 22 | 28 | 33 | 7 | 13 | 20 | 26 | 33 | 39 | 8 | 16 | 24 | 31 | 39 | 47 |
| **1.6** | 5 | 9 | 14 | 19 | 23 | 28 | 6 | 11 | 17 | 22 | 28 | 33 | 7 | 13 | 20 | 27 | 33 | 40 | 8 | 16 | 24 | 32 | 40 | 48 |
| **1.8** | 5 | 10 | 15 | 19 | 24 | 29 | 6 | 11 | 17 | 23 | 28 | 34 | 7 | 14 | 21 | 27 | 34 | 41 | 8 | 16 | 25 | 33 | 41 | 49 |
| **2** | 5 | 10 | 15 | 19 | 24 | 29 | 6 | 12 | 18 | 23 | 29 | 35 | 7 | 14 | 21 | 27 | 34 | 41 | 8 | 17 | 25 | 33 | 42 | 50 |
| **2.2** | 5 | 10 | 15 | 20 | 25 | 30 | 6 | 12 | 18 | 23 | 29 | 35 | 7 | 14 | 21 | 28 | 35 | 42 | 9 | 17 | 26 | 34 | 43 | 51 |
| **2.4** | 5 | 10 | 15 | 20 | 25 | 30 | 6 | 12 | 18 | 24 | 30 | 36 | 7 | 14 | 22 | 29 | 36 | 43 | 9 | 17 | 26 | 35 | 43 | 52 |
| **2.6** | 5 | 10 | 16 | 21 | 26 | 31 | 6 | 12 | 19 | 25 | 31 | 37 | 7 | 15 | 22 | 29 | 37 | 44 | 9 | 18 | 27 | 35 | 44 | 53 |
| **2.8** | 5 | 10 | 16 | 21 | 26 | 31 | 6 | 12 | 19 | 25 | 31 | 37 | 8 | 15 | 23 | 30 | 38 | 45 | 9 | 18 | 27 | 36 | 45 | 54 |
| **3** | 5 | 11 | 16 | 21 | 27 | 32 | 6 | 13 | 19 | 25 | 32 | 38 | 8 | 15 | 23 | 31 | 38 | 46 | 9 | 18 | 28 | 37 | 46 | 55 |
| **Chlorine Concentration (mg/L)** | **pH= 8 Log Inactivations** | | | | | | **pH = 8.5 Log Inactivations** | | | | | | **pH = 9.0 Log Inactivations** | | | | | | | | | | | |
| | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | | | | | | |
| **≤0.4** | 8 | 17 | 25 | 33 | 42 | 50 | 10 | 20 | 30 | 39 | 49 | 59 | 12 | 23 | 35 | 47 | 58 | 70 | | | | | | |
| **0.6** | 9 | 17 | 26 | 34 | 43 | 51 | 10 | 20 | 31 | 41 | 51 | 61 | 12 | 24 | 37 | 49 | 61 | 73 | | | | | | |
| **0.8** | 9 | 18 | 27 | 35 | 44 | 53 | 11 | 21 | 32 | 42 | 53 | 63 | 13 | 25 | 38 | 50 | 63 | 75 | | | | | | |
| **1** | 9 | 18 | 27 | 36 | 45 | 54 | 11 | 22 | 33 | 43 | 54 | 65 | 13 | 26 | 39 | 52 | 65 | 78 | | | | | | |
| **1.2** | 9 | 18 | 28 | 37 | 46 | 55 | 11 | 22 | 34 | 45 | 56 | 67 | 13 | 27 | 40 | 53 | 67 | 80 | | | | | | |
| **1.4** | 10 | 19 | 29 | 38 | 48 | 57 | 12 | 23 | 35 | 46 | 58 | 69 | 14 | 27 | 41 | 55 | 68 | 82 | | | | | | |
| **1.6** | 10 | 19 | 29 | 39 | 48 | 58 | 12 | 23 | 35 | 47 | 58 | 70 | 14 | 28 | 42 | 56 | 70 | 84 | | | | | | |
| **1.8** | 10 | 20 | 30 | 40 | 50 | 60 | 12 | 24 | 36 | 48 | 60 | 72 | 14 | 29 | 43 | 57 | 72 | 86 | | | | | | |
| **2** | 10 | 20 | 31 | 41 | 51 | 61 | 12 | 25 | 37 | 49 | 62 | 74 | 15 | 29 | 44 | 59 | 73 | 88 | | | | | | |
| **2.2** | 10 | 21 | 31 | 41 | 52 | 62 | 13 | 25 | 38 | 50 | 63 | 75 | 15 | 30 | 45 | 60 | 75 | 90 | | | | | | |
| **2.4** | 11 | 21 | 32 | 42 | 53 | 63 | 13 | 26 | 39 | 51 | 64 | 77 | 15 | 31 | 46 | 61 | 77 | 92 | | | | | | |
| **2.6** | 11 | 22 | 33 | 43 | 54 | 65 | 13 | 26 | 39 | 52 | 65 | 78 | 16 | 31 | 47 | 63 | 78 | 94 | | | | | | |
| **2.8** | 11 | 22 | 33 | 44 | 55 | 66 | 13 | 27 | 40 | 53 | 67 | 80 | 16 | 32 | 48 | 64 | 80 | 96 | | | | | | |
| **3** | 11 | 22 | 34 | 45 | 56 | 67 | 14 | 27 | 41 | 54 | 68 | 81 | 16 | 32 | 49 | 65 | 81 | 97 | | | | | | |

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T17. CT Values for Inactivation of Viruses by Free Chlorine

| | Log Inactivation | | Log Inactivation | | Log Inactivation | |
|---|---|---|---|---|---|---|
| | 2.0 | | 3.0 | | 4.0 | |
| **Temperature (C)** | **pH 6-9** | **pH 10** | **pH 6-9** | **pH 10** | **pH 6-9** | **pH 10** |
| **0.5** | 6 | 45 | 9 | 66 | 12 | 90 |
| **5** | 4 | 30 | 6 | 44 | 8 | 60 |
| **10** | 3 | 22 | 4 | 33 | 6 | 45 |
| **15** | 2 | 15 | 3 | 22 | 4 | 30 |
| **20** | 1 | 11 | 2 | 16 | 3 | 22 |
| **25** | 1 | 7 | 1 | 11 | 2 | 15 |

Table C3.T18. CT Values for Inactivation of *Giardia* Cysts by Chlorine Dioxide

| | Temperature (C) | | | | | |
|---|---|---|---|---|---|---|
| **Inactivation** | **≤1** | **5** | **10** | **15** | **20** | **25** |
| 0.5-log | 10 | 4.3 | 4 | 3.2 | 2.5 | 2 |
| 1-log | 21 | 8.7 | 7.7 | 6.3 | 5 | 3.7 |
| 1.5-log | 32 | 13 | 12 | 10 | 7.5 | 5.5 |
| 2-log | 42 | 17 | 15 | 13 | 10 | 7.3 |
| 2.5-log | 52 | 22 | 19 | 16 | 13 | 9 |
| 3-log | 63 | 26 | 23 | 19 | 15 | 11 |

Table C3.T19. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

| | Temperature (C) | | | | | |
|---|---|---|---|---|---|---|
| **Removal** | **≤1** | **5** | **10** | **15** | **20** | **25** |
| 2-log | 8.4 | 5.6 | 4.2 | 2.8 | 2.1 | 1.4 |
| 3-log | 25.6 | 17.1 | 12.8 | 8.6 | 6.4 | 4.3 |
| 4-log | 50.1 | 33.4 | 25.1 | 16.7 | 12.5 | 8.4 |

Table C3.T20. CT Values for Inactivation of *Giardia* Cysts by Ozone

| | Temperature (C) | | | | | |
|---|---|---|---|---|---|---|
| **Inactivation** | **≤1** | **5** | **10** | **15** | **20** | **25** |
| 0.5-log | 0.48 | 0.32 | 0.23 | 0.16 | 0.12 | 0.08 |
| 1-log | 0.97 | 0.63 | 0.48 | 0.32 | 0.24 | 0.16 |
| 1.5-log | 1.5 | 0.95 | 0.72 | 0.48 | 0.36 | 0.24 |
| 2-log | 1.9 | 1.3 | 0.95 | 0.63 | 0.48 | 0.32 |
| 2.5-log | 2.4 | 1.6 | 1.2 | 0.79 | 0.60 | 0.40 |
| 3-log | 2.9 | 1.9 | 1.43 | 0.95 | 0.72 | 0.48 |

Table C3.T21. CT Values for Inactivation of Viruses by Free Ozone

| | Temperature (C) | | | | | |
|---|---|---|---|---|---|---|
| **Inactivation** | **≤1** | **5** | **10** | **15** | **20** | **25** |
| 2-log | 0.9 | 0.6 | 0.5 | 0.3 | 0.25 | 0.15 |
| 3-log | 1.4 | 0.9 | 0.8 | 0.5 | 0.4 | 0.25 |
| 4-log | 1.8 | 1.2 | 1.0 | 0.6 | 0.5 | 0.3 |

Table C3.T22. CT Values for Inactivation of *Giardia* Cysts by Chloramine pH 6-9

| | Temperature (C) | | | | | |
|---|---|---|---|---|---|---|
| **Inactivation** | **≤1** | **5** | **10** | **15** | **20** | **25** |
| 0.5-log | 635 | 365 | 310 | 250 | 185 | 125 |
| 1-log | 1,270 | 735 | 615 | 500 | 370 | 250 |
| 1.5-log | 1,900 | 1,100 | 930 | 750 | 550 | 375 |
| 2-log | 2,535 | 1,470 | 1,230 | 1,000 | 735 | 500 |
| 2.5-log | 3,170 | 1,830 | 1,540 | 1,250 | 915 | 625 |
| 3-log | 3,800 | 2,200 | 1,850 | 1,500 | 1,100 | 750 |

Table C3.T23. CT Values for Inactivation of Viruses by Chloramine

| | Temperature (C) | | | | | |
|---|---|---|---|---|---|---|
| **Inactivation** | **≤1** | **5** | **10** | **15** | **20** | **25** |
| 2-log | 1,243 | 857 | 643 | 428 | 321 | 214 |
| 3-log | 2,063 | 1,423 | 1,067 | 712 | 534 | 356 |
| 4-log | 2,883 | 1,988 | 1,491 | 994 | 746 | 497 |

Table C3.T24. CT Values for Inactivation of Viruses by UV

| Log Inactivation | |
|---|---|
| **2.0** | **3.0** |
| 21 | 36 |

# CHAPTER 4

# WASTEWATER

## C4.1. SCOPE

This Chapter contains criteria to control and regulate discharges of wastewater into surface waters. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges, and pollutants from indirect dischargers.

## C4.2. DEFINITIONS

C4.2.1. 7-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 7 consecutive days.

C4.2.2. 30-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

C4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

C4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

C4.2.5. Best Management Practices (BMP). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into Waters of Japan.

C4.2.6. Biochemical Oxygen Demand ($BOD_5$). The 5-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

C4.2.7. Carbonaceous $BOD_5$ ($CBOD_5$). The 5-day measure of the pollutant parameter, $CBOD_5$. This test can substitute for the $BOD_5$ testing which suppresses the nitrification reaction/component in the $BOD_5$ test.

C4.2.8. Chemical Oxygen Demand (COD). COD is a measure of the oxygen consuming capacity of the biologically degradable and unbiodegradable organic materials present in wastewater.

C4.2.9. Conventional Pollutants. $BOD_5$, total suspended solids (TSS), oil and grease, total coliforms, pH, COD, copper, zinc, iron, manganese, chromium, mineral oils, animal and vegetable oils & fats, phenols, nitrogen, and phosphorus.

C4.2.10. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

C4.2.11. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

C4.2.12. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to Waters of Japan from any "point source."

C4.2.13. Domestic Wastewater Treatment System (DWTS). Any DoD or GoJ facility designed to treat wastewater before its discharge to Waters of Japan and in which the majority of such wastewater is made up of domestic sewage.

C4.2.14. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into Waters of Japan.

C4.2.15. Existing Source. A source in operation, or under construction, prior to 1 October 1994, unless it is subsequently substantially modified, that discharges pollutants.

C4.2.16. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

C4.2.17. Industrial Activities Associated with Storm Water. Activities that may contribute pollutants to storm water runoff or drainage during wet weather events. (See Table C4.T3, “Best Management Practices”).

C4.2.18. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to Waters of Japan.

C4.2.19. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

C4.2.20. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

C4.2.21. New Source. A source built or substantially modified on or after 1 October 1994 that directly or indirectly discharges pollutants to the wastewater system.

C4.2.22. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft, or any conveyance that merely collects natural surface flows of precipitation.

C4.2.23. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical waste; biological material; radioactive material; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

C4.2.24. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

C4.2.25. Regulated Facilities. Those facilities for which criteria are established under this Chapter, such as DWTS, IWTS, or industrial discharges.

C4.2.26. Storm Water. Run-off and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

C4.2.27. Substantial Modification. Any modification to a facility, the cost of which exceeds $1,000,000, regardless of funding source.

C4.2.28. Total Suspended Solids (TSS). The pollutant parameter total filterable suspended solids.

C4.2.29. Total Toxic Organics (TTO). The summation of all quantifiable values >0.01 mg/L for the toxic organics in Table C4.T1, "Components of Total Toxic Organics."

C4.2.30. Waters of Japan. Surface water including the territorial seas recognized under customary international law, including:

C4.2.30.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce.

C4.2.30.2. Waters which are or could be used for recreation or other purposes.

C4.2.30.3. Waters from which fish or shellfish are or could be taken and sold.

C4.2.30.4. Waters which are used or could be used for industrial purposes by industries.

C4.2.30.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

C4.2.30.6. Tributaries of waters identified in paragraphs C4.2.30.1 through C4.2.30.5 of this definition.

C4.2.30.7. Exclusions to Waters of Japan. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this Chapter, are not Waters of Japan. This exclusion applies only to manmade bodies of water that were neither originally Waters of Japan nor resulted from impoundment of Waters of Japan.

C4.3. CRITERIA

C4.3.1. Effluent Limitations for Direct Dischargers of Conventional Pollutants

C4.3.1.1. All new sources of pollutants directly discharged to Waters of Japan will comply with the following effluent limitations:

C4.3.1.1.1. $BOD_5$

C4.3.1.1.1.1. The 30-day average will not exceed 30 mg/L.

C4.3.1.1.1.2. The 7-day average will not exceed 45 mg/L.

C4.3.1.1.1.3. $CBOD_5$ may be substituted for $BOD_5$ as measured above. The C $BOD_5$ limit, if substituted for the parameter $BOD_5$, should be at least 5 mg/L less than each numerical limit for the 30-day and 7-day average for the $BOD_5$ limit. The $CBOD_5$ test procedure suppresses the nitrification component in the $BOD_5$ test procedure, thereby reducing the value or effects and lowering the oxygen demand. When $CBOD_5$ is substituted for $BOD_5$, the following limits will apply:

C4.3.1.1.1.3.1. The 30-day average will not exceed 25 mg/L.

C4.3.1.1.1.3.2. The 7-day average will not exceed 40 mg/L.

C4.3.1.1.2. TSS

C4.3.1.1.2.1. The 30-day average will not exceed 30 mg/L.

C4.3.1.1.2.2. The 7-day average will not exceed 45 mg/L.

C4.3.1.1.3. pH

C4.3.1.1.3.1. Effluent pH values for discharges to rivers and lakes will be maintained between 6.0 and 8.6.

C4.3.1.1.3.2. Effluent pH values for discharges to sea areas will be maintained between 6.0 and 9.0.

C4.3.1.2. All existing sources of pollutants directly discharged to Waters of Japan will comply with the following effluent limitations:

C4.3.1.2.1. $BOD_5$

C4.3.1.2.1.1. The 30-day average will not exceed 45 mg/L.

C4.3.1.2.1.2. The 7-day average will not exceed 65 mg/L.

C4.3.1.2.2. TSS

C4.3.1.2.2.1. The 30-day average will not exceed 45 mg/L.

C4.3.1.2.2.2. The 7-day average will not exceed 65 mg/L.

C4.3.1.2.3. pH

C4.3.1.2.3.1. Effluent pH values for discharges to rivers and lakes will be maintained between 6.0 and 8.6.

C4.3.1.2.3.2. Effluent pH values for discharges to sea areas will be maintained between 6.0 and 9.0.

C4.3.1.3. Additional Effluent Limitation. All new and existing sources of pollutants directly discharged to Waters of Japan will comply with the following effluent limitations, in addition to those in Tables C4.T5 through C4.T22, as applicable. In the case where two standards for the same parameter are given, the more protective standard shall prevail.

| Pollutant | Maximum (mg/L) | Daily Average (mg/L) |
|---|---|---|
| COD (for direct discharge into sea areas, lakes or marshes) | 160 | 120 |
| Total Coliform | | 3,000/mL |
| Copper | 3 | |
| Zinc | 2 | |
| Iron (Soluble) | 10 | |
| Manganese (Soluble) | 10 | |
| Chromium | 2 | |
| Mineral Oils (N-hexane Extract) | 5 | |
| Animal/Vegetable Oils & Fats (N-hexane Extract) | 30 | |
| Phenols | 5 | |
| Nitrogen | 120 | 60 |
| Phosphorus | 16 | 8 |

C4.3.1.4. All new and existing non-domestic sources of pollutants directly discharged to Waters of Japan (including direct discharges from IWTS) will also comply with the hazardous substances effluent limitations in Table C4.T4 in addition to those in Tables C4.T23 through C4.T25, as applicable. In the case where two standards for the same parameter are given, the more protective standard shall prevail.

C4.3.1.5. Monitoring. Monitoring requirements apply to all regulated facilities. Samples shall be collected at the point of discharge to the Waters of Japan. The monitoring frequency (including both sampling and analysis) is:

C4.3.1.5.1. BOD5, TSS, and pH. The monitoring frequency (including both sampling and analysis) is given in Table C4.T2, “Monitoring requirements”,

C4.3.1.5.2. Additional Effluent Limitation in C4.3.1.3 apply to regulated facilities which discharge volume is $\geq 50 m^3$/day (on average), unless indicated in Tables C4.T5 through C4.T22. The monitoring frequency is one or more times per year.

C4.3.1.5.3. The monitoring frequency of the hazardous substances effluent limitations in C4.3.1.4 is one or more times per year.

C4.3.1.6. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. Retain records for 3 years.

C4.3.1.6.1. The effluent, concentration, or other measurement specified for each regulated parameter.

C4.3.1.6.2. The daily volume of effluent discharge from each point source.

C4.3.1.6.3. Test procedures for the analysis of pollutants.

C4.3.1.6.4. The date, exact place, and time of sampling and/or measurements.

C4.3.1.6.5. The name of the person who performed the sampling and/or measurements.

C4.3.1.6.6. The date of analysis.

C4.3.1.7. Complaint System. A system for investigating water pollution complaints from individuals or the appropriate GoJ water pollution control authorities will be established, involving the EEA, as appropriate.

C4.3.1.8. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 0.049 million gallons per day (MGD), monthly sample must comply with level for 30-day average.

C4.3.2. Effluent Limitations For Non-Categorical Industrial Indirect Dischargers

C4.3.2.1. Effluent Limits. The following effluent limits will apply to all discharges of pollutants to DWTSs and associated collection systems from process wastewater for which categorical standards have not been established (see paragraph C4.3.3 for a list of categorical standards).

C4.3.2.1.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater treatment plant flow is prohibited.

C4.3.2.1.2. Ignitability and Explosivity

C4.3.2.1.2.1. The discharge of wastewater with a closed cup flashpoint of <70°C (158°F) is prohibited.

C4.3.2.1.2.2. The discharge of waste with any of the following characteristics is prohibited:

C4.3.2.1.2.2.1. A liquid solution that contains more than 24% alcohol by volume and has a flash point <70°C (158°F).

C4.3.2.1.2.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction.

C4.3.2.1.2.2.3. An ignitable compressed gas.

C4.3.2.1.2.2.4. An oxidizer, such as peroxide.

C4.3.2.1.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

C4.3.2.1.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

C4.3.2.1.3.2. Wastes that react violently with water;

C4.3.2.1.3.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water;

C4.3.2.1.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

C4.3.2.1.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

C4.3.2.1.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material"; and

C4.3.2.1.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

C4.3.2.1.4. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 is allowed.

C4.3.2.1.5. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin.

C4.3.2.1.6. Spills and Batch Discharges (slugs). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

C4.3.2.1.6.1. Description of discharge practices, including non-routine batch discharges;

C4.3.2.1.6.2. Description of stored chemicals;

C4.3.2.1.6.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this Chapter, including procedures for subsequent written notification within 5 days;

C4.3.2.1.6.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training;

C4.3.2.1.6.5. Proper procedures for building containment structures or equipment;

C4.3.2.1.6.6. Necessary measures to control toxic organic pollutants and solvents; and

C4.3.2.1.6.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

C4.3.2.1.7. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

C4.3.2.1.8. Heat. Heat in amounts that inhibit biological activity in the DWTS resulting in interference, but in no case in such quantities that the temperature of the process water at the DWTS exceeds 40°C (104°F).

C4.3.2.2. Complaint System. A system for investigating water pollution complaints from the appropriate GoJ water pollution control authorities will be established, involving the EEA as appropriate.

C4.3.3. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect). Any installations which have activities that fall into any of the industrial categories listed below must comply with the following effluent limitations (i.e., either direct or indirect discharge limitations at the source of the discharge). For most categories, the effluent limitations are the same for new and existing activities. Where differences in limitations exist, activities constructed or sustainability modified on or after 1 October 1994 will meet the limitations for new activities.

C4.3.3.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

C4.3.3.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

C4.3.3.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

C4.3.3.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

C4.3.3.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

C4.3.3.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

C4.3.3.1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

C4.3.3.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

C4.3.3.1.8. The following discharge standards apply to facilities in the above electroplating subparts which directly or indirectly discharge <38,000 liters per day (10,000 gallons per day):

| Pollutant | Daily Maximum[1] (mg/L) | 4-day Average (mg/L) |
|---|---|---|
| Cadmium | 0.1 | --- |
| Cyanide | 1 | --- |
| Fluorine, and its compounds[2] | 50 | --- |
| Lead | 0.1 | --- |
| Total Toxic Organics | 4.57 | --- |

Note:
1. If standards with different permissible limits are specified, the maximum permissible limit shall apply to the effluent discharged from the installation.
2. Standard for fluorine is transitional and in effect until 30 June 2013.

C4.3.3.1.9. The following discharge standards apply to facilities in the above electroplating subparts that directly or indirectly discharge ≥38,000 liters per day (10,000 gallons per day):

| Pollutant | Daily Maximum[1] (mg/L) | 4-day Average (mg/L) |
|---|---|---|
| Ammonia, ammonium compounds, nitrate and nitrite compounds[2] | 400 | --- |
| Boron, and its compounds[2] | 50 | --- |
| Cadmium | 0.1 | --- |
| Chromium (VI) | 0.5 | --- |
| Copper | 4.5 | 2.7 |
| Cyanide | 1 | --- |

| | | |
|---|---|---|
| Fluorine and its compounds[2] | 15 | --- |
| Lead | 0.1 | --- |
| Nickel | 4.1 | 2.6 |
| Zinc | 4.2 | 2.6 |
| Total Metals | 10.5 | 6.8 |
| Total Toxic Organics | 2.13 | --- |

Note:
1. If standards with different permissible limits are specified, the maximum permissible limit shall apply to the effluent discharged from the installation.
2. Standards for ammonia, boron and fluorine are transitional and in effect until 30 June 2013.

C4.3.3.1.10. In addition to the above standards, facilities that electroplate precious metals and that directly or indirectly discharge ≥38,000 liters per day (10,000 gallons per day) must comply with the following standard:

| **Pollutant** | **Daily Maximum (mg/L)** | **4-day Average (mg/L)** |
|---|---|---|
| Silver | 1.2 | 0.7 |

C4.3.3.2. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters that are specified in the paragraph of this Chapter dealing with industrial dischargers. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan.

C4.3.3.2.1. All direct discharges of pollutants by categorical industrial dischargers to Waters of Japan will also comply with the hazardous substances effluent limitations in Table C4.T4 and C4.3.1.3. The monitoring frequency is one or more times per year.

C4.3.4. Storm Water Management

C4.3.4.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table C4.T3, "Best Management Practices." Update the SWPPP annually using in-house resources.

C4.3.4.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events, should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

C4.3.5. Septic System. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should

be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

C4.3.6. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate.

Table C4.T1. Components of Total Toxic Organics

| | | |
|---|---|---|
| **Volatile Organics** | | |
| Acrolein (Propenyl) | 1,2-trans-Dichloroethene | 1,3-Dichloropropylene (1,3-Dichloropropene) |
| Acrylonitrile | Chloroform (trichloromethane) | Benzene |
| Methyl chloride (chloromethane) | 1,1,1-Trichloroethane | 2-Chloroethyl vinyl ether (mixed) |
| Methyl bromide (bromomethane) | 1,1,2-Trichloroethane | Tetrachloroethene |
| Vinyl Chloride (chloroethylene) | Bromodichloromethane | Toluene |
| Chloroethane | 1,1,2,2-Tetrachloroethane | Chlorobenzene |
| Methylene Chloride (9 dichloromethane) | 1,2-Dichloropropane | Ethylbenzene |
| 1,1-Dichloroethene | Bromoform (tribromomethane) | Carbon Tetrachloride (tetrachloromethane) |
| 1,1-Dichloroethane | Trichloroethene | |
| 1,2-Dichloroethane | Dibromochloromethane | |
| **Base/Neutral Extractable Organics** | | |
| N-nitrosodimethylamine | Acenaphthylene | Pyrene |
| bis (2-chloroethyl) ether | Dimethyl Phthalate | Benzidine |
| 1,3-Dichlorobenzene | 2,6-Dinitrotoluene | Butyl benzyl phthalate |
| 1,4-Dichlorobenzene | Acenaphthene | 1,2-benzoanthracene (benzo (a) anthracene) |
| 1,2-Dichlorobenzene | 2,4-Dinitrotoluene | Chrysene |
| bis(2-chloroisopropyl)-ether | Fluorene | 3,3-Dichlorobenzidine |
| Hexachloroethane | 4-Chlorophenyl phenyl ether | bis (2-ethylhexyl) phthalate |
| N-nitrosodi-n-propylamine | Diethyl phthalate | Di-n-octyl phthalate |
| Nitrobenzene | 1,2-Diphenylhydrazine | 3,4-Benzofluoranthene (benzo (b) fluoranthene) |
| Isophorone | N-nitrosodiphenylamine | 11,12-Benzofluoranthene (benzo (k) fluoranthene) |
| bis (2-chloroethoxy) methane | 4-Bromophenyl phenyl ether | Benzo (a) pyrene (3,4-benzopyrene) |
| 1,2,4-trichlorobenzene | Hexachlorobenzene | Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene) |
| Naphthalene | Phenanthrene | 1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene) |
| Hexachlorobutadiene | Anthracene | 1,12-Benzoperylene (benzo (g,h,i) perylene) |
| Hexachlorocyclopentadiene | Di-n-butyl phthalate | |
| 2-Chloronaphthalene | Fluoranthene | |
| **Acid Extractables Organics** | | |
| 2-Chlorophenol | 2,4-Dichlorophenol | 4-Nitrophenol |
| Phenol | 4,6-Dinitro-o-cresol | p-Chloro-m-cresol |
| 2-Nitrophenol | 2,4,6-Trichlorphenol | Pentachlorophenol |
| 2,4-Dimethylphenol | 2,4-Dinitrophenol | |
| **PCBs/Pesticides** | | |
| PCB-1242 (Arochlor 1242) | Alpha-Endosulfan | (p,p-TDE) |
| PCB-1254 (Arochlor 1254) | Beta-Endosulfan | Aldrin |
| PCB-1221 (Arochlor 1221) | Endosulfan sulfate | Chlordane (technical mixture and metabolites) |
| PCB-1232 (Arochlor 1232) | Alpha-BHC | Dieldrin |
| PCB-1248 (Arochlor 1248) | Beta-BHC | Endrin |
| PCB-1260 (Arochlor 1260) | Delta-BHC | Endrin aldehyde |
| PCB-1016 (Arochlor 1016) | Gamma-BHC | Toxaphene |
| | 4,4-DDT | Heptachlor |
| | 4,4-DDE (p,p-DDX) | Heptachlor Epoxide (BHC-hexachlorocyclohexane) |

Table C4.T2. Monitoring Requirements

| Plant Capacity (MGD) | Monitoring Frequency |
|---|---|
| 0.001 – 0.99 | Monthly |
| 1.0 – 4.99 | Weekly |
| ≥ 5.0 | Daily |

Table C4.T3. Best Management Practices

| Activity | Best Management Practice |
|---|---|
| Aircraft Ground Support Equipment Maintenance | Perform maintenance/repair activities inside<br>Use drip pans to capture drained fluids<br>Cap hoses to prevent drips and spills |
| Aircraft/runway deicing | Perform anti-icing before the storm<br>Put critical aircraft in hangars/shelters |
| Aircraft/vehicle fueling operations | Protect fueling areas from the rain<br>Provide spill response equipment at fueling station |
| Aircraft/vehicle maintenance & repair | Perform maintenance/repair activities inside<br>Use drip pans to capture drained fluids |
| Aircraft/vehicle washing | Capture wash water and send to wastewater treatment plant<br>Treat wash water with oil water separator before discharge |
| Bulk fuel storage areas | Use dry camlock connectors to reduce fuel loss<br>Capture spills with drip pans when breaking connections<br>Curb fuel transfer areas, treat with oil water separator |
| Construction activities | Construct sediment dams/silt fences around construction sites |
| Corrosion control activities | Capture solvent/soaps used to prepare aircraft for painting<br>Perform corrosion control activities inside |
| Hazardous material storage | Store hazardous materials inside or under cover<br>Reduce use of hazardous materials |
| Outdoor material storage areas | Cover and curb salt, coal, urea piles<br>Store product drums inside or under cover<br>Reduce quantity of material stored outside |
| Outdoor painting/depainting operations | Capture sandblasting media for proper disposal<br>Capture paint clean up materials (thinners, rinsates) |
| Pesticide operations | Capture rinse water when mixing chemicals<br>Store spray equipment inside |
| Power production | Capture leaks and spills from power production equipment using drip pans, etc. |
| Vehicle storage yards | Check vehicles in storage for leaks and spills<br>Use drip pans to capture leaking fluids |

Table C4.T4. Hazardous Substance Effluent Standards for Direct Discharges from Non-Domestic sources (including IWTS).

| Pollutant | Maximum Allowable Limit (mg/L) |
|---|---|
| Cadmium, and its compounds | 0.1 |
| Cyanide | 1 |
| Organic phosphorus compounds (parathion, methyl parathion, methyl demeton and EPN only) | 1 |
| Lead, and its compounds | 0.1 |
| Chromium (VI) | 0.5 |
| Arsenic, and its compounds | 0.1 |
| Total mercury | 0.005 |
| Alkyl mercury compounds | ND (Detection limit is 0.0005) |
| PCBs | 0.003 |
| Trichloroethylene | 0.3 |
| Tetrachloroethylene | 0.1 |
| Dichloromethane | 0.2 |
| Carbon tetrachloride | 0.02 |
| 1,2-dichloroethane | 0.04 |
| 1,1-dichloroethylene | 1 |
| cis-1,2-dichloroethylene | 0.4 |
| 1,1,1-trichloroethane | 3 |
| 1,1,2-trichloroethane | 0.06 |
| 1,3-dichloropropene | 0.02 |
| Thiuram | 0.06 |
| Simazine | 0.03 |
| Thiobencarb | 0.2 |
| Benzene | 0.1 |
| Selenium, and its compounds | 0.1 |
| Boron, and its compounds | 10 (Non-Marine Area) / 230 (Marine Area) |
| Fluorine, and its compounds | 8 (Non-Marine Area) / 15 (Marine Area) |
| Ammonia, ammonium compounds, nitrate and nitrite compounds | 100<br>Sum of ammonia,-N X 0.4, nitrate-N and nitrite-N) |
| 1,4-Dioxane | 0.5 |
| Dioxins | 0.00000001 (10 pg-TEQ/L) |

Note:

1.If documentation is available that explicitly states that one or more of the above substances are never introduced into the system, then those substances may be excluded from monitoring requirements.

Table C4.T5. Effluent Standards for Facilities Located in Saitama Prefecture (Effluent Discharged ≥ $10m^3$ /day)

| Item | Category | Allowable limit | Allowable limit[2] |
|---|---|---|---|
| BOD | 1) Night soil treatment facility (≥501 and < 2,000 people) | 60 mg/L | 25 (20) mg/L |
| | 2) Night soil treatment facility (>2,000 people) | 30 mg/L | 25 (20) mg/L |
| | 3) Factory or business establishment with specified facility other than those specified in 1 and 2 above or terminal sewage treatment facility | 25 (20) mg/L | |
| | 4) Specified facility in the specified area | 60 mg/L | 25 (20) mg/L |
| TSS | 1) Night soil treatment facility (≥501 and < 2,000 people) | 80 (70) mg/L | 60 (50) mg/L |
| | 2) Night soil treatment facility (>2,000 people) | 70 (60) mg/L | 60 (50) mg/L |
| | 3) Factory or business establishment with specified facility other than those specified in 1 and 2 above or terminal sewage treatment facility | 60 (50) mg/L | |
| | 4) Specified facility in the specified area | 80 (70) mg/L | 60 (50) mg/L[3] |
| Phenol | Factory or business establishment with specified facility other than night soil treatment facility or terminal sewage treatment facility | 1 mg/L | |

Note:
1. Values shown in brackets are daily average.
2. New establishments mean specified establishments established on or after 1 April 1992. (Except those under construction prior to 1 April 1992).

Table C4.T6. Effluent Standards for Facilities Located in Saitama Prefecture (Effluent Discharged <$10m^3$/day)

| Item | Allowable Limit |
|---|---|
| pH | 5.8-8.6 |
| BOD | 150 (120) mg/L |
| COD | 160( 120) mg/L |
| TSS | 180 (150) mg/L |

Note:
1. Values shown in brackets are daily average.
2. The levels listed in this table shall be applied to the effluent discharged from a factory or business establishment that has any of the following facilities, specified facilities in the specified areas, or a water treatment facility that treats the effluent discharged from such a factory or business establishment:
   - Food preparation facility installed in a central kitchen (except a facility established for a business establishment with a total floor space < 500 $m^2$)
   - Food preparation facility installed for boxed lunch preparation or catering business (except a facility established for a business establishment with a total floor space < 420 $m^2$)
   - Food preparation facility installed in restaurants (except a facility established for a business establishment with a total floor space < 420 $m^2$)
   - Food preparation facility installed in a noodle or sushi restaurant, cafeteria or other food service restaurant that does not serve common food items (except a facility established for a business establishment with a total floor space < 630 $m^2$)
   - Food preparation facility installed in a upper grade Japanese-style restaurant, bar, cabaret, night club or other similar food service establishment where fixtures, equipment, and/or ball room are provided for entertaining clients (except a facility established for a business establishment with a total floor space < 1,500 $m^2$)
   - Food preparation, cleaning, or bathing facility in a hospital with 300 or more beds
   - Car washing facility installed for automobile disassembling or maintenance business (except a facility established for a business establishment with a total floor space < 800 $m^2$ and an automated car washing facility)
   - Night soil treatment facility

Table C4.T7. Effluent Standards for Facilities Located in Kanagawa Prefecture (Effluent Discharged < 50m$^3$/day)

| Item | Water Area | Allowable limit | Allowable limit[2] |
|---|---|---|---|
| pH | Water quality preservation lakes[3] (Area A[3]) | | 5.8-8.6 |
| | Water quality preservation lakes[3] (Area A[3]) | 5.8-8.6 | |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | | 5.8-8.6 |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | 5.8-8.6 | |
| | Area B[3] | | 5.8-8.6 |
| | Area B[3] | 5.8-8.6 | |
| | Sea Area[3] | | 5.8-8.6 |
| | Sea Area[3] | 5.8-8.6 | |
| BOD | Water quality preservation lakes[3] (Area A[3]) | | 5 (3) mg/L |
| | Water quality preservation lakes[3] (Area A[3]) | 20 (15) mg/L | |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | | 15 (10) mg/L |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | 25 (20) mg/L | |
| | Area B[3] | | |
| | Area B[3] | | |
| | Sea Area[3] | | |
| | Sea Area[3] | | |
| COD | Water quality preservation lakes[3] (Area A[3]) | | 5 (3) mg/L |
| | Water quality preservation lakes[3] (Area A[3]) | 20 (15) mg/L | |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | | 15 (10) mg/L |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | 25 (20) mg/L | |
| | Area B[3] | | |
| | Area B[3] | | |
| | Sea Area[3] | | |
| | Sea Area[3] | | |
| TSS | Water quality preservation lakes[3] (Area A[3]) | | 15 (5) mg/L |
| | Water quality preservation lakes[3] (Area A[3]) | 50 (35) mg/L | |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | | 35 (20) mg/L |
| | Water areas other than water quality preservation lakes[3](Area A[3]) | 70 (40) mg/L | |
| | Area B[3] | | |
| | Area B[3] | | |
| | Sea Area[3] | | |
| | Sea Area[3] | | |

Note:

1. Values shown in brackets and total Coliform count are daily average.
2. New establishments mean specified establishments established on or after 1 November 1971 (except those under construction prior to 1 November 1971).
3. Water Area Categories:
   Water Area A: Chitose River, Niizaki River, Haya River, Sakawa River, Kaname River, Sagami River
   Water Quality Preservation Lakes: Lake Ashi, Lake Tanzawa, Lake Sagami, Lake Tsukui, Lake Okusagami, Lake Miyagase, and the rivers and water channels connecting to these lakes
   Water Area B: Waters of Japan other than that covered by Water Area A

Table C4.T8. Special Effluent Standard for the discharged from specified establishments that have only a night soil or terminal sewage treatment facility installed at Kanagawa Prefecture

| Item | Type of Facility | | Allowable Limit |
|---|---|---|---|
| BOD | Only a night soil treatment tank installed | New establishment[1] | 25 (20) mg/L |
| | | Other than new establishment | 40 (30) mg/L |
| | Night soil or terminal sewage treatment facility other than night soil treatment tank installed | | 25 (20) mg/L |
| COD | Only a night soil treatment tank installed | New establishment[1] | 25 (20) mg/L |
| | | Other than new establishment | 40 (30) mg/L |
| | Night soil or terminal sewage treatment facility other than night soil treatment tank installed | | 25 (20) mg/L |
| TSS | Only a night soil treatment tank installed | New establishment[1] | 70 (50) mg/L |
| | | Other than new establishment | 80 (60) mg/L |
| | Night soil or terminal sewage treatment facility other than night soil treatment tank installed | | 70 (50) mg/L |

Note:
1. New establishments mean specified establishments established on or after 1 April 1998 (except those under construction prior to 1 April 1998).
2. Values shown in brackets are daily average.

Table C4.T9. Special Effluent Standards for discharged from specified establishments[4] that have only specified facility in the specified area installed to Tokyo Bay at Kanagawa Prefecture

| Item | Type of Facilities | | Allowable Limit |
|---|---|---|---|
| BOD | New establishments[2] | | 40 (30) mg/L |
| | Other than new establishment | Combined treatment[3] | 80 (60) mg/L |
| | | Other than combined treatment | 120 (90) mg/L |
| COD | New establishments[2] | | 40 (30) mg/L |
| | Other than new establishment | Combined treatment[3] | 80 (60) mg/L |
| | | Other than combined treatment | 120 (90) mg/L |
| TSS | New establishments[2] | | 80 (60) mg/L |
| | Other than new establishment | Combined treatment[3] | 160 (120) mg/L |
| | | Other than combined treatment | 180 (140) mg/L |

Note:
1. Values shown in brackets is daily average.
2. New establishments mean specified establishments established on or after 1 April 1992 (except those under construction prior to 31 March 1992).
3. Combined treatment means the specified establishments which have specified facility in the specified area which treats domestic effluent (wastewater generated by daily activities such as cooking, laundry, and bathing other than factory effluent or other special wastewater) combined with night soil
4. "Specified facility in the specified area" means those facilities which discharge polluted water or wastewater of a degree that may cause damage to the living environment, as COD and other substances.
5. These standards shall not be applied to the effluent of specified establishments that discharge average daily effluent < 50 $m^3$.

Table C4.T10. Special Standards on Nitrogen and Phosphorus contents in the effluent discharged from specified facilities located in Kanagawa Prefecture

| Item | Type of Facilities | Allowable Limit[4] | Allowable Limit[5] |
|---|---|---|---|
| Nitrogen Content | Chemical industry other than those listed above | 20 (10) mg/L | 16 (8) mg/L |
| | Iron and steel industry that uses nitric acid pickling of stainless steel | 100 mg/L | 80 (40) mg/L |
| | Iron and steel industry that does not use nitric acid pickling of stainless steel | 20 (10) mg/L | 16 (8) mg/L |
| | Other non-ferrous metal primary refining industry | | 100 (50) mg/L |
| | Electroplating industry, immersion plating industry, and alumite treatment industry that use surface treatment facility using nitrogen and its compounds | | 100 (50) mg/L |
| | Automobile and automotive accessory manufacturing industry that use surface treatment facility using nitrogen and its compounds | 50 (25) mg/L | 40 (20) mg/L |
| | Manufacturing industry other than those listed above | 40 (20) mg/L | 20 (10) mg/L |
| | Sewage industry | 30 (20) mg/L | 20 (10) mg/L |
| | Night soil treatment tank with holding capacity for more than 200 people | 50 (30) mg/L | 20 (10) mg/L |
| | Industrial waste treatment service that treat wastewater containing nitrogen and its compounds | 80 (60) mg/L | 40 (20) mg/L |
| | Other | 50 (30) mg/L | 30 (20) mg/L |
| Phosphorous Content | Prepared food manufacturing industry | 8 (4) mg/L | 3 (1.5) mg/L |
| | Food manufacturing industry other than those listed above | 6 (3) mg/L | 2 (1) mg/L |
| | Iron and steel industry | 2 (1) mg/L | 1 (0.5) mg/L |
| | Electroplating industry, immersion plating industry, and alumite treatment industry that use surface treatment facility using phosphorus and its compounds | | 2 (1) mg/L |
| | Metal product manufacturing industry except electroplating industry, immersion plating industry, and alumite treatment industry that use surface treatment facility using phosphorus and its compounds | 4 (2) mg/L | 1.5 (1) mg/L |
| | Automobile and automotive accessory manufacturing industry that use surface treatment facility using phosphorus and its compounds | | 2 (1) mg/L |
| | Manufacturing industry other than those listed above | 4 (2) mg/L | 2 (1) mg/L |
| | Sewage industry | 4 (2) mg/L | 1 (0.5) mg/L |
| | Night soil treatment tank with holding capacity for more than 200 people | 8 (4) mg/L | 2 (1) mg/L |
| | Industrial waste treatment service that treat wastewater containing phosphorus and its compounds | 8 (4) mg/L | 2 (1) mg/L |
| | Other | 8 (4) mg/L | 4 (2) mg/L |

Note:

1. Values shown in brackets are daily average.
2. These standards shall not be applied to the effluent of specified establishments that discharge average daily effluent < 50 $m^3$.
3. The effluent standards listed in this table is applied to the effluent discharged into Tokyo Bay (the sea area surrounded by the straight line and seashore line connecting between Misaki, Tateyama City and Kenzaki, Miura City) and Waters of Japan area connecting to the bay.
4. Applies if specified establishment was established prior to 1 April 1999.
5. Applies if specified establishment was established on or after 1 April 1999.
6. As to the effluent discharged from more than one industries defined in "Industry type and other category" located in a specified establishment other than New establishments prior to 1 April 1999 where these industries have different Allowable levels, the largest allowable level shall be applied.
7. As to the effluent discharged from a specified establishment other than new establishments that has changed its category of industry that was effective prior to 1 April 1999 to other category after the date where these old and new industry categories have different allowable levels, the allowable level applicable on 1 April 1999 shall be applied.

8. As to the effluent discharged from more than one industries categories defined in "Industry type and other category" located in a new establishment where these industries have different allowable levels (except the new industry category that become effective due to a revision to the law (hereafter referred to as "additional industry category"), the smallest Allowable level shall be applied. However, when a specified establishment originally belongs to only one of "Industry type and other category" other than the additional industry category, the allowable level of the original industry category shall be applied.
9. For a business establishment engaging in treating sewage of a factory or other business establishment, the effluent standards specified herein is duly enforced by considering that such business establishment is in the same business field as that of the factory or other business establishment for which it provide sewage treatment service. In this case where there are different allowable levels for the category the factory or other business establishment belong to, Note 6, 7, and 8 shall be applied.

Table C4.T11. Effluent Standards for Facilities Located in Hiroshima Prefecture

| Item | Category | Allowable limit |
|---|---|---|
| pH | Water Area 4[5] | 5.5 – 9.0 |
| BOD | Water Area 1[5] (River) | 90 (70) mg/L |
| COD | Water Area 1[5] (Lake and reservoir) | 50 (40) mg/L |
| | Water Area 2[5] (Lake and reservoir) | 85 (65) mg/L |
| | Water Area 3[5] (Lake and reservoir) | 120 (90) mg/L |
| | Water Area 4[5] | 130 (100) mg/L |
| TSS | Water Area 1[5] (River) | 90 (70) mg/L |
| | Water Area 1[5] (Lake and reservoir) | 90 (70) mg/L |
| | Water Area 2[5] (River) | 90 (70) mg/L |
| | Water Area 2[5] (Lake and reservoir) | 90 (70) mg/L |
| Animal /vegetable fat (N-hexane extract) | Water Area 1[5] (River) | 8 mg/L |
| | Water Area 1[5] (Lake and reservoir) | 8 mg/L |
| | Water Area 2[5] (River) | 8 mg/L |
| | Water Area 2[5] (Lake and reservoir) | 8 mg/L |
| | Water Area 3[5] (River) | 20 mg/L |
| | Water Area 3[5] (Lake and reservoir) | 20 mg/L |
| | Water Area 4[5] | 20 mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day. However, when specified establishments use cyanide or chromium, the standards shall be applied to specified establishments that discharge effluent ≥ 30 $m^3$/day.
3. Chromium content must be equal to or < 2 mg/L regardless of discharged effluent volume.
4. For details of water area category, refer to Table C4.T12, "Water Area Categories in Hiroshima Prefecture".
5. "River" means Waters of Japan other than sea areas, lakes or reservoirs.

Table C4.T12. Water Area Categories in Hiroshima Prefecture

| Category | Description and Coverage |
|---|---|
| Water Area 1 | Waters of Japan that are not covered by Water Areas 2, 3 or 4 |
| Water Area 2 | Waters of Japan that are described below and the Waters of Japan connecting the area:<br>- A part of the Eikeiji River that lies upstream of junction where the Nakatsuoka River connects (including a part of the Nakatsuoka River)<br>- A part of the Mitarai River between the Sawarada Bridge and Mitarai Bridge<br>- A part of the Kawai River between the Kamiji Bridge and Tonko Bridge<br>- A part of the Hayata River between the Ikeda Bridge and Minaga Bridge<br>- A part of the Neya River that lies downstream of the junction point where the Jinkou River connects and parts of Ota river between the Ikumorigawa junction point and Oshiba Watergate and between the same junction point and Gion Watergate.<br>- A part of the Seno River that lies upstream of the Hiura Bridge.<br>- A part of the Nikou River between the Honjo Reservoir and the Kamiyamate Bridge<br>- A part of the Kurose River that lies upstream of the Nikyu Reservoir<br>- A part of the Noro River that lies upstream of the Utsumi Ohashi Bridge<br>- A part of the Takano River that lies upstream of the Gouroku Bridge<br>- A part of the Mitsuo River that lies upstream of the Shinkou Bridge<br>- A part of the Kamo River between the junction where the Tamari River connects and the Shinkou Bridge<br>- A part of the Nuta River between the junction where the Irino River connects and the Shippou Bridge (include a part of the Irino River and exclude the Mukunashi River and Buttsuji River )<br>- A part of the Wakuhara River that lies upstream of the Shimizu Bridge.<br>- A part of the Kurihara River that lies upstream of the Sakura Bridge<br>- A part of the Fujii River that lies upstream of the Shinkawa Bridge<br>- A part of the Hongo River that lies upstream of the Suehiro Oohashi Bridge<br>- A part of the Sannan River that lies upstream of the Tomodo Bridge<br>- A part of the Mitsugi River that lies downstream of the junction point where the Yahata River connects and a part of the Ashida River between the Ooto Bridge and Kamijima Bridge<br>- A part of the Basen River that lies downstream of the Washio Bridge (including the Kamishimo River that lies downstream of the Honmura River junction), a part of the Saijou River that lies downstream of the Yanagihara Bridge (including the Kawakita River), a part of the Shirobara River that lies downstream of the Chiyoda Bridge, a part of the Kouno River (mainstream only) from the Tajibi River junction through the Noga Bridge to the Ikuta River junction.<br>- All rivers in the islands in Hiroshima<br>- Waters of Japan that connect to the rivers listed in 1 to 20 of Water Area 3 (except water channels where effluent and household wastewater are discharged mainly, lakes, and reservoirs) |

| Category | Description and Coverage |
|---|---|
| Water Area 3 | Waters of Japan that are described below and lakes and reservoirs connecting the area:<br>- A part of the Oze River that lies downstream of the Nakaichii Sluice Gate<br>- A part of the Eikeiji River that lies downstream of junction where the Nakatsuoka River connects<br>- A part of the Mitarai River that lies downstream of the Mitarai Bridge<br>- A part of the Kawai River that lies downstream of the Tonko Bridge<br>- A part of the Yahata River that lies downstream of the Minaga Bridge<br>- A part of the Ota River, Kyuu Ota River, Tenma River, Motoyasu River, Kyobashi River, and Enko River that lie downstream of the Gion Watergate and Oshiba Watergate<br>- A part of the Seno River that lies downstream of the Hiura Bridge.<br>- A part of the Nikou River that lies downstream of the Kamiyamate Bridge<br>- A part of the Kurose River that lies downstream of the Nikyu Reservoir<br>- A part of the Noro River that lies downstream of the Utsumi Ohashi Bridge.<br>- A part of the Takano River that lies downstream of the Gouroku Bridge<br>- A part of the Mitsuo River that lies downstream of the Shinkou Bridge<br>- A part of the Kamo River that lies downstream of the Shinkou Bridge<br>- A part of the Nuta River that lies downstream of the Shippou Bridge<br>- A part of the Wakuhara River that lies downstream of the Shimizu Bridge.<br>- A part of the Kurihara River that lies downstream of the Sakura Bridge<br>- A part of the Fujii River that lies downstream of the Shinkawa Bridge<br>- A part of the Hongo River that lies downstream of the Suehiro Oohashi Bridge<br>- A part of the Sannan River that lies downstream of the Tomodo Bridge<br>- A part of the Ashida River that lies downstream of the Kamijima Bridge<br>- Water channels where mainly effluent and household wastewater is discharged among the Waters of Japan that connect to the rivers listed above in Water Area 3.<br>- Rivers that directly flow into other sea area (except rivers in the islands in Hiroshima) and the Waters of Japan that connect these rivers. |
| Water Area 4 | Coastal area adjacent to the seashore. |

Table C4.T13. Effluent Standards for Facilities Discharging into Kure Water Area[11] of Hiroshima Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| COD | Iron and steel industry | | |
| | Effluent discharged <10,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥10,000 $m^3$/day | 15 (10) mg/L | |
| | Metal product manufacturing and related industry[5] | | 15 (10) mg/L |
| | Other industry | | 40 (30) mg/L |
| TSS | Iron and steel industry | | |
| | Effluent discharged <10,000 $m^3$/day | | 65 (50) mg/L |
| | Effluent discharged ≥10,000 $m^3$/day | 65 (50) mg/L | 65 (50) mg/L |
| | Other industry | | 65 (50) mg/L |
| Dissolved iron | Iron and steel industry | | |
| | Effluent discharged <10,000 $m^3$/day | 3 mg/L | 3 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day | 1 mg/L | 1 mg/L |
| | Metal product manufacturing and related industry[5] | 3 mg/L | 3 mg/L |
| Dissolved manganese | Iron and steel industry | | |
| | Effluent discharged <10,000 $m^3$/day | 3 mg/L | 3 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day | 1 mg/L | 1 mg/L |
| | Metal product manufacturing industry[5] | 3 mg/L | 3 mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated. However, when specified establishments use cyanide or chromium, the standards shall be applied to specified establishments that discharge effluent ≥30 $m^3$/day.
3. Applies if specified establishment[12] was established prior to 24 March 1973.
4. Applies if specified establishment[12] was established on or after 24 March 1973.
5. Metal product manufacturing and related industry : Metal product manufacturing industry, general machinery and equipment manufacturing industry, electrical machinery and equipment manufacturing industry, manufacturing industry of machinery and equipment for transportation, and precision machinery and equipment manufacturing industry.
6. For effluent discharged from a factory or business establishment that has alkali surface treatment facility or electroplating facility installed (except factories or business establishments that belong to "Iron and steel industry" or "Metal product manufacturing and related industry"), the effluent standards specified for Metal product manufacturing industry and similar industries shall be applied.
7. As to the effluent discharged from a factory or business establishment that belongs to more than one industry categories where the relevant laws or this ordinance has defined different allowable effluent standards, the lowest allowable level shall be applied. However, if another industry category had became effective before the stricter effluent standards in Kure Water Area was enforced, the highest effluent standard shall be applied to the effluent of such a factory or business establishment.
8. For a business establishment engaging in treating sewage of a factory or other business establishment, the effluent standards specified herein are duly enforced by considering that such a business establishment is in the same business field as that of the factory or other business establishment for which it provides sewage treatment service. In this case, where there is different allowable levels for the category which such a factory or other business establishment belongs to, Note 6 shall be applied.
9. If a factory or business establishment discharging effluent into the Kure Water Area which was established before the stricter effluent standards in Kure Water Area became effective (or a factory or business establishment that is considered that it had been established before the standards in Kure Water Area became effective in accordance with Note 10) moves to other location and discharges effluent to the Kure Water Area or installed new specified facility after abolishing the old specified facility without changing the original industry category, such factory or business establishment at the new location is considered that it had been established before the stricter effluent standards in the Kure Water Area became effective only when the effluent standard on COD is applied to.

10. When a facility became a specified facility, the factory or business establishment that actually installed the facility (including a facility that became under construction before the date the stricter effluent standards in Kure Water Area became effective but exclude a specified facility established after the date) is considered that the factory or business establishment had been established before the facility became a specified facility.
11. Kure Water Area: Coastal and adjacent sea area along the seashore from the point where there is the border between Kure City and Saka-machi, to the other point where there is the border between Nigata-cho, Kure City and Kawajiri-cho, Kure City (except a part of Nikou River that lies upstream of JR Kure Line railroad bridge crossing Nikou River and a part of Kurose River that lies upstream of JR Kure Line railroad bridge crossing Nishiokawa River) and the Waters of Japan connecting to this area.
12. Specified establishments: Factory or business establishment with specified facility installed.
13. “Specified facility” means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
    ㋑Containing cadmium or other substances which may cause harmful damage to human health.
    ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.

Table C4.T14. Effluent Standards for Facilities Discharging into Seto Inland Sea(1) in Hiroshima Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| COD | Publishing, printing and related business industry | | |
| | Effluent discharged <500 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 40 (30) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Iron and steel industry other than iron manufacturing industry | | |
| | 1) Establishment that has electroplating facility installed | | |
| | Effluent discharged <500 $m^3$/day | 20 (15) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 20 (15) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | 2) Other | | |
| | Effluent discharged <500 $m^3$/day | 20 (15) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 15 (10) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Non-ferrous metal manufacturing industry | | |
| | Effluent discharged <500 $m^3$/day | 20 (15) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 15 (10) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Metal product manufacturing industry and machinery equipment manufacturing industry (except ordnance manufacturing industry) | | |
| | Effluent discharged <500 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 20 (15) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Central kitchen | | |
| | Effluent discharged <500 $m^3$/day | 85 (65) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Water supply industry (except sewage industry) | | |
| | Effluent discharged <500 $m^3$/day | 40 (30) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Sewage industry | | |
| | Effluent discharged <500 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 30 (20) mg/L |

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 30 (20) mg/L |
| | Automobile retailing and repair industry | | |
| | Effluent discharged <500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Restaurant | | |
| | Effluent discharged <500 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 100 (75) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Industrial waste treatment service industry | | |
| | Effluent discharged <500 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 40 (30) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Other industry (those that have alkali surface treatment or electroplating facility installed) | | |
| | Effluent discharged <500 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 20 (15) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | Other industry | | |
| | 1) Establishment that has car washing facility installed | | |
| | Effluent discharged <500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |
| | 2) Other | | |
| | Effluent discharged <500 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 27 March 1974.
4. Applies if facility was established on or after 27 March 1974.
5. If a factory or business establishment discharging effluent into the Seto Water Area which was established before the stricter effluent standards in Seto Water Area became effective (or a factory or business establishment that is considered that it had been established before the standards in Seto Water Area became effective in accordance with Note 6) moves to other location and discharges effluent to the Seto Water Area or installed new specified facility after abolishing the old specified facility without changing the original industry category, such factory or business establishment at the new location is considered that it had been established before the stricter effluent standards in the Seto Water Area became effective.

6. When a facility became a specified facility, the factory or business establishment that actually installed the facility (including a facility that became under construction before the date the stricter effluent standards in Kure Water Area became effective but exclude a specified facility established after the date) is considered that the factory or business establishment had been established before the facility became a specified facility.
7. As to the effluent discharged from a factory or business establishment that belongs to more than one industry categories where there are different allowable effluent standards, the lowest allowable limit shall be applied.
8. For a business establishment engaging in treating sewage of a factory or other business establishment, the effluent standards specified herein is duly enforced by considering that such business establishment is in the same business field as that of the factory or other business establishment for which it provide sewage treatment service. In this case, where there are different allowable limits for the category which such a factory or other business establishment belong to, Note 6 shall be applied.
9. Specified establishments: Factory or business establishment with specified facility installed.
10. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
    ㋑Containing cadmium or other substances which may cause harmful damage to human health.
    ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.

Table C4.T15. Effluent Standards for Facilities Discharging into Seto Inland Sea(2) in Hiroshima Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| COD | Waste disposal industry | | |
| | Effluent discharged <500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Hotel and other lodging industry | | |
| | Effluent discharged <500 $m^3$/day | 85 (65) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Medical service industry | | |
| | Effluent discharged <500 $m^3$/day | 85 (65) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Research institution | | |
| | Effluent discharged <500 $m^3$/day | 85 (65) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Night soil treatment plant (for > 500 people) | | |
| | 1) Established prior to 19 April 1975 | | |
| | Effluent discharged <500 $m^3$/day | 120 (90) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 120 (90) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | 2) Other | | |
| | Effluent discharged <500 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 30 (20) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 20 (15) mg/L |
| | Night soil treatment plant (for ≥ 201and ≤ 500 people) | | |
| | 1) Household night soil treatment plant and those established prior to 1 June 1981 | | |
| | Effluent discharged <500 $m^3$/day | 120 (90) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 120 (90) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 50 (40) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 30 (20) mg/L |
| | 2) Other | | |
| | Effluent discharged <500 $m^3$/day | 80 (60) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 80 (60) mg/L | |

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| | Effluent discharged <500 $m^3$/day | | 50 (40) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 30 (20) mg/L |
| | Night soil treatment industry (except those involving night soil treatment plants) | | |
| | Effluent discharged <500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 65 (50) mg/L | |
| | Effluent discharged <500 $m^3$/day | | 20 (15) mg/L |
| | Effluent discharged ≥500 $m^3$/day and <5,000 $m^3$/day | | 15 (10) mg/L |
| | Effluent discharged ≥5,000 $m^3$/day | | 15 (10) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 1 April 1983.
4. Applies if facility was established on or after 1 April 1983.
5. If a factory or business establishment discharging effluent into the Seto Water Area which was established before the stricter effluent standards in Seto Water Area became effective (or a factory or business establishment that is considered that it had been established before the standards in Seto Water Area became effective in accordance with Note 6) moves to other location and discharges effluent to the Seto Water Area or installed new specified facility after abolishing the old specified facility without changing the original industry category, such factory or business establishment at the new location is considered that it had been established before the stricter effluent standards in the Seto Water Area became effective.
6. When a facility became a specified facility, the factory or business establishment that actually installed the facility (including a facility that became under construction before the date the stricter effluent standards in Kure Water Area became effective but exclude a specified facility established after the date) is considered that the factory or business establishment had been established before the facility became a specified facility.
7. As to the effluent discharged from a factory or business establishment that belongs to more than one industry categories where there are different allowable effluent standards, the lowest allowable limit shall be applied.
8. For a business establishment engaging in treating sewage of a factory or other business establishment, the effluent standards specified herein is duly enforced by considering that such business establishment is in the same business field as that of the factory or other business establishment for which it provide sewage treatment service. In this case, where there are different allowable limits for the category which such a factory or other business establishment belong to, Note 6 shall be applied.
9. Specified establishments: Factory or business establishment with specified facility installed.
10. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
    ㋑Containing cadmium or other substances which may cause harmful damage to human health.
    ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.

Table C4.T16. Effluent Standards for Facilities Located in Yamaguchi Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| BOD | 1) Night soil treatment facility | 40 (30) mg/L | 40 (30) mg/L |
| | 2) Terminal sewerage treatment facility | | |
| | Primary quality treatment[6] | 150 (120) mg/L | 150 (120) mg/L |
| | Intermediate quality treatment[7] | 80 (60) mg/L | 80 (60) mg/L |
| | Superior quality treatment[8] | 25 (20) mg/L | 25 (20) mg/L |
| | 3) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 55 (40) mg/L | |
| | Effluent discharged <100 $m^3$/day | | 120 (90) mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 80 (60) mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 50 (40) mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 25 (20) mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 15 (10) mg/L |
| COD | 1) Night soil treatment facility | 40 (30) mg/L | 40 (30) mg/L |
| | 2) Terminal sewerage treatment facility | | |
| | Primary quality treatment[6] | 150 (120) mg/L | 150 (120) mg/L |
| | Intermediate quality treatment[7] | 80 (60) mg/L | 80 (60) mg/L |
| | Superior quality treatment[8] | 25 (20) mg/L | 25 (20) mg/L |
| | 3) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 55 (40) mg/L | |
| | Effluent discharged <100 $m^3$/day | | 120 (90) mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 80 (60) mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 50 (40) mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 25 (20) mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 15 (10) mg/L |
| TSS | 1) Terminal sewerage treatment facility | | |
| | Primary quality treatment[6] | 190 (150) mg/L | 190 (150) mg/L |
| | Intermediate quality treatment[7] | 150 (120) mg/L | 150 (120) mg/L |
| | Superior quality treatment[8] | 90 (70) mg/L | 90 (70) mg/L |
| | 2) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 150 (120) mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 90 (70) mg/L | |
| | Effluent discharged <100 $m^3$/day | | 90 (70) mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 90 (70) mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 40 (30) mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 20 (15) mg/L |
| Mineral oil (N-hexane extract) | 1) Waste oil treatment facility | 2 mg/L | |
| | 2) Other facility[12] | | |
| | Effluent discharged ≥500 $m^3$/day | 3 mg/L | |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 2 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 2 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 1 mg/L |

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| Vegetable oil and fat (N-hexane extract) | 1) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 10 mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 5 mg/L | |
| | Effluent discharged <100 $m^3$/day | | 15 mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 15 mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 10 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 10 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 5 mg/L |
| Phenols | 1) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 1 mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 1 mg/L | |
| | Effluent discharged <100 $m^3$/day | | 1 mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 1 mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 1 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 1 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 1 mg/L |
| Dissolved iron | 1) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 10 mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 10 mg/L | |
| | Effluent discharged <100 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 3 mg/L |
| Dissolved manganese | 1) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 10 mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 10 mg/L | |
| | Effluent discharged <100 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 3 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 3 mg/L |
| Chromium content | 1) Other facility[12] | | |
| | Effluent discharged <500 $m^3$/day | 2 mg/L | |
| | Effluent discharged ≥500 $m^3$/day | 2 mg/L | |
| | Effluent discharged <100 $m^3$/day | | 2 mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 2 mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 2 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 2 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 2 mg/L |
| Fluorine | 1) Other facility[12] | | |
| | Effluent discharged <100 $m^3$/day | | 15 mg/L |
| | Effluent discharged ≥100 $m^3$/day and <1,000 $m^3$/day | | 15 mg/L |
| | Effluent discharged ≥1,000 $m^3$/day and <10,000 $m^3$/day | | 15 mg/L |
| | Effluent discharged ≥10,000 $m^3$/day and <100,000 $m^3$/day | | 15 mg/L |
| | Effluent discharged ≥100,000 $m^3$/day | | 15 mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 24 June 1972.
4. Applies if facility was established on or after 24 June 1972.

5. When there are different allowable limits defined for each of mineral oil contents, animal /vegetable oil and fat contents, the allowable limit for the largest pollutant discharge load of each parameter shall be applied.
6. Primary quality treatment: sewerage treatment using precipitation method.
7. Intermediate quality treatment: sewerage treatment using high-rate trickling filter method, modified aeration method or methods with equivalent quality.
8. Superior quality treatment: sewerage treatment using activated sludge method, standard trickling filter method, or methods with equivalent quality.
9. When a specified establishment within a sewerage service area discharges effluent into the Waters of Japan, the stricter effluent standard applicable to a terminal sewage treatment facility shall be applied to the establishment (if the establishment has multiple terminal sewage treatments installed, the most strict effluent standard among all stricter effluent standards applied to the all terminal sewage treatments shall be applied).
10. Specified establishments: Factory or business establishment with specified facility installed
11. “Specified facility” means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
    ㋑Containing cadmium or other substances which may cause harmful damage to human health.
    ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.
12. Other facility: gas supply facility, water supply facility, acid or alkali surface treatment facility, electroplating facility, central kitchen, restaurant, waste oil treatment facility (established on or after 24 June 1972).

Table C4.T17. Effluent Standards for Facilities Located in Nagasaki Prefecture[5]

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| BOD | Within a sewerage service area | | |
| | Effluent discharged ≥2 $m^3$/day and <10 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥10 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥2 $m^3$/day | | 30 (20) mg/L |
| | Within an area with no sewerage service | | |
| | Effluent discharged ≥10 $m^3$/day and <20 $m^3$/day | 80 (60) mg/L | 80 (60) mg/L |
| | Effluent discharged ≥20 $m^3$/day and <50 $m^3$/day | 80 (60) mg/L | 80 (60) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 30 (20) mg/L | 30 (20) mg/L |
| COD | Within a sewerage service area | | |
| | Effluent discharged ≥2 $m^3$/day and <10 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥10 $m^3$/day | 30 (20) mg/L | |
| | Effluent discharged ≥2 $m^3$/day | | 30 (20) mg/L |
| | Within an area with no sewerage service | | |
| | Effluent discharged ≥10 $m^3$/day and <20 $m^3$/day | 80 (60) mg/L | 80 (60) mg/L |
| | Effluent discharged ≥20 $m^3$/day and <50 $m^3$/day | 80 (60) mg/L | 80 (60) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 30 (20) mg/L | 30 (20) mg/L |
| TSS | Within a sewerage service area | | |
| | Effluent discharged ≥2 $m^3$/day and <10 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged ≥10 $m^3$/day | 50 (40) mg/L | |
| | Effluent discharged ≥2 $m^3$/day | | 50 (40) mg/L |
| | Within an area with no sewerage service | | |
| | Effluent discharged ≥10 $m^3$/day and <20 $m^3$/day | 100 (80) mg/L | 100 (80) mg/L |
| | Effluent discharged ≥20 $m^3$/day and <50 $m^3$/day | 100 (80) mg/L | 100 (80) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 50 (40) mg/L | 50 (40) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if specified facility[6] was established prior to 1 January 1988.
4. Applies if specified facility[6] was established on or after 1 January 1988.
5. Applicable area: Oomura Bay (the sea area surrounded by the 270 degrees C line and the seashore line between the sea surface underneath Saikai Bridge and the point located 90 m southwest to the left bank of Kakezaki River estuary (at 33° 6' 35" north in latitude of 129° 47' 40" east in longitude where Sasebo's former Sakioka tidal level observation site)) and all rivers and the water area that flow into the bay.
6. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
   ㋑Containing cadmium or other substances which may cause harmful damage to human health.
   ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.

Table C4.T18. Effluent Standards for Facilities Discharging into Nakagusuku Bay, Yokatsu Peninsula and Kin Bay Sea Areas in Okinawa Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| BOD | All which have a specified facility[5] within a sewerage service area | 40 (30) mg/L | 30 (20) mg/L |
| | Facility within an area with no sewerage service | | |
| | 1) Terminal sewerage treatment facility (effluent ≥50 $m^3$/day) | 40 (30) mg/L | |
| | 2) Other facility[6] | | |
| | Effluent discharged ≥20 $m^3$/day and <50 $m^3$/day | 160 (120) mg/L | 160 (120) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 70 (50) mg/L | |
| | Effluent discharged ≥50 $m^3$/day and <200 $m^3$/day | | 70 (50) mg/L |
| | Effluent discharged ≥200 $m^3$/day | | 30 (20) mg/L |
| COD | All which have a specified facility[5] within a sewerage service area | 40 (30) mg/L | 30 (20) mg/L |
| | Facility within an area with no sewerage service | | |
| | 1) Terminal sewerage treatment facility (effluent ≥50 $m^3$/day) | 40 (30) mg/L | |
| | 2) Other facility[6] | | |
| | Effluent discharged ≥20 $m^3$/day and <50 $m^3$/day | 160 (120) mg/L | 160 (120) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 70 (50) mg/L | |
| | Effluent discharged ≥50 $m^3$/day and <200 $m^3$/day | | 70 (50) mg/L |
| | Effluent discharged ≥200 $m^3$/day | | 30 (20) mg/L |
| TSS | All which have a specified facility[5] within a sewerage service area | 90 (70) mg/L | 70 (50) mg/L |
| | Facility within an area with no sewerage service | | |
| | 1) Terminal sewerage treatment facility (effluent ≥50 $m^3$/day) | 90 (70) mg/L | |
| | 2) All which have an automated car washing facility (effluent ≥20 $m^3$/day) | 100 (80) mg/L | 70 (50) mg/L |
| | 3) Other facility[6] | | |
| | Effluent discharged ≥20 $m^3$/day and <50 $m^3$/day | 200 (150) mg/L | 200 (150) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged ≥50 $m^3$/day and <200 $m^3$/day | | 130 (100) mg/L |
| | Effluent discharged ≥200 $m^3$/day | | 90 (70) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 5 August 1976.
4. Applies if facility was established on or after 5 August 1976.
5. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
   ㋑Containing cadmium or other substances which may cause harmful damage to human health.
   ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.
6. Other facility: gas supply facility, water supply facility, acid or alkali surface treatment facility, electroplating facility, central kitchen, restaurant, laundry facility, photo printing facility, hospital with 300 or more beds, waste oil treatment facility, business establishment for scientific technology research, study or test (except those related to humanities only), waste treatment facility, night soil treatment facility.

Table C4.T19. Effluent Standards for Facilities Discharging into Tengan River Water Areas in Okinawa Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| pH | All which have an automated car washing facility (effluent ≥5 $m^3$/day) | 6.5-8.5 | 6.5-8.5 |
| | Other facility[5] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 6.5-8.5 | 6.5-8.5 |
| | Effluent discharged ≥50 $m^3$/day | 6.5-8.5 | 6.5-8.5 |
| BOD | Other facility[5] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 160 (120) mg/L | 100 (80) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 40 (30) mg/L | 30 (20) mg/L |
| TSS | All which have an automated car washing facility (effluent ≥5 $m^3$/day) | 40 (30) mg/L | 40 (30) mg/L |
| | Other facility[5] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 200 (150) mg/L | 150 (100) mg/L |
| | Effluent discharged ≥50 $m^3$/day | 90 (70) mg/L | 90 (70) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 5 August 1976.
4. Applies if facility was established on or after 5 August 1976.
5. Other facility: gas supply facility, water supply facility, acid or alkali surface treatment facility, electroplating facility, central kitchen, restaurant, laundry facility, photo printing facility, hospital with 300 or more beds, waste oil treatment facility, business establishment for scientific technology research, study or test (except those related to humanities only), waste treatment facility, night soil treatment facility.

Table C4.T20. Effluent Standards for Facilities Discharging into Hija River Water Areas in Okinawa Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| pH | All which have a specified facility[5] within a sewerage service area | 6.5-8.5 | |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 6.5-8.5 | |
| | Effluent discharged ≥50 $m^3$/day | 6.5-8.5 | |
| | 2) All which have a night soil treatment facility only (effluent ≥5 $m^3$/day) | 6.5-8.5 | |
| | 3) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 6.5-8.5 | |
| | Effluent discharged ≥50 $m^3$/day | 6.5-8.5 | 6.5-8.5 |
| BOD | All which have a specified facility[5] within a sewerage service area | 40 (30) mg/L | |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 80 (60) mg/L | |
| | Effluent discharged ≥50 $m^3$/day | 50 (40) mg/L | |
| | 2) All which have a night soil treatment facility only (effluent ≥5 $m^3$/day) | 40 (30) mg/L | |
| | 3) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 160 (120) mg/L | |
| | Effluent discharged ≥50 $m^3$/day | 40 (30) mg/L | 30 (20) mg/L |
| TSS | All which have a specified facility[5] within a sewerage service area | 90 (70) mg/L | 90 (70) mg/L |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 130 (100) mg/L | |
| | Effluent discharged ≥50 $m^3$/day | 90 (70) mg/L | |
| | 2) All which have a night soil treatment facility only (effluent ≥5 $m^3$/day) | 90 (70) mg/L | |
| | 3) All which have an automated car washing facility (effluent ≥5 $m^3$) | 40 (30) mg/L | |
| | 4) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 200 (150) mg/L | |
| | Effluent discharged ≥50 $m^3$/day | 90 (70) mg/L | 90 (70) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 5 August 1976.
4. Applies if facility was established on or after 5 August 1976.
5. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
   ㋑Containing cadmium or other substances which may cause harmful damage to human health.
   ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.
6. Other facility: gas supply facility, water supply facility, acid or alkali surface treatment facility, electroplating facility, central kitchen, restaurant, laundry facility, photo printing facility, hospital with 300 or more beds, waste oil treatment facility, business establishment for scientific technology research, study or test (except those related to humanities only), waste treatment facility, night soil treatment facility (applies to facilities established after 5 Aug 1976), terminal sewage treatment facility.

Table C4.T21. Effluent Standards for Facilities Discharging into Taiho River Water Areas in Okinawa Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| pH | All which have a specified facility[5] installed | | 6.5-8.5 |
| BOD | All which have a specified facility[5] installed (effluent <50 $m^3$/day) | 160 (120) mg/L | |
| | All which have a specified facility[5] installed | | 30 (20) mg/L |
| TSS | All which have a specified facility[5] installed (effluent <50 $m^3$/day) | 200 (150) mg/L | |
| | All which have a specified facility[5] installed | | 90 (70) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 5 August 1976.
4. Applies if facility was established on or after 5 August 1976.
5. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
   ㋑Containing cadmium or other substances which may cause harmful damage to human health.
   ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.

Table C4.T22. Effluent Standards for Facilities Discharging into Naha Port Water Areas in Okinawa Prefecture

| Item | Category | Allowable limit[3] | Allowable limit[4] |
|---|---|---|---|
| pH | All which have a specified facility[5] within a sewerage service area | 6.5-8.5 | |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility (effluent ≥5 $m^3$/day) | 6.5-8.5 | |
| | 2) All which have a car washing facility installed | | 6.5-8.5 |
| | 3) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 6.5-8.5 | |
| | Effluent discharged ≥50 $m^3$/day | 6.5-8.5 | 6.5-8.5 |
| BOD | All which have a specified facility[5] within a sewerage service area | 40 (30) mg/L | |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility (effluent ≥5 $m^3$) | 80 (60) mg/L | |
| | 2) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 160 (120) mg/L | |
| | Effluent discharged ≥50 $m^3$ | 40 (30) mg/L | 30 (20) mg/L |
| COD | All which have a specified facility[5] within a sewerage service area | 40 (30) mg/L | |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility (effluent ≥5 $m^3$) | 80 (60) mg/L | |
| | 2) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 160 (120) mg/L | |
| | Effluent discharged ≥50 $m^3$ | 40 (30) mg/L | 30 (20) mg/L |
| TSS | All which have a specified facility[5] within a sewerage service area | 90 (70) mg/L | |
| | Facility within an area with no sewerage service | | |
| | 1) Laundry business facility (effluent ≥5 $m^3$) | 130 (100) mg/L | |
| | 2) All which have an automated car washing facility (effluent ≥5 $m^3$) | 40 (30) mg/L | |
| | 3) Other facility[6] | | |
| | Effluent discharged ≥5 $m^3$/day and <50 $m^3$/day | 200 (150) mg/L | |
| | Effluent discharged ≥50 $m^3$ | 90 (70) mg/L | 90 (70) mg/L |
| | 4) All which have a car washing facility installed | | 40 (30) mg/L |

**Notes:**

1. Values shown in brackets are daily average.
2. Applies to installation with discharge effluent ≥50 $m^3$/day, unless indicated.
3. Applies if facility was established prior to 5 August 1976.
4. Applies if facility was established on or after 5 August 1976.
5. "Specified facility" means those facilities which discharge polluted water or wastewater meeting either of the following conditions:
   ㋑Containing cadmium or other substances which may cause harmful damage to human health.
   ㋺Being of a degree, that may cause damage to the living environment, as COD and other substances as showing the condition of water pollution.
6. Other facility: gas supply facility, water supply facility, acid or alkali surface treatment facility, electroplating facility, central kitchen, restaurant, laundry facility, photo printing facility, hospital with 300 or more beds, waste oil treatment facility, business establishment for scientific technology research, study or test (except those related to humanities only), waste treatment facility, night soil treatment facility, terminal sewage treatment facility.

Table C4.T23. Effluent Standards for Facilities Located in Tokyo Prefecture

| Item | Water Area | Facility | Allowable Limit |
|---|---|---|---|
| Cadmium and Its compounds | Headwater Area[2] | Factories[3] | 0.01 mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.1mg/L |
| Cyanide | Headwater Area[2] | Factories[3] | ND |
| | Headwater Area[2] | Designated Work Places[4] | 1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 1mg/L |
| Organic phosphorus compound | Headwater Area[2] | Factories[3] | ND |
| | Headwater Area[2] | Designated Work Places[4] | 1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 1mg/L |
| Lead and its compounds | Headwater Area[2] | Factories[3] | 0.01 mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.1mg/L |
| Hexavalent chromium compound | Headwater Area[2] | Factories[3] | 0.05mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.5mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.5mg/L |
| Arsenic and its compounds | Headwater Area[2] | Factories[3] | 0.01 mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.1mg/L |
| Mercury, alkyl mercury, and mercury compounds | Headwater Area[2] | Factories[3] | 0.0005 mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.005mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.005mg/L |
| Alkyl mercury compound | Headwater Area[2] | Factories[3] | ND |
| | Headwater Area[2] | Designated Work Places[4] | ND |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | ND |
| PCB | Headwater Area[2] | Factories[3] | ND |
| | Headwater Area[2] | Designated Work Places[4] | 0.003mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.003mg/L |
| Trichloroethylene | Headwater Area[2] | Factories[3] | 0.03mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.3mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.3mg/L |
| Tetrachloroethylene | Headwater Area[2] | Factories[3] | 0.01mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.1mg/L |
| Dichloromethane | Headwater Area[2] | Factories[3] | 0.02mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.2mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.2mg/L |
| Carbon tetrachloride | Headwater Area[2] | Factories[3] | 0.002mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.02mg/L |
| | General water area A, B[2], and | Factories and Designated | 0.02mg/L |

| Item | Water Area | Facility | Allowable Limit |
|---|---|---|---|
| | Island and surrounding sea area[2] | Work Places | |
| 1,2-Dichloroethane | Headwater Area[2] | Factories[3] | 0.004mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.04mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.04mg/L |
| 1,1-Dichloroethylene | Headwater Area[2] | Factories[3] | 0.02mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.2mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.2mg/L |
| cis-1,2-Dichloroethylene | Headwater Area[2] | Factories[3] | 0.04mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.4mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.4mg/L |
| 1,1,1-Trichloroethane | Headwater Area[2] | Factories[3] | 1mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 3mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 3mg/L |
| 1,1,2-Trichloroethane | Headwater Area[2] | Factories[3] | 0.0006mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.06mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.06mg/L |
| 1,3-Dichloropropene | Headwater Area[2] | Factories[3] | 0.002mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.02mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.02mg/L |
| Thiuram | Headwater Area[2] | Factories[3] | 0.006mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.06mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.06mg/L |
| Simazine | Headwater Area[2] | Factories[3] | 0.003mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.03mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.03mg/L |
| Thiobencarb | Headwater Area[2] | Factories[3] | 0.02mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.2mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.2mg/L |
| Benzene | Headwater Area[2] | Factories[3] | 0.01mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.1mg/L |
| Selenium and its compounds | Headwater Area[2] | Factories[3] | 0.01mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 0.1mg/L |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 0.1mg/L |
| Boron and its compounds | Headwater Area[2] | Factories[3] | 1 mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 10 mg/L(Areas other than sea area) |
| | | | 230 mg/L(Sea area) |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 10 mg/L(Areas other than sea area) |
| | | | 230 mg/L(Sea area) |

| Item | Water Area | Facility | Allowable Limit |
|---|---|---|---|
| | | | |
| Fluorine and its compounds | Headwater Area[2] | Factories[3] | 0.8 mg/L |
| | Headwater Area[2] | Designated Work Places[4] | 8 mg/L(Areas other than sea area) |
| | | | 15 mg/L(Sea area) |
| | General water area A, B[2], and Island and surrounding sea area[2] | Factories and Designated Work Places | 8 mg/L(Areas other than sea area) |
| | | | 15 mg/L(Sea area) |

Note:

1. The levels listed in this table shall be applied to any of the factories below and the levels stipulated by National Standards shall be applied to factories other than those listed below (as to the level of boron and its compounds and fluorine and its compounds of the factories that the levels listed in this table are not applied to, the standard levels defined for the effluent discharged to Waters of Japan other than sea area):
   - Factory built by construction started on or after 1 April 2001. Factory built by construction started on or after 1 April 2002 if it is a factory that discharges the effluent containing Boron and its compounds or Fluorine and its compounds.
   - Factory that was already built or under construction on 31 March 2001 and has changed the structure of its effluent source facility on or after 1 April 2001 resulting in increased effluent. Factory that was already built or under construction on 31 March 2002 and has changed the structure of its effluent source facility on or after 1 April 2002 resulting in increased effluent, if the factory is the one that discharges the effluent containing boron and its compounds or fluorine and its compounds.
2. For details of water area category, refer to Table C4.T24.
3. Factories:
   3.1 Factory that uses a motor that produce a total rated output of 2.2 kw or greater for continuous manufacturing, processing or working procedure (or factory that has been planned to continue the production for a year or longer if it produces ready-mixed concrete).
   3.2 Factory using a motor that produce a total rated output from 0.75 to < 2.2 kw for continuous manufacturing, processing or working procedure listed below:
   - Printing or bookbinding
   - Metal stamping, spinning, or cutting (except the procedure that uses a mechanical saw)
   - Cutting, shaving, or shredding wood, stone, or synthetic resin
   - Polishing or sandblasting glass
   - Manufacturing or processing of food using a liquid fuel burner that consumes 20 L of fuel/hr or a furnace that with a grate area $\geq 0.5$ m$^2$.

   3.3 Factory used for continuous manufacturing, processing or working procedure listed below:
   - Electric or gas welding or cutting of metal
   - Hammering of metal material 0.5 mm thick or thicker or metal polishing, metal removing, or metal tack hammering using electric or pneumatic tools
   - Metal surfacing using shot blast or sandblast
   - Applying paint, dye, or coloring material using spray painting
   - Dry cleaning
   - Assembling, testing, or tuning of TV sets, electric phonographs, alarms, or other similar acoustic devices in a workshop with a total floor space $\geq 50$ m$^2$
   - Testing or tuning of engines that combust gas, petroleum or other fuel
   - Power generating work
   - Incineration of wastes using an incinerator with a fire bed $\geq 0.5$ m$^2$ or incineration capacity $\geq 50$ kg/hr.
   - Photo printing
   - Manufacturing or processing procedure that discharges toxic gas
   - Manufacturing or processing procedure that discharges hazardous substance

   4. Designated workshops:
   - Car parking facility with parking capacity ≥20 cars
   - Car terminal with parking capacity ≥10 commercial vehicles
   - Gasoline, LPG, or LNG station
   - Car washing station that uses steam cleaning or motor-powered washing equipment

- Waste transshipment or storage site
- Material storage site with a total area ≥ 100 $m^2$
- Workshop with the installation for making blue prints
- Business establishment that has a laundry facility
- Business establishment that has a waste oil treatment facility
- Business establishment that has a sludge treatment facility
- Business establishment that has a night soil treatment facility with a holding capacity for 200 people or more
- Business establishment that has a wastewater treatment facility for the effluent discharged from a factory or workshop
- Sewage treatment facility
- Business establishment that has an air-heating furnace for heating (except a furnace that uses electric or waste heat as an only heat source or combusts a gas containing 0.1 % of sulfur compound by volume only)
- Business establishment that has a boiler (except a boiler that uses electric or waste heat as an only heat source or has a heat transfer area <5 $m^2$ when calculated in accordance with JIS B8201 and B8203 (or < 10 $m^2$ when such a boiler combusts a gas containing 0.1 % of sulfur compound by volume only))
- Business establishment that has a gas turbine (except a turbine with combustion capacity ≤50 L in heavy oil equivalent per hour, turbine for emergency use) or an gas engine (except a gas engine with combustion capacity equal to or ≤5 L in heavy oil equivalent per hour, turbine for emergency use)
- Business establishment that has an incinerator (except an incinerator with a fire bed equal to or < 0.5 $m^2$ and incineration capacity ≤50 kg/hr.)
- Business establishment that has a pumping facility to pump up ground water for air conditioning, toilet flushing, or car washing equipment and a public bath with a total floor space > 150 $m^2$ that has a pumping facility
- Business establishment that has a sedimentation or filtration facility as a water treatment facility for drinking or industrial water supply system or private industrial water supply system (except a facility that is used for a business establishment with a water treatment capacity < 10,000 $m^3$/day)
- Hospital with 300 or more beds

Table C4.T24. Water Area Category of Tokyo Prefecture

| Water Area Category | Water Area Subcategory | | Area Description |
|---|---|---|---|
| - Headwater Area | River | Edo River water area | The water area of the Edo River from the border between Tokyo and Saitama (hereafter referred to as "Saitama border") down to the left (adjacent to Yagiri, Matsudo, Chiba) and right (adjacent to 5-chome, Shibamata, Katsushika, Tokyo) banks by the intake of Kuriyama water treatment plant and Waters of Japan that flows into the area |
| | | Tama River water area | The water area of the Tama River mainstream (except the area that lies downstream of the left (adjacent to 2-4, Kamata, Setagaya, Tokyo) and right (adjacent to Unane, Kawasaki, Kanagawa) banks by the intake of Kinutashimo water treatment plant and Ogouch Reservoir known as Lake Okutama) and Waters of Japan that flows into the area |
| | | Kasumi River water area | The water area of the Kasumi River mainstream and the Yabata River (only the areas of both rivers that lie upstream of Saitama border) and Waters of Japan that flows into the area |
| | | Nariki River water area | Waters of Japan source areas of the Nariki River mainstream that lies upstream of Saitama border and Waters of Japan that flows into the area |
| | Lake and reservoir | Ogouchi reservoir | Ogouchi reservoir (Lake Okutama) |
| General Water Area A | River | Edo River water area (Downstream) | The water area of the Edo River mainstream from the intake of Kuriyama water treatment plant down to the left (adjacent to Maihama, Urayasu, Chiba) and right (adjacent to 5-chome, Rinkaicho, Edogawa, Tokyo) banks of the river estuary and Waters of Japan (except Shinnaka River) that flows into the area |
| | | Tama River water area (Downstream A) | The water area of the Tama River mainstream from the left (1-5, Denenchofu, Oota, Tokyo) and right (Kamimarukotennjin, Kawasaki, Kanagawa) banks by the intake of Kinutashimo water treatment plant to Chofu water intake gate and Waters of Japan that flows into the area |
| General Water Area B | River | Tama River water area (Downstream B) | The water area of the Tama River mainstream from Chofu water intake gate to the left (adjacent to 3-33 Haneda, Oota, Tokyo) and right (adjacent to 1 Daishigawara, Kawasaki, Kanagawa) banks of the river estuary and Waters of Japan that flows into the area |
| | | Ara River water area | The water area and the connecting Waters of Japan that covers the areas below:<br>1 The area of the Ara River mainstream from Saitama border to the left (the south end of Sewaritei) and right (adjacent to 3-7 Shinsuna, Kotou-ku, Tokyo) banks of the river estuary<br>2 The area of the Naka River mainstream from Saitama border to the left (adjacent to 1-1 Seishincho, Edogawa-ku, Tokyo) and right (the south end of Sewaritei) banks of the river estuary<br>3 The Shin Naka River<br>4 Upstream of the left (the west end of 8 Toyomicho, Chuo-ku, Tokyo) and right (the east end of 1-10 Kaigan, Minato-ku, Tokyo) banks of the Sumida River mainstream<br>5 The area of the branch river of Sumida River from its left (adjacent to 2-1 Toyosu, Koto-ku, Tokyo) and right (at the east end of 2-2 Harumi, Chuo-ku, Tokyo) banks to the junction point that connects to the Sumida River |

| Water Area Category | Water Area Subcategory | | Area Description |
|---|---|---|---|
| | | | 6 The area of the Shingashi River that lies downstream from Saitama border<br>7 The area of the Ayase River from Saitama border to its junction point that connect the Naka River<br>8 The areas of the Shirako River, Kuriome River, Yanase River, Nobidomeyousui, and Furo River that lie upstream of Saitama border<br>9 Kotokasen (Waters of Japan traveling along the river bank from the south end of right bank of the Ara River at 3-7 Shinsuna, Koto-ku, Tokyo through the south end of 1 Edagawa, Koto-ku, Tokyo to the east end of Aioi Bridge at 2-1 Ecchujima, Koto-ku where it reaches the nearby coast) |
| | | Jonan water area | The water area and the connecting Waters of Japan that covers the areas below:<br>1 The area of the Furu River upstream of its left (adjacent to 1-15 Kaigan, Minato-ku, Tokyo) and right (adjacent to 2-7 Kaigan, Minato-ku, Tokyo) banks<br>2 The area of the Meguro River upstream of its left (adjacent to 1-39 Higashishinagawa, Shinagawa-ku, Tokyo) and right (adjacent to 3-8 Higashishinagawa, Shinagawa-ku, Tokyo) banks<br>3 Upstream of the left (2 Konan, Minato-ku, Tokyo) and right (adjacent to 1-3 Higashishinagawa, Shinagawa-ku, Tokyo) banks of the branch river of Meguro River.<br>4 Upstream of the left (adjacent to 2-27 Higashishinagawa, Shinagawa-ku, Tokyo) and right (1-6 Minamioi, Shinagawa-ku, Tokyo) banks of the Tachiai River<br>5 Upstream of the left (adjacent to 1-36 Omorihigashi, Ota-ku, Tokyo) and right (adjacent to 1-37 Omorihigashi, Ota-ku, Tokyo) banks of the Uchi River<br>6 Upstream of the left (adjacent to 5-28 Omorihigashi, Ota-ku, Tokyo) and right (adjacent to 4-4 Omorihiminami, Ota-ku, Tokyo) banks of the Kyu-Nomi River<br>7 Upstream of the left (adjacent to 5-6-2 Omoriminami, Ota-ku, Tokyo) and right (adjacent to 6-3-1 Higashikojiya, Ota-ku, Tokyo) banks of the Nomi River |
| | | Tsurumi River water area | The Tsurumi River upstream above the border between Tokyo and Kanagawa (hereafter referred to "Kanagawa border"), the Onda River upstream above Kanagawa border and Waters of Japan connecting to these rivers |
| | | Sakai River water area | Upstream above Kanagawa border of the Sakai River mainstream and Waters of Japan connecting to the river |
| | Sea | Tokyo Bay water area | Coastal area along the seashore of Tokyo from the right bank of the Edo River estuary to Tama River estuary and Waters of Japan connecting to this area which do not belong to other water area |
| Islands and their sea water area | River | Islands' fresh water areas | The rivers and the connecting Waters of Japan in the islands of Izu Island Ogasawara Islands |
| | Sea | Islands' sea water areas | Sea water areas surrounding Izu and Ogasawara Islands |

Table C4.T25. Effluent Standards for Facilities Located in Kanagawa Prefecture (Effluent Discharged ≥ 50m$^3$/day)

| Item | Water Area | Allowable limit | Allowable limit[2] |
|---|---|---|---|
| Cadmium and its compounds | Water quality preservation lakes[3] (Area A[3]) | ND | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 0.05mg/L | ND |
| | Area B[3] | | |
| | Sea Area[3] | | |
| Cyanide | Water quality preservation lakes[3] (Area A[3]) | 0.5mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 0.5mg/L | |
| | Area B[3] | | |
| | Sea Area[3] | | |
| Organo-phosphorous compounds | Water quality preservation lakes[3] (Area A[3]) | ND | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 0.2mg/L | ND |
| | Area B[3] | 0.2mg/L | 0.2mg/L |
| | Sea Area[3] | 0.2mg/L | 0.2mg/L |
| Lead and its compounds[4] | Water quality preservation lakes[3] (Area A[3]) | 0.05mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | 0.05mg/L |
| | Area B[3] | | |
| | Sea Area[3] | | |
| Hexavalent chromium compound | Water quality preservation lakes[3] (Area A[3]) | 0.05mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | 0.05mg/L |
| | Area B[3] | | |
| | Sea Area[3] | | |
| Arsenic and its compounds[5] | Water quality preservation lakes[3] (Area A[3]) | 0.01mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | 0.01mg/L |
| | Area B[3] | | |
| | Sea Area[3] | | |
| pH | Water quality preservation lakes[3] (Area A[3]) | | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | |
| | Area B[3] | | |
| | Sea Area[3] | 5.8-8.6 | 5.8-8.6 |
| Fluorine and its compounds[6] | Water quality preservation lakes[3] (Area A[3]) | 0.8mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | 0.8mg/L |
| | Area B[3] | | |
| | Sea Area[3] | | |
| BOD | Water quality preservation lakes[3] (Area A[3]) | 20 (15) mg/L | 5 (3) mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 25 (20) mg/L | 15 (10) mg/L |
| | Area B[3] | 60 (50) mg/L | 25 (20) mg/L |
| | Sea Area[3] | | |
| COD | Water quality preservation lakes[3] (Area A[3]) | 20 (15) mg/L | 5 (3) mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 25 (20) mg/L | 15 (10) mg/L |
| | Area B[3] | 60 (50) mg/L | 25 (20) mg/L |
| | Sea Area[3] | 60 (50) mg/L | 25 (20) mg/L |
| TSS | Water quality preservation lakes[3] (Area A[3]) | 50 (35) mg/L | 15 (5) mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 70 (40) mg/L | 35 (20) mg/L |
| | Area B[3] | 90 (70) mg/L | 70 (40) mg/L |
| | Sea Area[3] | 90 (70) mg/L | 70 (40) mg/L |
| N-Hexane extracts (Mineral Oil) | Water quality preservation lakes[3] (Area A[3]) | 3mg/L | 3mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | 3mg/L |
| | Area B[3] | | |
| | Sea Area[3] | | |

| Item | Water Area | Allowable limit | Allowable limit[2] |
|---|---|---|---|
| N-Hexane extracts (Animal and vegetable fat) | Water quality preservation lakes[3] (Area A[3]) | 3mg/L | 3mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 5mg/L | 3mg/L |
| | Area B[3] | 10mg/L | 5mg/L |
| | Sea Area[3] | 10mg/L | 5mg/L |
| Phenols | Water quality preservation lakes[3] (Area A[3]) | 0.005mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 0.05mg/L | 0.005mg/L |
| | Area B[3] | 0.5mg/L | 0.5mg/L |
| | Sea Area[3] | 0.5mg/L | 0.5mg/L |
| Copper | Water quality preservation lakes[3] (Area A[3]) | 1mg/L | 1mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 1mg/L | 1mg/L |
| | Area B[3] | | 1mg/L |
| | Sea Area[3] | | 1mg/L |
| Zinc | Water quality preservation lakes[3] (Area A[3]) | 1mg/L | 1mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 1mg/L | 1mg/L |
| | Area B[3] | 3mg/L | 1mg/L |
| | Sea Area[3] | 3mg/L | 1mg/L |
| Dissolved iron | Water quality preservation lakes[3] (Area A[3]) | 0.3mg/L | 0.3mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 1mg/L | 0.3mg/L |
| | Area B[3] | | 3mg/L |
| | Sea Area[3] | | 3mg/L |
| Dissolved manganese | Water quality preservation lakes[3] (Area A[3]) | 0.3mg/L | 0.3mg/L |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 1mg/L | 0.3mg/L |
| | Area B[3] | 1mg/L | 1mg/L |
| | Sea Area[3] | 1mg/L | 1mg/L |
| Chromium | Water quality preservation lakes[3] (Area A[3]) | 0.1mg/L | |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | 1mg/L | 0.1mg/L |
| | Area B[3] | | |
| | Sea Area[3] | | |
| Total Coliform | Water quality preservation lakes[3] (Area A[3]) | | 1,000/cm[3] |
| | Water areas other than water quality preservation lakes[3] (Area A[3]) | | |
| | Area B[3] | | |
| | Sea Area[3] | | |

Note:

1. Values shown in brackets and total Coliform count are daily average
2. New establishments mean specified establishments established on or after 1 November 1971 (except those under construction prior to 1 November 1971)
3. Water Area Categories:
   Water Area A: Chitose River, Niizaki River, Haya River, Sakawa River, Kaname River, Sagami River
   Water Quality Preservation Lakes: Lake Ashi, Lake Tanzawa, Lake Sagami, Lake Tsukui, Lake Okusagami, Lake Miyagase, and the rivers and water channels connecting to these lakes
   Water Area B: Waters of Japan other than that covered by Water Area A
4. The emission standard of Lead and its compounds shall not be applied to the effluent discharged from a specified establishment (installed prior to 1 February 1995 or under construction prior to 31 January 1995) to the water area other than Water Quality Preservation Lakes in Water Area A.
5. The emission standard value "0.01" of Arsenic and its compounds shall be read as "0.05" when applied to the effluent discharged from a specified establishment (installed prior to 1 February 1995 or under construction prior to 31 January 1995) to the water area other than Water Quality Preservation Lakes in Water Area A.
6. The emission standard of fluorine and its compounds shall not be applied to the effluent less than average of 50m$^3$/day discharged from a specified establishment (installed prior to 1 July 2002 or under construction prior to 30 June 2002) to the water area other than Water Quality Preservation Lakes in Water Area A.

# C5. CHAPTER 5

# HAZARDOUS MATERIAL

## C5.1. SCOPE

This Chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements, which are covered under other Chapters. These JEGS do not cover munitions.

## C5.2. DEFINITIONS

C5.2.1. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the following information:

C5.2.1.1. Identification/name of hazardous chemicals;

C5.2.1.2. Appropriate hazard warnings; and

C5.2.1.3. The name and address of the manufacturer, importer, or other responsible party; and that is prepared in accordance with DoDI 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006.

C5.2.2. Hazardous Material. Any material that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table C5.T1, "Typical Hazardous Materials Characteristics," or the material is listed in Table C20.T4, "List of Hazardous Waste/Substances/Materials." Munitions are excluded.

C5.2.3. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006.

C5.2.4. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle, either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

C5.2.5. Material Safety Data Sheet (MSDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

C5.3. CRITERIA

C5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and Marine Corps Order (MCO) 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999 provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Interservice Manual 24-204(I), Army Technical Order (TO) 38-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, DCMAD1, Ch3.4 (HM24), "Preparing Hazardous Materials for Military Air Shipments," 15 April 2007, incorporating Change 1, 4 May 2007.

C5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

C5.3.3. Installations will ensure that for each hazardous material shipment:

C5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material and include an MSDS;

C5.3.3.2. All drivers are trained on the hazardous material included in the shipment including health risks of exposure and the physical hazards of the material, including potential for fire, explosion, and reactivity;

C5.3.3.3. Drivers will be trained on spill control and emergency notification procedures;

C5.3.3.4. For any hazardous material categorized on the basis of Appendix 1, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes;

C5.3.3.5. The transport vehicles are subjected to a walk-around inspection by the driver before and after the hazardous material is loaded; and

C5.3.3.6. Packages are labeled in accordance with paragraph C5.3.7.

C5.3.3.7. Vehicle Placarding is prohibited outside DoD installations in Japan.

C5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material as well as an inventory of all hazardous materials contained therein. (See paragraph C18.3.2).

C5.3.5. Each MSDS shall be in English or Japanese, and shall contain at least the following information:

C5.3.5.1. The identity used on the label.

C5.3.5.1.1. If the hazardous chemical is a single substance, its chemical and common name.

C5.3.5.1.2. If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or

C5.3.5.1.3. If the hazardous chemical is a mixture that has not been tested as a whole:

C5.3.5.1.3.1. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

C5.3.5.1.3.2. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations that would exceed an established Occupational Safety and Health Administration (OSHA)-permissible exposure limit, or could present a health hazard to employees; and

C5.3.5.1.3.3. The chemical and common name(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

C5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

C5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

C5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical;

C5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

C5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available;

C5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen;

C5.3.5.8. Any generally applicable precautions for safe handling and use that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate

hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

C5.3.5.9. Any generally applicable control measures that are known to the chemical manufacturer, importer, or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment;

C5.3.5.10. Emergency and first aid procedures;

C5.3.5.11. The date of preparation of the MSDS or the last change to it; and

C5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

C5.3.6. Each work center will maintain a file of MSDSs for each hazardous material procured, stored, or used at the work center. MSDSs that are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site.

C5.3.7. All hazardous materials on DoD installations will have a Hazardous Chemical Warning Label in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006 (or Japanese equivalent) and have MSDS information either available or in the HMIRS in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006 and other DoD Component instructions. These requirements apply throughout the life-cycle of these materials.

C5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

C5.3.9. All excess hazardous material will be processed through the Defense Logistics Agency (DLA) Disposition Services in accordance with the procedures in DoD 4160.21-M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993. The DRMS will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local pharmacy or exchange program.

C5.3.10. All personnel who use, handle, or store hazardous materials will be trained in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006, and other DoD Component instructions.

C5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

Table C5.T1. Typical Hazardous Materials Characteristics.

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|---|
| 1. The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials that damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gases, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive materials. |
| 2. The item and/or its disposal is regulated by the GoJ because of its hazardous nature. |
| 3. The item has a flashpoint below 93°C (200°F) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control. |
| 4. The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of > 1.0 volt or < -1.0 volt. |
| 5. In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics. |
| 6. The item has special characteristics that, in the opinion of the manufacturer or the DoD Components, could cause harm to personnel if used or stored improperly. |

# C6. CHAPTER 6

# HAZARDOUS WASTE

## C6.1. SCOPE

This Chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed, and recycled in an environmentally sound manner.

## C6.2. DEFINITIONS

C6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4, "List of Hazardous Waste/Substances/Material." with a U.S. Environmental Protection Agency (USEPA) waste number with the "P" designator, or those hazardous wastes in Table AP1.T3 with Hazard Code "H".

C6.2.2. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into or on any land or water that would allow the waste or constituent to enter the environment. Proper disposal effectively mitigates hazards to human health and the environment.

C6.2.3. DoD Hazardous Waste Generator. The DoD considers a generator to be the installation, or activity on an installation, that produces a hazardous waste.

C6.2.4. Elementary Neutralization. A process of neutralizing a HW, that is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

C6.2.5. Hazardous Constituent. A chemical compound listed by name in Table AP1.T4, "List of Hazardous Waste/Substances/Material," or that possesses the characteristics described in section AP1.1.

C6.2.6. Hazardous Waste. A discarded material that may be solid, semi-solid, liquid, or contained gas, and either exhibits a characteristic of a hazardous waste as defined in section AP1.1 or is listed as a hazardous waste in Tables AP1.T1 through AP1.T4. Excluded from this definition are domestic sewage sludge, household wastes, and medical wastes.

C6.2.7. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area (HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

C6.2.8. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending, or other treatment is also hazardous waste fuel.

C6.2.9. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this document.

C6.2.10. Hazardous Waste Log. A listing of HW deposited and removed from an HWSA. Information such as the waste type, volume, location, and storage removal dates should be recorded.

C6.2.11. Hazardous Waste Profile Sheet (HWPS). A document that identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

C6.2.12. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. An HWSA may store more than 55 gallons of a HW stream, and more than one quart of an acute HW stream.

C6.2.13. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

C6.2.14. Industrial Waste. A classification term used in Japan that describes waste resulting from business activity and includes ash, sludge, waste oil, waste acid, waste alkali, and waste plastic. Industrial waste is a term relevant to the transportation, treatment or disposal of wastes by Japanese contractors, not to the management of HW within USFJ installations.

C6.2.15. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

C6.2.16. Specially Controlled General Wastes (SCGW). A classification term used in Japan that describes HW that exhibit the characteristics of explosivity, corrosivity, infection or harm to human health or environment originating from non-industrial sources. SCGW is a term relevant to the transportation, treatment or disposal of wastes by Japanese contractors, not to the management of HW within USFJ installations (See Tables AP1.T5).

C6.2.17. Specially Controlled Industrial Wastes (SCIW). A classification term used in Japan that describes HW that exhibit the characteristics of explosivity, corrosivity, infection or harm to human health or environment from industrial sources. SCIW is a term relevant to the transportation, treatment or disposal of wastes by Japanese contractors, not to the management of HW within USFJ installations (See Tables AP1.T5 and AP1.T6).

C6.2.18. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste that would render such waste non-hazardous, or less

hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

C6.2.19. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The unique identification number used by all generators in Japan shall be DoD Activity Address Code (DoDAAC).

C6.2.20. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment. "Used oil," means any oil or other waste petroleum, oil, or lubricant (POL) product that has been refined from crude oil, or is synthetic oil, has been used and as a result of such use, is contaminated by physical or chemical impurities, or is off specification and cannot be used as intended. Although used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, it is still considered used oil, unless it has been mixed with hazardous waste. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

C6.3. CRITERIA

C6.3.1. DoD Hazardous Waste Generators.

C6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using their knowledge of the materials and processes that generated the waste, or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name), and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics shall be measurable by standardized, and available Japanese and/or equivalent USEPA testing protocols.

C6.3.1.2. A Hazardous Waste Profile Sheet (HWPS) will be used to identify each hazardous waste stream. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams or process modifications that change the character of the hazardous waste handled at the storage area.

C6.3.1.3. Each generator will use their unique identification number for all recordkeeping, reports, and manifests for hazardous waste.

C6.3.1.4. Pre-Transport Requirements

C6.3.1.4.1. Transportation

C6.3.1.4.1.1. When transporting HW via commercial transportation on Japanese public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable Japanese transportation regulations. Requirements may include placarding, marking, containerization, and labeling. Hazardous waste designated for international

transport will be prepared in accordance with applicable international regulations. In the absence of Japanese regulations, international standards will be used.

C6.3.1.4.1.2. When transporting HW via military vehicle on Japanese public roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, if required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), Japanese transportation regulations. Vehicle placarding is prohibited outside DoD installations in Japan.

C6.3.1.4.2. Manifesting. All HW leaving the installation will be accompanied by a serially-numbered manifest to ensure a complete audit trail from point of origin to ultimate disposal. The manifest will include the information listed below. Japanese forms will be used when the destination is a Japanese facility; otherwise, DD Form 1348-1A, "Issue Release/Receipt Document" may be used. This manifest should include:

C6.3.1.4.2.1. Generator's name, address, and telephone number;

C6.3.1.4.2.2. Generator's unique identification number;

C6.3.1.4.2.3. Transporter's name, address, and telephone number;

C6.3.1.4.2.4. Destination name, address, and telephone number;

C6.3.1.4.2.5. Description of waste (including USEPA HW number from Tables AP1.T1 through AP1.T4, and the JEGS HW code from Tables AP1.T5 and AP1.T6);

C6.3.1.4.2.6. Total quantity of waste;

C6.3.1.4.2.7. Date of shipment; and

C6.3.1.4.2.8. Date of receipt.

C6.3.1.4.3. Generators will maintain an audit trail of HW from the point of generation to disposal. Generators using the disposal services of DLA Disposition Services will obtain a signed copy of the manifest from the initial DLA Disposition Services' recipient of the waste, at which time the DLA Disposition Services will assume responsibility. A generator, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different unique identification number (see definition C6.2.19) will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer, and disposal of the waste. Activities desiring to dispose of their HW outside the DLA Disposition Services system will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal.

C6.3.2. Hazardous Waste Accumulation Point (HWAP)

C6.3.2.1. An HWAP is defined in paragraph C6.2.7. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those that are

chemically incompatible. Each HWAP will have warning signs (National Fire Protection Association or appropriate international sign) appropriate for the waste being accumulated at that site.

C6.3.2.2. An HWAP will comply with the storage limits in paragraph C6.2.7. When these limits have been reached, the generator will make arrangements within five working days to move the HW to an HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348-1A) to appropriate authorities responsible for removing the HW (e.g., DLA Disposition Services). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-Quart) volume accumulation limits, but must be transported off-site to a final destination facility within one year.

C6.3.2.3. All criteria of paragraph C6.3.4, "Use and Management of Containers," apply to HWAPs with the exception of paragraph C6.3.4.1.5, "Weekly Inspections."

C6.3.2.4. The following provisions of paragraph C6.3.5, "Recordkeeping Requirements," apply to HWAPs: C6.3.5.1 ("Turn-in Documents"), C6.3.5.5 ("Manifests"), and C6.3.5.6 ("Waste Analysis/Characterization Records").

C6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate HW training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph C6.3.9.

C6.3.3. Hazardous Waste Storage Area (HWSA)

C6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

C6.3.3.2. Design and Operation of HWSAs. HWSAs must be designed, constructed maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned release of HW or HW constituents to air, soil, groundwater or surface water that could threaten human health or the environment. Hazardous waste should not be stored longer than one year in an HWSA.

C6.3.3.3. Waste Analysis and Verification

C6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served, will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

C6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, an HWPS for each waste stream that is stored at each HWSA.

C6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

C6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided.

C6.3.3.3.3.2. Ensure that no waste is accepted for storage unless an HWPS is provided, or is available and properly referenced.

C6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

C6.3.3.3.3.4. Analyze waste shipments in accordance with the waste analysis plan to determine whether it matches the waste description on the accompanying manifest and documents; and

C6.3.3.3.3.5. Reject shipments that do not match the accompanying waste descriptions unless the generator provides an accurate description.

C6.3.3.4. Security

C6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the HWSA grounds.

C6.3.3.4.2. Security System Design. An acceptable security system for a HWSA consists of either:

C6.3.3.4.2.1. A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the HWSA; or

C6.3.3.4.2.2. An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff) that completely surrounds the HWSA, combined with a means to control entrance at all times (e.g., an attendant, television monitors, locked gate, or controlled roadway access).

C6.3.3.4.3. Required Signs. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the HWSA, and at other locations, in sufficient numbers to be seen from any approach to the HWSA. The legend must be written in English and Japanese, and must be legible from a distance of at least 25 feet. Existing signs with a legend other than "Danger Unauthorized Personnel Keep Out," may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the HWSA, and that entry can be dangerous.

C6.3.3.5. Required Aisle Space. Aisle space must allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation during an emergency. Containers must not obstruct an exit.

C6.3.3.6. Access to Communications or Alarm System

C6.3.3.6.1. General. Whenever HW is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

C6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

C6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

C6.3.3.7.1. An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel.

C6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams.

C6.3.3.7.3. Portable fire extinguishers, fire control equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment.

C6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems.

C6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, and eyewash and shower facilities.

C6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA communications alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its proper operation in time of emergency.

C6.3.3.8. General Inspection Requirements

C6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of HW constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

C6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of HW, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump

pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

C6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems (e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, or eroding dike).

C6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in paragraph C6.3.4.1.5. Minimum frequencies for inspecting tank systems are found in paragraph C6.3.7.5.2. For equipment not covered by those paragraphs, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

C6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

C6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep the records for at least three years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

C6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate HW training program in accordance with the training requirements in paragraph C6.3.9.

C6.3.3.10. Storage Practices

C6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion, and generation of toxic gases.

C6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No Smoking" signs, or the appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "No Smoking" legend must be written in English and in any other

language predominant in the area. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

C6.3.3.11. Closure and Closure Plans

C6.3.3.11.1. Closure. At closure of an HWSA, HW and HW waste residues must be removed from the containment system, including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of HW and according to the Closure Plan.

C6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA will also develop a Closure Plan. The Closure Plan will be implemented concurrent with the decision to close the HWSA. The Closure Plan will include: estimates of the storage capacity of the HW, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

C6.3.4. Use and Management of Containers

C6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following criteria will apply when handling and storing HW containers.

C6.3.4.1.1. Containers holding HW will be in good condition, free from severe rusting, bulging, or structural defects.

C6.3.4.1.2. Containers used to store HW, including overpack containers, must be compatible with the materials stored.

C6.3.4.1.3. Management of Containers

C6.3.4.1.3.1. A container holding HW must always be closed during storage, except when it is necessary to add or remove waste.

C6.3.4.1.3.2. A container holding HW must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

C6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

C6.3.4.1.4. Containers holding HW will be marked with a HW marking, and a label indicating the hazard class of the waste contained (flammable, corrosive, etc.).

C6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking and deteriorating containers as well as deterioration of the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

C6.3.4.2. Containment. Container storage areas must have a secondary containment system meeting the following:

C6.3.4.2.1. Must be sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

C6.3.4.2.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

C6.3.4.2.3. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in paragraph C6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

C6.3.4.2.4. Rainwater captured in secondary containment areas should be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the HW in the containers. Contaminated water shall be treated as HW until determined otherwise.

C6.3.4.3. Special Requirements for Ignitable or Reactive Waste. Areas that store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

C6.3.4.4. Special Requirements for Incompatible Wastes

C6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

C6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

C6.3.4.4.3. A storage container holding HW that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments, must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

C6.3.5. Recordkeeping Requirements

C6.3.5.1. Turn-in Documents. Turn-in documents, e.g., DD 1348-1A or manifests, must be maintained for 5 years.

C6.3.5.2. Hazardous Waste Log. A written HW log will be maintained at the HWSA to record all HW handled and should consist of the following:

C6.3.5.2.1. Name/address of generator;

C6.3.5.2.2. Description and hazard class of the hazardous waste;

C6.3.5.2.3. Number and types of containers;

C6.3.5.2.4. Quantity of hazardous waste;

C6.3.5.2.5. Date stored;

C6.3.5.2.6. Storage location; and

C6.3.5.2.7. Disposition data, to include: dates received, sealed, and transported, and transporter used.

C6.3.5.3. The HW log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

C6.3.5.4. Inspection Logs. Records of inspections should be maintained for a period of 3 years.

C6.3.5.5. Manifests. Manifests of incoming and outgoing hazardous wastes will be retained for a period of 5 years.

C6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until 5 years after closure of the HWSA.

C6.3.5.7. The installation will maintain records, identified in paragraphs C6.3.5.1., C6.3.5.5., and C6.3.5.6. for all HWAPs on the installation.

C6.3.6. Contingency Plan

C6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of HW in accordance with the provisions of Chapter 18., "Spill Prevention and Response Planning."

C6.3.6.2. A current copy of the installation contingency plan must be:

C6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan that are pertinent to their facilities and operation); and

C6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and upon which the plan relies to provide emergency services. Contingency Plans should be available in both English and Japanese.

C6.3.7. Tank Systems. The following criteria apply to all storage tanks containing HW. See Chapter 19, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POLs and hazardous substances.

C6.3.7.1. Application. The requirements of this paragraph apply to HWSAs that use tank systems for storing or treating HW. Tank systems that are used to store or treat HW that contain no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in paragraph C6.3.7.4., Containment and Detection of Releases. Tank

systems, including sumps that serve as part of a secondary containment system to collect or contain releases of HW, are exempted from the requirements in paragraph C6.3.7.4.

C6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of paragraph C6.3.7.4., installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

C6.3.7.3. Design and Installation of New Tank Systems or System Components. Managers of HWSAs installing new tank systems or system components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating HW. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

C6.3.7.4. Containment and Detection of Releases. To prevent the release of HW or hazardous constituents to the environment, secondary containment that meets the requirements of this paragraph must be:

C6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

C6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

C6.3.7.4.3. Provided for tank systems that store or treat HW by 1 January 1999;

C6.3.7.4.4. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

C6.3.7.4.5. Constructed to include one or more of the following: a liner external to the tank, a vault, or double-walled tank.

C6.3.7.5. General Operating Requirements

C6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

C6.3.7.5.2. The installation must inspect and log at least once each operating day:

C6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

C6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

C6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of HW (e.g., wet spots, dead vegetation).

C6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA .

C6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or that is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

C6.3.7.6.1. Cessation of use; prevention of flow or addition of wastes. The installation must immediately stop the flow of HW into the tank system or secondary containment system and inspect the system to determine the cause of the release.

C6.3.7.6.2. Containment of visible releases to the environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

C6.3.7.6.2.1. Prevent further migration of the leak or spill to soil or surface water;

C6.3.7.6.2.2. Remove and properly dispose of any contaminated soil (see paragraph C6.3.11 for contaminated soil criteria) or surface water;

C6.3.7.6.2.3. Remove free product to the maximum extent possible; and

C6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

C6.3.7.6.3. Make required notifications and reports.

C6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable (see paragraph C6.3.11 for contaminated soil criteria), and structures and equipment.

C6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

C6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

C6.3.8.1.1. Industrial furnaces.

C6.3.8.1.2. Boilers that are identified as follows:

C6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

C6.3.8.1.2.2. Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids;

C6.3.8.1.2.3. Used oil-fired space heaters provided that:

C6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

C6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.5 million BTU per hour; and

C6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

C6.3.8.2. Prohibitions on Dust Suppression or Road Treatment. Used oil, HW, or used oil contaminated with any HW will not be used for dust suppression or road treatment.

C6.3.8.3. Lead-acid batteries that are to be recycled will be managed as industrial waste when transported off the installation. Lead-acid batteries that are not recycled will be managed as HW.

C6.3.9. Hazardous Waste Training

C6.3.9.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006.

C6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

C6.3.9.3. Training Contents and Requirements. The training program must:

C6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

C6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience.

C6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

C6.3.9.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

C6.3.9.3.4.1. Emergency procedures (response to fire/explosion/spills; use of communications/alarm systems; body and equipment clean up);

C6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures;

C6.3.9.3.4.3. Employee Protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

C6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

C6.3.9.4. Documentation of Training. Installations must document all HW training for each individual assigned duties involving actual or potential exposure to HW. Updated training records on personnel assigned duties involving actual or potential exposure to HW must be kept by the HWSA manager or the responsible installation office and retained for at least three years after termination of duty of these personnel.

C6.3.10. Hazardous Waste Disposal

C6.3.10.1. All DoD HW should normally be disposed of through DLA Disposition Services. A decision not to use DLA Disposition Services for HW disposal may be made in accordance with DoDD 4001.1, "Installation Management," September 4, 1986 to best accomplish the installation mission, but should be concurred with by the component chain of command to ensure that installation contracts and disposal criteria are at least as protective as criteria used by DLA Disposition Services.

C6.3.10.2. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or Japanese law are not disposed of in Japan unless the disposal is conducted in accordance with the following:

C6.3.10.2.1. When HW cannot be disposed of in accordance with these JEGS within Japan, it will either be retrograded to the U.S. or, if permissible under international agreements, transferred to another country outside the U.S. where it can be disposed of in an environmentally sound manner and in compliance with FGS applicable to the country of disposal, if any exist. Transshipment of HW to a country other than the U.S. for disposal must be approved by, at a minimum, the DUSD(I&E).

C6.3.10.2.2. The determination of whether particular DoD-generated HW may be disposed of in Japan will be made by the EEA, in coordination with the unified combatant

commander, the Director of DLA, other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

C6.3.10.3. HW Disposal Procedures (except contaminated soils). For criteria to dispose of contaminated soils, see paragraph C6.3.11.

C6.3.10.3.1. The determination of whether HW may be disposed of in Japan must include consideration of whether the means of treatment and/or containment technologies employed in the GoJ program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the GoJ program includes:

C6.3.10.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

C6.3.10.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

C6.3.10.3.1.3. Appropriate standards and limitations on the methods that may be used to treat and dispose of HW.

C6.3.10.3.1.4. Standards designed to minimize the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface, or groundwater.

C6.3.10.3.2. The EEA must also be satisfied, either through reliance on the GoJ regulatory system and/or provisions in the disposal contracts, that:

C6.3.10.3.2.1. Persons and facilities in the waste management process have demonstrated the appropriate level of training and reliability; and

C6.3.10.3.2.2. Effective inspections, monitoring, and recordkeeping will take place.

C6.3.10.3.3. Contracting for HW transportation, treatment and/or disposal: Contractors for transportation, treatment or disposal of HW must be licensed by the prefectural governor or a local government entity. DLA Disposition Services, or a HW generator who is using a non DLA Disposition Services contract, will inform contractors of HW characteristics and constituents prior to any transfer action. DLA Disposition Services, or the HW generator who is using a non-DLA Disposition Services contract, shall confirm the capabilities of the contractor. Generators of HW are prohibited from contracting with a licensed transporter that requires the transporter to subcontract with a disposal facility. Rather, the HW generator must:

C6.3.10.3.3.1. Contract with a single contractor who is licensed to both transport HW and to dispose of HW; or

C6.3.10.3.3.2. Contract separately with:

C6.3.10.3.3.2.1. A licensed HW transportation contractor, and

C6.3.10.3.3.2.2. A licensed HW disposal facility.

C6.3.10.3.4. The standard for hazardous waste transfer from ship-to-shore or airplane-to-port is that no HW originating from any country other than Japan will be accepted for disposal in Japan, with the following exception:

C6.3.10.3.4.1. Units operating/training away from Okinawa and mainland Japan where there is no DLA Disposition Services to receive HW generated during the deployment are allowed to return HW to Okinawa/Japan where it can be properly disposed of in accordance with these JEGS.

C6.3.10.4. Japanese facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the GoJ (or its duly designated representative) as being in compliance with their regulatory requirements. This evaluation and approval may consist of having a valid permit or GoJ (or its duly designated representative) equivalent for the HW that will be handled.

C6.3.10.5. Hazardous waste will be recycled or reused to the maximum extent practical. Safe and environmentally acceptable methods will be used to identify, store, prevent leakage, and dispose of HW, to minimize risks to health and the environment.

C6.3.10.6. Land Disposal Requirements. Hazardous waste shall not be land disposed on any DoD installation in Japan.

C6.3.10.7. Incinerator Standards. This paragraph applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

C6.3.10.7.1. Incinerators used to dispose of HW must be licensed or permitted by the GoJ and approved by the EEA. This license, permit, or approval must comply with the criteria listed in paragraph C6.3.10.7.2.

C6.3.10.7.2. A license, permit, or EEA approval for incineration of HW must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme that would require an incinerator to achieve the standards set forth in either paragraphs C6.3.10.7.2.1 or C6.3.10.7.2.2 is acceptable.

C6.3.10.7.2.1. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission of particulate matter, and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

C6.3.10.7.2.2. The incinerator has demonstrated, as a condition for obtaining a license, permit, or EEA approval, the ability to effectively destroy the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the GoJ and the EEA to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

C6.3.10.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes categorized as hazardous on the basis of section AP1.1 and which, after treatment as described herein, no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix 1 will continue to be managed as HW under the criteria of this document, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of Japanese disposal alternatives. These technologies should not be implemented without consultation with the EEA.

C6.3.10.8.1. Organics

C6.3.10.8.1.1. Incineration in accordance with the requirements of paragraph C6.3.10.7.1.

C6.3.10.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

C6.3.10.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentrations of a representative compound or indicator parameter (e.g., total organic carbon) has been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the HW being biodegraded.

C6.3.10.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction; liquid extraction; precipitation/crystallization, or phase separation techniques, such as decantation, filtration, and centrifugation when used in conjunction with one of the above techniques.

C6.3.10.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions.

C6.3.10.8.2. Heavy Metals

C6.3.10.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

C6.3.10.8.2.2. Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals.

C6.3.10.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits the characteristic for reactivity defined in Appendix 1.

C6.3.10.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3 will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

C6.3.10.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with paragraphs C6.3.10.8.2.1 or C6.3.10.8.2.2 to stabilize, fix or recover heavy metals, as appropriate, and in accordance with paragraph C6.3.10.8.4 to neutralize any corrosives before disposal.

C6.3.10.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accord with paragraphs C6.3.10.7 and C6.3.10.8.

C6.3.11. Contaminated Soil Disposal

C6.3.11.1. Disposal of contaminated soil shall be accomplished using a contaminated soil treatment contractor that has been licensed by the appropriate GoJ authorities, and using the appropriate GoJ contaminated soil manifest.

C6.3.11.2. Criteria for the proper characterization of contaminated soils for the purpose of disposal in Japan are provided in Table AP1.T7.

C6.3.11.3. There are 4 categories of Licensed Contaminated Soil Treatment Facilities:

C6.3.11.3.1. Soil treatment facilities;

C6.3.11.3.2. Cement manufacture facilities;

C6.3.11.3.3. Landfill treatment facilities; and

C6.3.11.3.4. Separating treatment facilities.

C6.3.11.4. These soil disposal criteria are **NOT** to be interpreted as soil quality standards or guidelines, and as such, shall **NOT** to be used for the purposes of compliance with DoDI 4715.8, “Environmental Remediation for DoD Activities Overseas,” February 2, 1998, as amended or updated.

# C7. CHAPTER 7

# SOLID WASTE

## C7.1. SCOPE

This Chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated, and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4 ("Pollution Prevention," June 18, 1996) and service solid waste management manuals. The criteria in this Chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are located in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste Management," Chapter 11, "Pesticides," Chapter 14, "Polychlorinated Biphenyls," and Chapter 15, "Asbestos."

## C7.2. DEFINITIONS

C7.2.1. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

C7.2.2. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

C7.2.3. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

C7.2.4. Collection Frequency. The number of times collection is provided in a given period of time.

C7.2.5. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

C7.2.6. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

C7.2.7. Construction and Demolition Waste. The waste building materials, packaging, and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures.

C7.2.8. Curb Collection. Collection of solid waste placed adjacent to a street.

C7.2.9. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

C7.2.10. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

C7.2.11. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

C7.2.12. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

C7.2.13. Generation. The act or process of producing solid waste.

C7.2.14. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

C7.2.15. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

C7.2.16. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities.

C7.2.17. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

C7.2.18. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C (77°F) and atmospheric pressure.

C7.2.19. Municipal Solid Waste (MSW). Normally, residential and commercial solid waste generated within a community, not including yard waste. (See also definition in Chapter 2, "Air Emissions.")

C7.2.20. Municipal Solid Waste Landfill (MSWLF) Unit. A discrete area of land or an excavation, on or off an installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. An MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

C7.2.21. Open Burning. Burning of solid wastes in the open, such as in an open dump.

C7.2.22. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

C7.2.23. Residential Solid Waste. The wastes generated by normal household activities, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

C7.2.24. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

C7.2.25. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

C7.2.26. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

C7.2.27. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

C7.2.28. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 91-8, Army TM 5-634, or their successor documents.

C7.2.29. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.30. Solid Wastes. Garbage, refuse, sludge, and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.31. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

C7.2.32. Stationary Compactor. A powered machine that is designed to compact solid waste or recyclable materials and that remains stationary when in operation.

C7.2.33. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

C7.2.34. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

C7.2.35. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

C7.2.36. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

C7.2.37. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

## C7.3. CRITERIA

C7.3.1. DoD solid wastes will be treated, stored, and disposed of in facilities that have been evaluated against paragraphs C7.3.12, C7.3.14, and C7.3.15. These evaluated facilities will be used to the maximum extent practical.

C7.3.2. Installations will cooperate with GoJ officials, to the extent possible, in the solid waste management planning process.

C7.3.2.1. Contracting for industrial waste transportation and/or disposal. Installations utilizing off-base disposal facilities will ensure that the transportation and disposal facility contractor(s) are properly licensed by the appropriate local or prefectural authorities for the industrial wastes being disposed. Installations are not required to inspect these facilities. Generators of industrial wastes are prohibited from contracting with a licensed transporter that requires the transporter to then subcontract with a licensed disposal facility. Therefore, the generator must either:

C7.3.2.1.1. Contract with a single contractor who is licensed to both transport AND dispose of industrial waste, or

C7.3.2.1.2. Contract separately with a licensed transporter AND a licensed disposal facility.

C7.3.2.2. All industrial wastes leaving an installation and destined for disposal in a Japanese facility shall be accompanied by a serially-numbered manifest to ensure a complete audit trail from point of origin to ultimate disposal. A copy of this manifest will be maintained by the installation for a minimum of 5 years.

C7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting, and waste minimization efforts.

C7.3.4. All solid wastes or materials that have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled to avoid spillage.

C7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2, "Air Emissions," or hazardous constituents as defined in Chapter 6, "Hazardous Waste." Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 14, and 15 of these JEGS.

C7.3.6. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of these JEGS, there will be provisions for storage in accordance with these JEGS that will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

C7.3.7. Storage containers should be leakproof, waterproof, and vermin-proof, including sides, seams and bottoms, and be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking, or deforming in a manner that would impair serviceability. Storage containers should have functional lids.

C7.3.8. Containers should be stored on a firm, level, well-drained surface that is large enough to accommodate all of the containers and that is maintained in a clean, spillage-free condition.

C7.3.9. Recycling programs will be instituted on DoD installations in accordance with the policies in DoDI 4715.4, "Pollution Prevention," June 18, 1996.

C7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located, and only after justification that unique circumstances mandate a new unit.

C7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

C7.3.11.1. Location restrictions with regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, and unstable areas;

C7.3.11.2. Procedures for excluding hazardous waste;

C7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions, and record keeping requirements; and

C7.3.11.4. Inspection program.

C7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

C7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with the EEA, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

C7.3.12. Installations operating MSWLF units will:

C7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day.

C7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

C7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, PCBs, and wastes determined unsuitable for the specific MSWLF unit.

C7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling.

C7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

C7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

C7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation.

C7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

C7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

C7.3.12.10. Operate in an aesthetically acceptable manner.

C7.3.12.11. Operate in a manner to protect aquifers.

C7.3.12.12. Control public access to landfill facilities.

C7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

C7.3.12.14. Maintain records on the preceding criteria.

C7.3.12.15. During closure and post-closure operations, installations will:

C7.3.12.15.1. Install a final cover system that is designed to minimize infiltration and erosion.

C7.3.12.15.2. Ensure that the infiltration layer is composed of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or a combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present, or a permeability no greater than 0.00001 cm/sec, whichever is less.

C7.3.12.15.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earthen material that is capable of sustaining native plant growth.

C7.3.12.15.4. If possible, revegetate the final cap with native plants that are compatible with the landfill design, including the liner.

C7.3.12.15.5. Prepare a written Closure Plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, groundwater monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. The post-closure period will be a minimum of 5 years.

C7.3.13. Open burning will not be the regular method of solid waste disposal. Where burning is the method, incinerators meeting air quality requirements of Chapter 2, “Air Emissions,” will be used.

C7.3.14. A composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, “Wastewater”) will comply with the following criteria:

C7.3.14.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge, and other materials, such as nutrient or bulking agents being composted, including the source and volume or weight of the material.

C7.3.14.1.1. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

C7.3.14.1.2. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically.

C7.3.14.1.3. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system.

C7.3.14.1.4. The temperature and retention time for the material being composted must be monitored and recorded.

C7.3.14.1.5. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate, nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCBs.

C7.3.14.1.6. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

C7.3.14.1.6.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing to maintain aerobic conditions during the composting process; and

C7.3.14.1.6.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55°C (131°F). A stabilization period of at least 7 days must follow the decomposition period.

C7.3.15. Classification and Use of Compost from DoD Composting Facilities. Compost produced at a composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4,"Wastewater") must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

C7.3.15.1. Class A compost must be stored until the compost is matured, i.e., 60% decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated in Table C7.T1. The compost must be stabilized and contain no greater amounts of inert material than indicated.

C7.3.15.2. Class B compost consists of any compost generated that fails to meet Class A standards.

C7.3.15.3. Compost distribution and end use:

C7.3.15.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

C7.3.15.3.2. Class B compost may not be distributed for agricultural applications.

Table C7.T1. Class A Compost Criteria

| Contaminant | Maximum Total Compost Concentration Standard (mg/kg of soil) | Soil Leachate Standard (mg/L) |
|---|---|---|
| Carbon Tetrachloride | | 0.002 |
| 1,2-Dichloroethane | | 0.004 |
| 1,1-Dichloroethylene | | 0.02 |
| Cis-1,2-Dichloroethylene | | 0.04 |
| 1,3-Dichloropropene | | 0.002 |
| Dichloromethane | | 0.02 |
| Tetrachloroethylene | | 0.01 |
| 1,1,1-Trichloroethane | | 1 |
| 1,1,2-Trichloroethane | | 0.006 |
| Trichloroethylene | | 0.03 |
| Benzene | | 0.01 |
| Cadmium, and its compounds | 150 [1] | 0.01 |
| Hexavalent Chromium compounds | 250 | 0.05 |
| Cyanide compounds | 50 | ND |
| Total Mercury, and its compounds | 15 | 0.0005 |
| Alkyl Mercury | | ND |
| Selenium, and its compounds | 150 | 0.01 |
| Lead, and its compounds | 150 | 0.01 |
| Arsenic, and its compounds | 150 [2] | 0.01 |
| Fluorine, and its compounds | 4,000 | 0.8 |
| Boron, and its compounds | 4,000 | 1.0 |
| Copper | 500 [3] | -- |
| Zinc | 120 | -- |
| Nickel | 100 | -- |
| Simazine | | 0.003 |
| Thiuram | | 0.006 |
| Thiobencarb | | 0.02 |
| PCB | | 0.003 |
| Organic phosphorus compounds | | ND |

Note:
1. ≤1 mg/kg in brown rice that is grown in composted material
2. ≤15 mg/kg in composted material used for rice production only
3. ≤125 mg/kg in composted material used for rice production only

# C8. CHAPTER 8

# MEDICAL WASTE MANAGEMENT

## C8.1. SCOPE

This Chapter contains criteria for the management of medical waste at medical, dental, research and development, and veterinary facilities generated in the diagnosis, treatment, or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This waste also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

## C8.2. DEFINITIONS

C8.2.1. Infectious Agent. Any organism (such as a virus or bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

C8.2.2. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitology laboratory.

C8.2.3. Infectious Medical Waste. Solid waste produced by medical and dental treatment facilities that is specially managed because it has the potential for causing disease in humans and may pose a risk to both individuals or community health if not managed properly, and that includes the following classes:

C8.2.3.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration, are known to cause disease in humans.

C8.2.3.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Animal carcasses, body parts, blood, and bedding from contaminated animals are also included.

C8.2.3.3. Human 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.

C8.2.3.4. Potentially infectious materials, including human body 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.

C8.2.3.5. 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, test tubes, ampoules, vials, and broken glass potentially contaminated with infectious waste.

C8.2.3.6. 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 excretion exudates and discarded materials contaminated with blood.

C8.2.4. Noninfectious Medical Waste. Solid waste created that does not require special management because it has been determined to be incapable of causing disease in humans or which has been treated to render it noninfectious.

C8.2.5. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

C8.2.6. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed.

C8.3. CRITERIA

C8.3.1. Infectious medical waste will be separated, if practical, from other solid waste at the point of origin.

C8.3.2. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M, "Defense Materiel Disposition Manual," August 18, 1997, and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. DLA Disposition Services have no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

C8.3.3. Solid waste that is classified as a hazardous waste in accordance with Appendix 1 will be managed in accordance with the criteria in Chapter 6, "Hazardous Waste."

C8.3.4. Mixtures of other solid waste and infectious medical waste will be handled as infectious medical waste.

C8.3.5. Radioactive medical waste will be managed in accordance with Service Directives.

C8.3.6. Infectious medical waste will be segregated, transported, and stored in bags or receptacles a minimum of 0.0762 millimeters (3 mils) thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use.

C8.3.7. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and Japanese (Figure C8.1), and will include markings that identifies the generator, date of generation, and the contents.

C8.3.8. Sharps will only be discarded into rigid receptacles. Needles will not be clipped, cut, bent, or recapped before disposal.

C8.3.9. Infectious medical waste will be transported and stored to minimize human exposure, and will not be placed in chutes or dumbwaiters.

C8.3.10. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph C8.3.17. Containers holding sharps will not be compacted.

C8.3.11. All anatomical pathology waste (i.e., large body parts) must be placed in containers lined with plastic bags that comply with paragraph C8.3.6, and may only be disposed of in a landfill or by burial in a designated area after being treated for disposal by incineration or cremation.

C8.3.12. Blood, blood products, and other liquid infectious wastes will be handled as follows:

C8.3.12.1. Bulk blood and blood products may be decanted into a sewer system connection (sinks, drains, etc.), unless pre-treatment is required. If pre-treatment is required, the methods contained in Table C8.T1, "Treatment and Disposal Methods for Infectious Medical Waste," will be employed prior to discharge to the sewer system. The emptied containers will continue to be managed as infectious medical waste.

C8.3.12.2. Suction canister waste from operating rooms will either be decanted into a clinical sink or will be sealed into leak-proof containers and incinerated.

C8.3.13. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

C8.3.14. If infectious medical waste cannot be treated on-site, it will be managed during storage as follows:

C8.3.14.1. Infectious medical waste will be maintained in a nonputrescent state, using refrigeration as necessary.

C8.3.14.2. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

C8.3.15. Storage sites must be:

C8.3.15.1. Specifically designated by display of a sign, no less than 60 cm x 60 cm (24" x 24") in size and written in both English and Japanese:

C8.3.15.1.1. Prohibiting unauthorized entry;

C8.3.15.1.2. Prohibiting removal of containers without permission, and;

C8.3.15.1.3. Providing a point of contact (name, telephone number).

C8.3.15.2. Constructed to prevent entry of insects, rodents, and other pests;

C8.3.15.3. Prevent access by unauthorized personnel; and

C8.3.15.4. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and Japanese (Figure C8.1).

C8.3.16. Bags and receptacles containing infectious medical waste must be placed into rigid or semi-rigid, leak-proof containers before being transported off-site.

C8.3.17. Infectious medical waste must be treated in accordance with Table C8.T1, "Treatment and Disposal Methods for Infectious Medical Waste," and the following before disposal:

C8.3.17.1. Sterilizers must maintain the temperature at 121°C (250°F) for at least 30 minutes at 1.034 bar (15 psi).

C8.3.17.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips or an equivalent biological performance test.

C8.3.17.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens, and must meet applicable criteria in Chapter 2, "Air Emissions."

C8.3.17.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6, "Hazardous Waste." Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

C8.3.17.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

C8.3.18. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

C8.3.19. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

C8.3.19.1. Response personnel must comply with paragraph C8.3.13.

C8.3.19.2. Blood, body fluid, and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste.

C8.3.19.3. Surfaces contacted by infectious medical waste must be washed with soap and water and chemically decontaminated in accordance with paragraph C8.3.17.5.

C8.3.20. Installations will keep records of the following information concerning infectious medical waste for at least 5 years after the date of disposal:

C8.3.20.1. Type of waste;

C8.3.20.2. Amount of waste (volume or weight);

C8.3.20.3. Treatment, if any, including date of treatment; and

C8.3.20.4. Disposition, including date of disposition, and if the waste was transferred to Japanese facilities, and receipts acknowledging paragraphs C8.3.20.1. - C8.3.20.3. for each transfer, including the name, title, address and permit number of each consignee.

Figure C8.1. Universal biohazard symbol

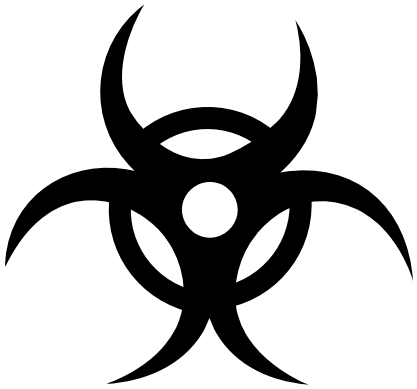

Table C8.T1. Treatment and Disposal Methods for Infectious Medical Waste

| Type of Medical Waste | Method of Treatment | Method of Disposal |
|---|---|---|
| Microbiological | [1] Steam sterilization | [2] Municipal solid waste landfill (MSWLF) |
| | Chemical disinfection | |
| | Incineration | |
| Pathological | [3] Incineration | MSWLF |
| | [3] Cremation | Burial |
| | [4] Chemical Sterilization | [5] Domestic wastewater treatment plant (DWTP) |
| | [4] Steam sterilization | |
| Bulk blood & suction canister waste | [6] Steam sterilization Chemical disinfection | DWTP |
| | [6] Incineration | MSWLF |
| Sharps in sharps containers | Steam sterilization | MSWLF |
| | Incineration | |

**Notes:**

1. Preferred method for cultures and stocks because they can be treated at point of generation
2. See Chapter 7, "Solid Waste," for criteria for solid waste landfills.
3. Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.
4. This only applies to placentas, small organs and small body parts which may be steam sterilized or chemically sterilized, ground, and discharged to a domestic wastewater treatment plant.
5. See Chapter 4, "Wastewater," for criteria for domestic wastewater treatment plants.
6. Bulk blood or suction canister waste known to be infectious must be treated by incineration or steam sterilization before disposal.

# C9. CHAPTER 9

# PETROLEUM, OIL, AND LUBRICANTS

## C9.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 18, "Spill Prevention and Response Planning."

## C9.2. DEFINITIONS

C9.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

C9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs, that are exempt from all criteria in Chapter 19, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 19 are counted toward the aggregate thresholds in paragraph C9.2.7.2. below.

C9.2.3. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

C9.2.4. Loading/ Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

C9.2.5. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

C9.2.6. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

C9.2.7. POL Facility. An installation with either:

C9.2.7.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

C9.2.7.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

C9.2.7.3. A pipeline facility as identified in paragraph C9.2.5.

C9.2.8. POL Storage Container. POL containers with capacities GREATER than 55 gallons (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 19 are EXCLUDED from the definition of POL storage containers.

C9.3. CRITERIA

C9.3.1. Applicability. The below criteria apply only at POL Facilities as defined in paragraph C9.2.7.

C9.3.2. General POL Storage Container Criteria

C9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

C9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criteria for below ground storage containers.

C9.3.2.3. Permeability. Permeability for containment areas will be a maximum of $10^{-7}$ cm/sec.

C9.3.2.4. Containment Area Drainage. Drainage of storm water from containment areas will be controlled by a valve that is locked closed when not in active use. Storm water will be inspected for petroleum sheen before being drained from containment areas. If a petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, “Hazardous Waste.”

C9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

C9.3.3. Additional POL Storage Container Criteria

C9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

C9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

C9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

C9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

C9.3.4.1. POL container cleaning wastes (sludge and washwaters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

C9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

C9.3.5. General Transport and Distribution Criteria

C9.3.5.1. Loading/Unloading Racks and Areas

C9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

C9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

C9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

C9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and/or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of

POL, which reasonably could be expected to cause a sheen on waters of Japan defined in Chapter 4, "Wastewater."

C9.3.5.2. POL Pipeline Facilities

C9.3.5.2.1. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

C9.3.5.2.1.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies.

C9.3.5.2.1.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

C9.3.5.2.1.3. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

C9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; and the applicable contents of the facility Spill Plan.

# C10. CHAPTER 10

## RESERVED

# C11. CHAPTER 11

# PESTICIDES

## C11.1. SCOPE

This Chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

## C11.2. DEFINITIONS

C11.2.1. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides and have been formally certified in accordance with DoD 4150.7-M, "DoD Pest Management Training and Certification," dated April 24, 1997 (which accepts Japanese certification in appropriate circumstances).

C11.2.2. Integrated Pest Management (IPM). A planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods, including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control and, where necessary, the judicious use of least-hazardous pesticides.

C11.2.3. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the well being of humans or animals; attack real property, supplies, equipment, or vegetation; or are otherwise undesirable.

C11.2.4. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities who provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

C11.2.5. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

C11.2.6. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

C11.2.6.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or the appropriate GoJ authorities;

C11.2.6.2. Any pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

C11.2.6.3. Any material used to clean up a pesticide spill; or

C11.2.6.4. Any containers, equipment, or material (including wastewater) contaminated with pesticides. Empty pesticide containers that have been triple rinsed are NOT considered hazardous waste, and can be disposed of as normal solid waste.

C11.2.7. Registered Pesticide. A pesticide registered and approved for sale or use within the U.S. or Japan.

C11.3. CRITERIA

C11.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1, "Pest Management Maintenance Report," or a computer generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998.

C11.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

C11.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

C11.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

C11.3.3.2. Arthropod skin and clothing repellents; and

C11.3.3.3. Pesticides applied as part of an installation's self help program.

C11.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

C11.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed.

C11.3.6. Installations will only use registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan.

C11.3.7. Pesticides will be included in the installation spill contingency plan. (See Chapter 18, “Spill Prevention and Response Planning.”)

C11.3.8. Pest management facilities, including mixing and storage areas, will comply with Military Handbook 1028/8A (“Design of Pest Management Facilities,” November 1, 1991).

C11.3.9. All pesticide applications will be in accordance with guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If local nationals will be using the pesticides, the precautionary messages and use instructions will be in English and in Japanese.

C11.3.10. MSDSs and labels for all pesticides will be available at the storage and holding facility.

C11.3.11. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

C11.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below:

C11.3.12.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6 of these JEGS.

C11.3.12.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of these JEGS.

C11.3.12.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through DLA Disposition Services, as a solid waste. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

# C12. CHAPTER 12

# HISTORIC AND CULTURAL RESOURCES

## C12.1. SCOPE

This Chapter contains criteria for required plans and programs needed to ensure proper protection and management of historic and cultural resources, such as properties on the World Heritage List or the GoJ list equivalent to the U.S. National Register of Historic Places.

## C12.2. DEFINITIONS

C12.2.1. Adverse Effect. Changes that diminish the quality or significant value of historic or cultural resources.

C12.2.2. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal remains, or any portion of any of the foregoing items.

C12.2.3. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

C12.2.3.1. Limiting the magnitude of the action;

C12.2.3.2. Relocating the action in whole or in part;

C12.2.3.3. Repairing, rehabilitating, or restoring the affected resources, affected property; and

C12.2.3.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered.

C12.2.4. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

C12.2.5. Historic or Cultural Resources. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national, or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object, and also includes natural resources (plants, animals, landscape features, etc.) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or the GoJ equivalent of the National

Register of Historic Places. GoJ lists of properties should be evaluated to determine if they are equivalent with the National Register of Historic Places prior to application.

C12.2.6. Inventory. To determine the location of historic and cultural resources that may have world, national, or local significance.

C12.2.7. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

C12.2.7.1. Surface or subsurface structures;

C12.2.7.2. Surface or subsurface artifact concentrations or scatters;

C12.2.7.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments;

C12.2.7.4. By-products, waste products, or debris resulting from manufacture or use;

C12.2.7.5. Organic waste;

C12.2.7.6. Human remains;

C12.2.7.7. Rock carvings, rock paintings, and intaglios;

C12.2.7.8. Rock shelters and caves;

C12.2.7.9. All portions of shipwrecks; or

C12.2.7.10. Any portion or piece of any of the foregoing.

C12.2.8. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

C12.2.9. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack, or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

## C12.3. CRITERIA

C12.3.1. Installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on the GoJ equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

C12.3.2. Installations shall have access to the World Heritage List and the GoJ equivalent of the National Register of Historic Places.

C12.3.3. Installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resources management.

C12.3.4. Installations shall, after coordination with the appropriate GoJ authorities, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

C12.3.5. Installations shall, after coordination with the appropriate GoJ authorities, and if financially and otherwise practical:

C12.3.5.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

C12.3.5.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

C12.3.5.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

C12.3.6. Installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the GoJ.

C12.3.7. Installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

C12.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the appropriate GoJ authorities. A general system for the treatment of human remains is provided in Table C12.T1.

Table C12.T1. General System for Treatment of Human Remains in Japan.

| Recent Burial (Post-WWII) | Historic Burial (WWII or before) | Unknown |
|---|---|---|
| Remains exhumed, forensic studies performed | Remains documented, recorded & left *in situ* | Remains documented, recorded & left *in situ*<br><br>Installation may consider requests for further investigations (such as universities, anthropologists or cultural resources organization as designated by GoJ) to determine era of origin of human remains |
| | Remains recorded, exhumed to determine ethnicity, age, sex, & number of individuals | Remains claimed by owner |

# C13. CHAPTER 13

# NATURAL RESOURCES AND ENDANGERED SPECIES

## C13.1. SCOPE

This Chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the U.S. or the appropriate GoJ authorities.

## C13.2. DEFINITIONS

C13.2.1. Adverse Effect. Changes that diminish the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance, and fitness.'

C13.2.2. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

C13.2.3. GoJ-Protected Species. Any species of flora or fauna listed or designated by the GoJ, because continued existence of the species is, or is likely to be, threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

C13.2.4. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

C13.2.5. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

C13.2.6. Natural Resources Management. Actions taken that combine science, economics, and policy, to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

C13.2.7. Significant Land or Water Area. Land or water area that is normally 500 or more acres outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

C13.2.8. Threatened and Endangered Species. Any species of fauna or flora, listed in Tables C13.T1, "Threatened and Endangered Species of Wild Fauna & Flora in Japan" and C13.T2, "Natural Monument Species in Japan," respectively.

## C13.3. CRITERIA

C13.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and GoJ-protected species and their habitat.

C13.3.2. Installations shall maintain, or have access to, Table C13.T1, "Threatened and Endangered Species of Wild Fauna & Flora in Japan" and Table C13.T2, "Natural Monument Species in Japan".

C13.3.3. Installations with significant land or water areas shall, after coordination with the appropriate GoJ authorities, develop natural resources management plans.

C13.3.4. Installations with natural resources management plans shall, after coordination with the appropriate GoJ authorities, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

C13.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or GoJ-protected species, or support GoJ surveys.

C13.3.4.2. Implement natural resources management plans.

C13.3.5. The U.S. Ambassador will be notified of the discovery of any endangered or threatened species and GoJ-protected species not previously known to be present on the installation.

C13.3.6. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent GoJ facilities where practical.

C13.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, GoJ-protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

C13.3.8. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna. The invasive animal and plant species (e.g., non-indigenous) listed in Table C13.T3, "Invasive Species prohibited from introduction in Japan," shall not be raised, planted, stored or otherwise possessed on DoD installations in Japan without permission from the appropriate GoJ authorities. If invasive species are discovered on a DoD installation, installation commanders shall immediately notify the EEA and implement management actions to prevent the spread of these species. To the maximum extent practicable, installation commanders shall, upon request, cooperate with GoJ efforts to eradicate invasive species present on DoD installations in Japan.

C13.3.9. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

C13.3.10. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

Table C13.T1. Threatened and Endangered Species of Wild Fauna & Flora in Japan.

| Japanese Name | Scientific Name | English Name |
|---|---|---|
| **Birds** | | |
| Ootaka | *Accipiter gentilis fujiyamae* | Goshawk, Japanese |
| Hahajimameguro | *Apalopteron familiare hahasima* | Honeyeater, Bonin Islands |
| Inuwashi | *Aquila chrysaetos japonica* | Eagle, Japanese Golden |
| Shijyukaragan | *Branta canadensis leucopareia* | Goose, Canada |
| Washimimizuku | *Bubo bubo* | Owl, Eurasian Eagle |
| Daitounosuri | *Buteo buteo oshiroi* | Buzzard (Daito Islands subspecies) |
| Ogasawaranosuri | *Buteo buteo toyoshimai* | Buzzard (Ogasawara Islands subspecies) |
| Ogasawarakawarahiwa | *Carduelis sinica kittlitzi* | Greenfinch, Oriental |
| Kin(n)bato | *Chalcophaps indica yamashinai* | Dove, Emerald |
| Kounotori | *Ciconia boyciana* (=ciconia b.) | Stork, Oriental White |
| Akagashirakarasubato | *Columba janthina nitens* | Pigeon, Japanese Wood |
| Yonakunikarasubato | *Columba janthina stejnegeri* | Pigeon, Stejneger's Wood |
| Ohsutonooakagera | *Dendrocopos leucotos owstoni* | Woodpecker, White-Backed |
| Akahige | *Erithacus komadori komadori* | Robin, Ryukyu |
| Hontouakahige | *Erithacus komadori namiyei* | Robin, Stejneger's Ryukyu |
| Usuakahige | *Erithacus komadori subrufus* | Robin, Yaeyama Ryukyu |
| Shimahayabusa | *Falco peregrinus fruitii* | Falcon, Volcano Islands Pergrine |
| Hayabusa | *Falco peregrinus japonensis* | Falcon, Pergrine |
| Rurikakesu | *Garrulus lidthi* | Jay, Lidth's |
| Tancho | *Grus japonensis* | Crane, Japanese Red-Crowned |
| Nabe-zuru | *Grus monacha* | Crane, Hooded |
| Ojirowashi | *Haliaeetus albicilla* | Eagle, White-Tailed Sea |
| Oowashi | *Haliaeetus pelagicus pelagicus* | Eagle, Steller's Sea |
| Shimafukurou | *Ketupa blakistoni blakistoni* | Owl, Blakiston's Fish |
| Raicho | *Lagopus mutus japonicus* | Ptarmigan, Japanese Rock |
| Etopirika | *Lunda cirrhata* | Puffin, Tufted |
| Oosekka | *Megalurus pryeri pryeri* | Warbler, Japanese Marsh (Swamp) |
| Toki | *Nippoia nippon* | Ibis, Japanese Crested |
| Chishimaugarasu | *Phalacrocorax urile* | Cormorant, Red-Faced |
| Ahō-dori | *Phoebastria* (=*Diomedea*) *albatrus* | Albatross, Short-Tailed (=Stellar's) |
| Miyubigera | *Picoides tridactylus inouyei* | Woodpecker, Inouye's Three-Toed |
| Yairocyou | *Pitta brachyura nympha* | Pitta, Fairy |
| Yanbarukuina | *Gallirallus okinawae* | Rail, Okinawa |
| Noguchigera | *Sapheopipo noguchii* | Woodpecker, Pryer's |
| Amamiyamashigi | *Scolopax mira* | Woodcock, Amami |
| Kanmuriwashi | *Spilornis cheela perplexus* | Eagle, Crested Serpent |
| Kumataka | *Spizaetus nipalensis orientalis* | Eagle, Hodgson's Hawk |
| Karafutoaoashishigi | *Tringa guttifer* | Greenshank, Nordmann's |
| Ootoratsugumi | *Turdus dauma amami* | Thrush, White's Ground |
| Umigarasu | *Uria aalge inornata* | Guillemot |
| **Mammals** | | |
| Tsushima yamaneko | *Prionailurus bengalensis* ssp. *euptilura* | Cat, Tsushima |
| Iriomote yamaneko | *Prionailurus bengalensis* ssp. *iriomotensis* | Cat, Iriomote |
| Amamino kurousagi | *Pentalagus furnessi* | Rabbit, Ryukyu |
| Daitouoo koumori | *Pteropus dasymallus daitoensis* | Flying Fox, Daito |
| Ogasawaraoo koumori | *Pteropus pselaphon* | Flying Fox, Bonin |
| Kerama-jika | *Cervus nippon keramae* | Deer, Ryukyu Sika |
| Jugong | *Dugong dugon* | Dugong |
| Nihon zaru | *Macaca fuscata* | Macaque, Japanese |
| Shiro-nagasu-kujira | *Balaenoptera musculus* | Whale, Blue |

| Japanese Name | Scientific Name | English Name |
|---|---|---|
| Nagasu-kujira | *Balaenoptera physalus* | Whale, Finback |
| Koku-kujira | *Eschrichtius robustus* | Whale, Gray |
| Zato-kujira | *Megaptera novaeangliae* | Whale, Humpback |
| Semi-kujira | *Balaena glacialis (incl. australis)* | Whale, Right |
| Iwashi-kujira | *Balaenoptera borealis* | Whale, Sei |
| Makko-kujira | *Physeter catodon(=macrocephalus)* | Whale, Sperm |
| **Reptiles** | | |
| Kikuzato-sawa-hebi | *Opisthotropis kikuzatoi* | Snake, Kikuzato's Stream |
| Kuroumigame | *Chelonia mydas agassizii* | Sea Turtle, Green |
| Taimai | *Eretmochelys imbricata* | Sea Turtle, Hawksbill |
| Osagame | *Dermochelys coriacea* | Sea Turtle, Leatherback |
| Akaumigame | *Caretta caretta* | Sea Turtle, Loggerhead |
| Himeumigame | *Lepidochelys olivacea* | Sea Turtle, Olive Ridley (=Pacific) |
| **Amphibians** | | |
| Abesanshouuo | *Hynobius abei* | Salamander, Abe's |
| | Andrias japonicus (=davidianus j.) | Salamander, Japanese giant |
| **Fish** | | |
| Itasenpara | *Acheilognathus longipinnis* | Bitterling, Deepbody |
| Suigenzenitanago | *Rhodeus atremius suigensis* | Bitterling, Suwon Rosy |
| Tanago, Miyako | *Tanakia tanago* | Bitterling, Tokyo |
| Nekogigi | *Coreobagrus ichikawai* | Catfish |
| Ayumodoki | *Leptobotia curta (*=Hymenophysa) | Loach, Kissing |
| **Insects** | | |
| Yasya Gengoro | *Acilius kishii* | |
| Yanbaru Tenagakogane | *Cheirotonus jambar* | Yanbaru Long-Armed Scarab |
| Bekkotombo | *Libellula angelina* | |
| Ishigakiniinii | *Platypleura albivannata* | Cicada |
| Goishitsubame Shijimi | *Shijimia moorei* | Moore's Cupid |
| **Plants** | | |
| Asahiebine | *Calanthe hattorii* | |
| Hoshitsururan | *Calanthe hoshii* | |
| Kitadakesou | *Callianthemum insigne var. Hondoense* | |
| Urajirokomurasaki | *Callicarpa nishimurae* | |
| Chousenkibana Atsumorisou | *Cypripedium guttatum* | Spotted Lady’s Slipper Orchid |
| Hotei Atsumori | *Cypripedium macranthum var. hotei atsumorianum* | |
| Rebun Atsumorisou | *Cypripedium macranthum var. rebunense* | |
| Atsumorisou | *Cypripedium macranthum var. speciosum* | |
| Okinawa Sekkoku | *Dendrobium okinawense* | |
| Kogomekinoeran | *Liparis elliptica* | |
| Shimahozakiran | *Malaxis boninensis* | |
| Muninnobotan | *Melastoma tetramerum* | |
| Taiyoufuutoukazura | *Piper postelsianum* | |
| Kobatobera | *Pittosporum parvifolium* | |
| Kunigamitonbosou | *Platanthera sonoharai* | |
| Hanashinobu | *Polemonium kiushianum* | Jacob's Ladder |
| Amami Denda | *Polystichum obae* | |
| Munintsutsuji | *Rhododendron boninense* | |
| Yadori Kokemomo | *Vaccinium amamianum* | |

Table C13.T2. Natural Monument Species in Japan

| Japanese | Scientific | English | Region |
|---|---|---|---|
| Rurikakesu | *Garrulus lidthi* | Lidth's Jay | Kagoshima |
| Amaminokurousagi | *Pentalagus furnessi* | Amami Hare, Amami Rabbit | Kagoshima |
| Raicho | *Lagopus mutus japonicus* | Ptarmigan | Toyama, Nagano, Gifu, Niigata, Yamanashi, Shizuoka |
| Tosa no onagadori | *Gallus gallus* | Tosa Fowl | Kochi |
| Akita ken | *Canis familiaris* | Akita Dog | Akita |
| Kai ken | *Canis familiaris* | Kai Dog | Yamanashi |
| Toki | *Nipponia nippon* | Japanese Crested Ibis | * No Wild Habitat |
| Oosanshouuo | *Megalobatrachus japonicus* | Japanese Giant Salamander | Okayama, Hyogo, Tottori, Yamaguchi, Mie, Aichi, Ooita |
| Kounotori | *Ciconia ciconia boyciana* | White Stork | * No Wild Habitat in Japan. |
| Koshigaya no shirakobato | *Streptopelia decaocto decaocto* | Collared Turtle Dove | Saitama |
| Ahoudori | *Diomedea albatrus* | Short-Tailed Albatross | Tokyo, Okinawa |
| Kawauso | *Lutra lutra nippon* | Japanese Otter | Ehime, Kochi |
| Usubakicho | *Parnassius eversmanni* | Eversmann's Parnassius | Hokkaido |
| Daisetsu takanehikage | *Oeneis Melissa* | Daisetsuzana Arctic | Hokkaido |
| Asahi hyoumon | *Clossiana freija* | Freija Fritillary | Hokkaido |
| Kumagera | *Dryocopus martius* | Black Woodpecker | Hokkaido, Iwate, Akita, Aomori |
| Inuwashi | *Aquila chrysaetos japonica* | Golden Eagle | Hokkaido and Others |
| Karafuto rurishijimi | *Vacciniina optilete daisetsuzana* | Hedge Blue | Hokkaido |
| Tancho | *Grus japonensis* | Japanese Crane | Hokkaido |
| Akagashira karasubato | *Columba janthina nitens* | Japanese Wood Pigeon | Ogasawara Islands, Tokyo |
| Ogasawara ookoumori | *Pteropus pselaphon* | Bonin Flying Fox | Ogasawara Islands, Tokyo |
| Meguro | *Apalopteron familiare* | Bonin Island Honeyeater | Tokyo |
| Ogasawara shijimi | *Celastrina ogasawaraensis* | Ogasawara Hedge Blue | Tokyo |
| Shima akane | *Boninthemis insularis* | Ogasawara Common Skimmer | Tokyo |
| Ogasawara itotombo | *Indolestes boninensis* | Ogasawara Common Skimmer | Tokyo |
| Hanadaka tombo | *Rhinocypha ogasawarensis* | Hanadaka Common Skimmer | Tokyo |
| Ojirowashi | *Haliaeetus albicilla* | White-tailed Sea-Eagle | Hokkaido, Niigata |
| Oowashi | *Haliaeetus pelagicus pelagicus* | Steller's Sea Eagle | Hokkaido, Ishikawa, Fukui |
| Akahige | *Erithacus komadori komadori* | Ryukyu Robin | Kagoshima, Nagasaki, Okinawa |
| Ogasawara amenbo | *Neogerris boninensis* | Ogasawara Pond Skater | Tokyo |
| Ogasawara kumabachi | *Xylocopa ogasawarensis* | Ogasawara Carpenter Bee | Tokyo |
| Ohsutonooakagera | *Dendrocopos leucotos owstoni* | White-Backed Woodpecker | Kagoshima |

| Japanese | Scientific | English | Region |
|---|---|---|---|
| Ezo shimafukurou | *Ketupa blakistoni blakistoni* | Blakiston's Fish Owl | Hokkaido |
| Ootora tsugumi | *Turdus dauma amami* | White's Ground Thrush | Kagoshima |
| Ogasawaranosuri | *Buteo buteo toyoshimai* | Buzzard | Ogasawara Islands (Tokyo) |
| Karasubato | *Columba janthina janthina* | Japanese Wood Pigeon | Mie, Wakayama, Nagasaki, Kagoshima & Others |
| Kokugan | *Branta bernicla orientalis* | Brant | Hokkaido, Aomori, Akita & Others |
| Tsushimayamaneko | *Felis euptilura* | Tsushima Cat | Tsushima (Nagasaki) |
| Hishikui | *Anser fabalis serrerostris* | Bean Goose | Hokkaido, Aomori, Miyagi, Niigata, Ishikawa & Others |
| Magan | *Anser albifrons* | White-Fronted Goose | Hokkaido, Aomori, Miyagi, Niigata, Ishikawa |
| Tsushimatenn | *Martes melampus tsuensis* | Tsushima Marten | Tsushima (Nagasaki) |
| Kenaganezumi | *Diplothrix legata* | Long Fur Rat | Kagoshima, Okinawa |
| Togenezumi | *Tokudaia osimensis* | Spiny Rat | Kagoshima, Okinawa |
| Noguchigera | *Sapheopipo noguchii* | Pryer's Woodpecker | Okinawa |
| Iriomoteyamaneko | *Felis iriomotensis* | Iriomote Cat | Okinawa |
| Semaruhakogame | *Cuora flavomarginata flavomarginata* | Yellow-Marginated Box Turtle | Ishigakijimanishiomotejima Island |
| Ryukyu kinbato | *Chalcophaps indica* | Emerald Dove | Okinawa |
| Kanmuriwashi | *Spilornis cheela perplexus* | Crested Serpent Eagle | Nishiomotejima Island shigakijima Island |
| Iwakuni no shirohebi | *Elaphe climacophora f. Albino* | Iwakuni Snake | Yamaguchi |
| Daitoh ookoumori | *Pteropus dasymallus daitoensis* | Daito Flying Fox | Okinawa |
| Itasenpara | *Acheilognathus logipinnis* | Itasenpara | Oosaka, Aichi, Gifu, Toyama & Kyoto |
| Miyakotanago | *Tanakia tanago* | Toyko Bitterling | Tochigi, Saitama, Chiba & Kanagawa |
| Himechamadaraseseri | *Pyrgus malvae coreanus* | Maculatus Skipper | Hokkaido |
| Goishitsubameshijimi | *Libellula angelina* | Short Tailed Blue | Kumamoto |
| Akakokko | *Turdus celaenops* | Seven Islands Thrush | Tokyo & Kagoshima |
| Erabu ookoumori | *Pteropus dasymallus dasymallus* | Erabu Flying Fox | Kagoshima |
| Yamane | *Glirulus japonicus* | Japanese Dormouse | Honsyu, Shikoku And Kyushu Area |
| Kanmuri umisuzume | *Bynthliboramphus wumizusume* | Japanese Murrelet | Tokyo, Shizuoka, Mie, Fukuoka, Okinawa & Others |
| Iijimamushikui | *Phylloscopus ijimae* | Iijima's Willow Warber | Tokyo, Kagoshima, Okinawa |
| Kishinouetokage | *Eumeces kishinouyei* | Kishinoue's Giant Skink | Okinawa |
| Ryukyuyamagame | *Geoemyda spengleri japonica* | Yanbarugame | Okinawa |
| Ayumodoki | *Leptobotia curta* | Japanese Catfish | Shiga, Kyoto, Osaka And Okayama |
| Nekogigi | *Coreobagrus ichikawai* | Bagrid Catfish | Gifu, Aichi & Mie |
| Yanbarukuina | *Rallus okinawae* | Okinawa Rail | Okinawa |
| Yanbarutenagakogane | *Cheirotonus jambar* | Yanbaru Beetle | Okinawa |
| Kishuu kenn | *Canis familiaris* | Kishu Dog | Nonspecified |

| Japanese | Scientific | English | Region |
|---|---|---|---|
| Kamoshika | *Capricornis crispus* | Japanese Serow | Nonspecified |
| Koshinoinu | *Canis familiaris* | Koshinoinu | Nonspecified |
| Toutenko | *Gallus gallus* | Totenko | Nonspecified |
| Shiba ken | *Canis familiaris* | Shiba Dog | Nonspecified |
| Tosa ken | *Canis familiaris* | Tosa Dog | Nonspecified |
| Minohikichabo | *Gallus gallus* | Minohikichabo | Nonspecified |
| Uzurachabo | *Gallus gallus* | Uzurachabo | Nonspecified |
| Hokkaido ken | *Canis familiaris* | Hokkaido Dog | Nonspecified |
| Koeyoshidori | *Gallus gallus* | Koeyoshidori | Nonspecified |
| Toumaru | *Gallus gallus* | Tomaru | Nonspecified |
| Minohikidori | *Gallus gallus* | Minohiki | Nonspecified |
| Shoukoku | *Gallus gallus* | Ogunidori | Nonspecified |
| Jidori | *Gallus gallus* | Jidori | Nonspecified |
| Shamo | *Gallus gallus* | Shamo | Nonspecified |
| Chabo | *Gallus gallus* | Chabo | Nonspecified |
| Ukokkei | *Gallus gallus* | Ukkokkei | Nonspecified |
| Hinaidori | *Gallus gallus* | Hinaidori | Nonspecified |
| Jittokko | *Gallus gallus* | Jitokko | Nonspecified |
| Satsumadori | *Gallus gallus* | Satsumadori | Nonspecified |
| Kawachiyakko | *Gallus gallus* | Kawachiyakko | Nonspecified |
| Kurokashiwakei | *Gallus gallus* | Kurokashiwa | Nonspecified |
| Naranoshika | *Cervus nippon* | Japanese Deer | Nara |
| Ogasawara tamamushi | *Chrysochroa holstii* | Ogasawara Jewel Beetle | Tokyo |
| Ogasawara tonbo | *Hemicordulia ogasawarensis* | Ogasawara Dragonfly | Tokyo |
| Ogasawara zemi | *Meimuna boninensis* | Ogasawara Cicada | Tokyo |
| Okayadokari | *Coenobita purpureus* | Land Hermit Crab | Tokyo, Kagoshima And Okinawa |
| Kasagai | *Cellana mazatlandica* | Limpet | Tokyo |
| Ogasawara sesujigengoro | *Copelatus ogasawarensis* | Ogasawara Diving Beetle | Tokyo |
| Ogasawarashotosanrikugai (yamakisagoka, kubikiregaika, kawazanshougaika, okamimigaika, okamonoaragaika, nomigaika, kibasanagigaika, kiserugaimodokika, enzagaika, kohakugaika, bekkoumaimaika, nanbanmaimaika) | | Ogasawar land snails<br><br>(Helicinidae, Truncatellidae, Assimineidae, Ellobiidae, Succineidae, Elasmatinidae, Vertiginidae, Buliminidae, Endodotidae, Zonitidae, Helicarionidae, Camaenidae) | Tokyo |
| Jugon | *Dugong dugon* | Dugong | Okinawa |

Table C13.T3. Invasive Species Prohibited from Introduction in Japan

| Class | Order | Family | Genus | Invasive Alien Species |
|---|---|---|---|---|
| **1↖ Animal Kingdom** | | | | |
| Mammalia | Marsupialia | Didelphidae | *Didelphis* | None |
| | | | All other genera of Didelphidae | None |
| | | Phalangeridae | *Trichosurus* | Brushtail possum (*T. vulpecula*) |
| | | | All other genera of Phalangeridae | None |
| | Insectivora | Erinaceidae | *Erinaceus* | Any species of the genus *Erinaceus* |
| | | | *Atelerix*<br>*Hemiechinus*<br>*Mesechinus* | None |
| | Primates | Cercopithecidae | *Macaca* | Taiwan macaque (*M. cyclopis*) |
| | | | | Crab-eating macaque (*M. fascicularis*) |
| | | | | Rhesus macaque (*M. mulatta*) |
| | Rodentia | Agoutidae | All genera of Agoutidae | None |
| | | Capromyidae | All genera of Capromyidae | None |
| | | Dinomyidae | All genera of Dinomyidae | None |
| | | Myicastoridae | *Myocastor* | Coypu or Nutria (*M. coypus*) |
| | | Sciuridae | *Callosciurus* | Pallas's squirrel or Taiwan squirrel (*C. erythraeus*) |
| | | | *Pteromys* | Russian (or Siberian) flying squirrel (*P. volans*) excluding Japanese subspecies (*P. volans orii*) |
| | | | *Sciurus* | Gray squirrel (*S. carolinensis*) |
| | | | | Eurasian red squirrel (*S. vulgaris*) excluding Japanese subspecies (*S. vulgaris orientis*) |
| | | | All other genera of Sciuridae | None |
| | | Muridae | *Ondratra* | Muskrat (*O. zibethicus*) |
| | Carnivora | Procyonidae | *Procyon* | Raccoon (*P. lotor*) |
| | | | | Crab-eating raccoon (*P. cancrivorus*) |
| | | Mustelidae | *Mustela* | American mink (*M. vison*) |
| | | Herpestidae | *Herpestes* | Javan mongoose (*H. javanicus*) |
| | | | *Mungos* | Banded mongoose (*M. mungo*) |
| | | | All other genera of Herpestidae<br>! ! | None |
| | Artiodactyla | Cervidae | *Axis* | All species of the genus *Axis* |
| | | | *Cervus* | All species of the genus *Cervus* excluding:<br>*C. nippon centralis*<br>*C. nippon keramae*<br>*C. nippon mageshimae*<br>*C. nippon nippon*<br>*C. nippon pulchellus*<br>*C. nippon yakushimae*<br>*C. Nippon yesoensis* |
| | | | *Dama* | All species of the genus *Dama* |
| | | | *Elaphurus* | Pere David's deer *(E. davidianus)* |
| | | | *Muntiacus* | Reeves's muntjac (*M. reevesi*) |
| Aves | Passeriformes | Timaliidae | *Garrulax* | Laughing thrushes (*G. canorus*) |
| | | | | White-browed laughingthrush (*G. sannio*) |
| | | | | Masked laughingthrush (*G. perspicillatus*) |
| | | | *Leiothrix* | Red-billed mesia (*L. lutea*) |
| | | | All other genera of Timaliidae | None |
| Reptilia | Testudinata | Chelydridae | *Chelydra* | Snapping turtle (*C. serpentina*) |
| | | | All other genera of Chelydridae | None |
| | Squamata | Iguanidae (Polychrotidae) | *Anolis* | *A. angusticeps* |
| | | | | Green anole (*A. carolinensis*) |

| Class | Order | Family | Genus | Invasive Alien Species |
|---|---|---|---|---|
| | | | | Knight anole *(A. equestris*) |
| | | | | *A. garmanni* |
| | | | | Brown anole (*A. sagre*i) |
| | | | *Norops* | None |
| | | Colubridae | *Boiga* | Green cat snake *B. cyanea* |
| | | | | Dog-toothed cat snake *(B. cynodon*) |
| | | | | Gold-ringed cat snake, Mangrove snake) (*B. dendrophila*) |
| | | | | Brown tree snake (*B. irregularis*) |
| | | | | Black-heade Cat snake (*B. nigriceps*) |
| | | | *Psammodynastes* | None |
| | | | *Elaphe* | Taiwan beauty snake (*E. taeniura friesi*) |
| | | Viperidae | *Protobothrops* | Taiwan pit vipers (*P. mucrosquamatus*) |
| | | | *Bothrops* | None |
| Amphibia | Anura | Bufonidae | *Bufo* | Great plains toad(*B. cognatus*) |
| | | | | Spotted toad (*B. guttatus*) |
| | | | | Cane toad (*B. marinus*) |
| | | | | Red-spotted toad (*B. punctatus*) |
| | | | | Oak toad (*B. quercicus*) |
| | | | | Texas toad (*B. speciosus*) |
| | | | | South American common toad (*B. typhonius*) |
| | | Hylidae | *Osteopilus* | Cuban treefrog (*O. septentrionalis*) |
| | | Leptodactylidae | *Eleutherodactylus* | Puerto Rican coqui (*E. coqui*) |
| | | Ranidae | *Rana* | Bullfrog (*R. catesbeiana*) |
| | | Rhacorhoridae | *Polypedates* | Asian tree frog (*P. leucomystax*) |
| Osteichthyes | Siluriformes | Ictaluridae | *Ictalurus* | Channel catfish (*I. punctatus*) |
| | | | *Ameiurus* | None |
| | Esociformes | Esocidae | *Esox* | Northern pike (*E. lucius*↗ |
| | | | | Muskellunge (*E. masquinongy*↗ |
| | Cyprinodontiformes | Poeciliidae | *Gambusia* | Western mosquito fish (*G. affinis*↗ |
| | Perciformes (Percoidei) | Centrarchidae | *Lepomis* | Bluegill (*L. macrochirus*) |
| | | | *Micropterus* | Smallmouth bass (*M. dolomieu*) |
| | | | | Largemouth bass (*M. salmoides*) |
| | | | All other genera of Centrarchidae | None |
| | | Centropomidae | All genera of Centropomidae | None |
| | | Nandidae | All genera of Nandidae | None |
| | | Moronidae | *Morone* | Striped bass (*M. saxatilis*↗ |
| | | | | White bass (*M. chrysops*↗ |
| | | | All genera of Moronidae | None |
| | | Percichthyidae | *Gadopsis* | None |
| | | | *Maccullochella* | None |
| | | | *Macquaria* | None |
| | | | *Percichthys* | None |
| | | Percidae | *Gymnocephalus* | None |
| | | | *Perca* | Eurasian perch )*P. fluviatilis*↗ |
| | | | *Sander* (*Stizostedion*) | Pikeperch )*S. lucioperca*↗ |
| | | | *Zingel* | None |
| | | Sinipercidae | *Siniperca* | Mandarin fish (*S. chuatsi*↗ |
| | | | | Mandarin fish (*S. scherzeri*↗ |
| Arachnid | Scorpiones | Buthidae | All genera of Buthidae | Any species of the familyButhidae |
| | Araneae | Hexathelidae | *Atrax* | Sydney funnelweb spider (*A. robustus*) and all other species of the genus *Atrax* |
| | | | *Hadronyche* | Any species of the genus *Hadronyche* |
| | | Loxoscelidae | *Loxosceles* | *L. recluse* |
| | | | | *L. laeta* |
| | | | | *L. gaucho* |
| | | Theridiidae | *Latrodectus* | Brown widow spider (*L. geometricus*) |
| | | | | Red back spider (*L. hasseltii*) |
| | | | | Black widow spider (*L. mactans*) |
| | | | | Mediterranean Black Widow Spider (*L. tredecimguttatus*) |
| Crustacea | Decapoda | Astacidae | *Astacus* | Any species of the genus *Astacus* |

| Class | Order | Family | Genus | Invasive Alien Species |
|---|---|---|---|---|
| | | | *Atlantoastacus*<br>*Austropotamobius*<br>*Caspiastacus*<br>*Pacifastacus* | Signal crayfish (*P. leniusculus*) |
| | | Cambaridae | *Orconectes* | Rusty crayfish (*O. rusticus*) |
| | | | All genera of Cambaridae | None |
| | | Parastacidae | *Cherax* | Any species of the genus *Cherax* |
| | | | All genera of Parastacidae | None |
| | | Varunidae | *Eriocheir* | Any species of the genus *Eriocheir* excluding Japanese mitten crab (*E. japonica*) |
| Insecta | Coleoptera | Scarabaeidae | *Cheirotonus* | Any species of the genus *Cheirotonus* excluding Yanbaru Long-armed scarab (*C. jambar*) |
| | | | *Euchirus* | Any species of the genus *Euchirus* |
| | | | *Propomacrus* | Any species of the genus *Propomacrus* |
| | Hymenoptera | Apidae | *Bombus* | Large earth bumblebee (*B. terrestris*) |
| | | Formicidae | *Solenopsis* | Red imported fire ant (*S. invicta*) |
| | | | | Fire ant (*S. geminata*) |
| | | | *Linepithema* | Argentine ant or Tropical fire ant (*L. humile*) |
| | | | *Wasmannia* | Little fire ant (*W. auropunctata*↗ |
| Mollusca | Mytiloida | Mytilidae | *Limnoperna* | Any species of the genus *Limnoperna* |
| | Veneroida | Dreissenidae | *Dreissena* | Quagga mussel (*D. bugensis*) |
| | | | | Zebra mussel (*D. polymorpha*) |
| | Stylommatophora | Haplotrematidae | *Ancotrema*<br>*Haplotrema* | None |
| | | Oleacinidae | All genera of Oleacinidae | None |
| | | Rhytididae | All genera of ↽ ↖ ⇧ ⇢ ↗ ⇒↗ ⇒↛ ⇓ | None |
| | | Spiraxidae | *Euglandina* | Cannibal snail (*E. rosea*) |
| | | | All genera of Spiraxidae | None |
| | | Streptaxidae | All genera of Streptaxidae | None |
| | | Subulinidae | All genera of Subulinidae | None |
| Platyhelminthes | Tricladida | Rhynchodemidae | *Platydemus* | Predatory flatworm (*P. manokwari*) |
| **2↜ Plant Kingdom** | | | | |
| Tracheophyte | Sympetalae | Compositae | *Coreopsis* | Lanceleaf tickseed (excluding cut flowers) (*C. lanceolata*) |
| | | | *Gymnocoronis* | Senegal tea plant (*G. spilanthoides*) |
| | | | *Rudbeckia* | Cutleaf coneflower (excluding cut flowers) (*R. laciniata*) |
| | | | *Senecio* | Madagascar ragwort (*S. madagascariensis*) |
| | | Scrophulariaceae | *Veronica* | Water speedwell (excluding cut flowers) (*V. anagallis-aquatica*) |
| | Caryophyllales | Amaranthaceae | *Alternanthera* | Alligatorweed (*A. philoxeroides*) |
| | | Apiaceae | *Hydrocotyle* | Floating marshpennywort or Pennywort (*H. ranunculoides*) |
| | | Cucurbitaceae | *Sicyos* | Bur cucumber (*S. angulatus*) |
| | | Haloragaceae | *Myriophyllum* | Parrotfeather (*M. aquaticum*) |
| | Liliopsida | Poaceae | *Spartina* | Common cord grass (*S. anglica*) |
| | | Araceae | *Pistia* | Water lettuce (*P. stratiotes*) |
| | Pteridophyta | Azollaceae | *Azolla* | Water fern (*A. cristata*) |

# C14. CHAPTER 14

# POLYCHLORINATED BIPHENYLS

## C14.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage, and disposal of polychlorinated biphenyls (PCB). These criteria 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, and cables.

## C14.2. DEFINITIONS

C14.2.1. Capacitor. A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

C14.2.2. Chemical Waste Landfill. A landfill at which 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.

C14.2.3. 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 of a non-industrial, non-substation building.

C14.2.4. Incinerator. 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.

C14.2.5. Leak or Leaking. Any instance in which a PCB article, PCB container, PCB equipment, has any PCBs on any portion of its external surface.

C14.2.6. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to these JEGS.

C14.2.7. Marked. PCB items and PCB storage areas marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

C14.2.8. Non-PCB Dielectric Fluid. Dielectric fluid from heavy electrical equipment that contains less than or equal 0.5 mg/kg PCB.

C14.2.9. Non-PCB Transformer. Any transformer that contains less than or equal 0.5 mg/kg PCB.

C14.2.10. PCB Article. Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

C14.2.11. 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.

C14.2.12. 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.

C14.2.13. 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 detectable concentrations of PCB, but <500 ppm PCB.

C14.2.14. PCB Equipment. Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

C14.2.15. 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 detectable concentration of PCB.

C14.2.16. PCB Transformer. Any transformer that contains ≥500 ppm PCB.

C14.2.17. 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.

C14.2.18. Substantial Contact Area. An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

C14.2.19. PCB Large High Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at 2,000 volts (alternating current (AC) or direct current (DC)) or above.

C14.2.20. PCB Large Low Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates below 2,000 volts (AC or DC).

## C14.3. CRITERIA

### C14.3.1. General

C14.3.1.1. The installation spill contingency plan will address PCB items, including temporary storage items. Chapter 18, “Spill Prevention and Response Planning,” provides criteria on how to prepare these plans.

C14.3.1.2. Spills of PCB liquids will be responded to immediately upon discovery and cleaned up in accordance with the following:

C14.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms (µg) per 100 square centimeters ($cm^2$).

C14.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 µg per 100 $cm^2$.

C14.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing <1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling, and a reference to any reports documenting the site conditions.

C14.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests ≤10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing <1 ppm PCBs.

C14.3.1.3. All PCB transformers, PCB Large High Voltage Capacitors, PCB containers, and certain PCB items containing PCBs (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and Japanese. The marking must identify the item as containing PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criteria also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB Large Low Voltage Capacitors and equipment containing a PCB transformer or PCB Large High Voltage Capacitor.

C14.3.1.4. Each installation having PCB items will maintain a written inventory that includes 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 for that year. Inventory records should be maintained for a period of time at least 3 years after disposal of the last item on the list.

C14.3.1.5. Disposal of PCB items will only be through the servicing DLA Disposition Services in accordance with DoD 4160.21-M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993, or paragraph C14.3.5 of this Guide.

C14.3.1.6. All periodic inspections as required in this Chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for 3 years after disposal of the transformer.

C14.3.2. PCB Transformers (≥500 ppm PCB)

C14.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

C14.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

C14.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

C14.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed 1 year.

C14.3.2.5. PCB transformers will be serviced as follows:

C14.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing <500 ppm PCB;

C14.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

C14.3.2.5.3. PCBs removed during servicing will be captured and disposed of in accordance with paragraph C14.3.5;

C14.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

C14.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing <500 ppm PCBs that are mixed with fluids containing ≥500 ppm PCBs will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be >500 ppm PCBs; and

C14.3.2.5.6. Dielectric fluids containing ≥500 ppm PCBs will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

C14.3.2.6. All in-service PCB transformers (>500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100% of dielectric fluid or PCB transformers tested and found to contain <60,000 ppm PCBs will be inspected at least every 12 months.

C14.3.2.7. If any PCB transformer is involved in a fire and was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and disposed of in accordance with Chapter 4, “Wastewater.”

C14.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

C14.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

C14.3.3. Other PCB Items.

C14.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

C14.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing <500 ppm PCB;

C14.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of ≥500 ppm that requires the removal and rework of the internal components is prohibited;

C14.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

C14.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of ≥500 ppm will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

C14.3.3.1.5. Dielectric fluids containing ≥500 ppm will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

C14.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

C14.3.3.2.1. Use and storage for reuse of PCB Large High Voltage Capacitors and PCB Large Low Voltage Capacitors that pose an exposure risk to food or feed is prohibited;

C14.3.3.2.2. Use of PCB Large High Voltage and PCB Large Low Voltage Capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have an adequate roof, walls, and floor to contain any release of PCBs; and

C14.3.3.2.3. Any PCB item removed from service will be marked with the date it is removed from service.

C14.3.4. Storage

C14.3.4.1. PCBs and PCB items that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

C14.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

C14.3.4.1.2. A containment berm, at least 6 inches high, sufficient to contain twice the internal volume of the largest PCB article, or 25% of the total internal volume of all PCB articles or containers stored, whichever is greater;

C14.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines, or other openings constructed to prevent any release from the bermed area;

C14.3.4.1.4. Continuous, smooth, and impervious flooring material; and

C14.3.4.1.5. To the maximum extent possible, a new PCB storage area will be 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 control plan will address the risk.

C14.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

C14.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

C14.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

C14.3.4.2.3. PCB containers in which non-liquid PCBs have been placed; and

C14.3.4.2.4. PCB containers in which PCBs at a concentration <500 ppm have been placed, and whose containers are marked to indicate there is <500 ppm PCB.

C14.3.4.3. Non-leaking and structurally undamaged Large PCB High Voltage Capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting the criteria of paragraph C14.3.4 if they are inspected weekly.

C14.3.4.4. All other PCB storage areas will be inspected at least monthly.

C14.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing DLA Disposition Services.

C14.3.5. Disposal

C14.3.5.1. Installations that generate PCB waste will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, “Hazardous Waste.”

C14.3.5.2. PCB waste shall NOT be treated by DoD components without obtaining prior written approval from the Environmental Executive Agent (EEA).

C14.3.5.3. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the U.S. will be returned to the U.S. for delivery to a permitted disposal facility if Japan 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 criteria in paragraph C14.3.1.3.

C14.3.6. Elimination of PCB Products

C14.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

C14.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

C14.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs at the time of shipment.

C14.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

# C15. CHAPTER 15

# ASBESTOS

## C15.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1 ("DoD Safety and Occupational Health (SOH) Program," August 19, 1998) and DoDI 6055.5 ("Occupational and Environmental Health (OEH), November 11, 2008) and concomitant service instructions.

## C15.2. DEFINITIONS

C15.2.1. Adequately Wet. Sufficiently mix or penetrate 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.

C15.2.2. 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 and/or altered.

C15.2.3. Asbestos-Containing Material (ACM). Any material containing more than 0.1% asbestos by weight.

C15.2.4. Friable Asbestos. Any material containing more than 0.1% asbestos fibers that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.5. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 0.1% asbestos.

C15.2.6. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing more than 0.1% asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.7. Regulated ACM. Means (a) Friable asbestos material, (b) Category I Nonfriable ACM that has become friable, (c) Category I Nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) 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.

C15.3. CRITERIA

C15.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

C15.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

C15.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

C15.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

C15.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

C15.3.2.4. Work control/permit systems to control activities that might disturb ACM;

C15.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM;

C15.3.2.6. Record keeping to document O&M activities related to asbestos identification management and abatement;

C15.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

C15.3.2.8. Procedures to assess and prioritize identified hazards for abatement; and

C15.3.2.9. Procedures to prevent the use of ACM in new construction.

C15.3.3. Prior to demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

C15.3.4. Prior to demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

C15.3.5. Installations will remove friable ACM when the ACM poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

C15.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all regulated ACM.

C15.3.7. When disposing of all asbestos waste, installations will do the following:

C15.3.7.1. Segregate all waste ACM into one of the two following types:

C15.3.7.1.1. Type I waste ACM. Type I waste ACM shall be categorized as a Specified Hazardous Industrial Waste (SHIW), which is a subcategory of Specially Controlled Industrial Waste (SCIW). Type 1 waste ACM includes, but is not limited to: sprayed asbestos; asbestos lagging material; diatomaceous earth (kieselguhr) lagging material; Pearlite lagging material; lagging material that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure, or when placed in contact with moving air or vibration; items contaminated with asbestos as a result of asbestos removal operations (e.g., PPE, plastic sheeting); items contaminated with asbestos (e.g., respirators, asbestos dust collection filters, equipment); and imported asbestos.

C15.3.7.1.2. Type II waste ACM. Type II waste ACM shall be categorized as an Industrial Waste, and refers to all other waste ACM not otherwise segregated as a Type I waste ACM, including, but not limited to: fire safes; slate board; cement board; siding board; floor tile; gaskets; packing; cement pipe; and brake shoes.

C15.3.7.2. Adequately wet all waste ACM or solidify waste ACM using cement;

C15.3.7.3. Seal each segregated type of waste ACM in a double high strength plastic bag; and

C15.3.7.4. Properly dispose of it in an appropriate GoJ-approved or licensed facility or landfill for each type of waste ACM. Type I waste ACM may also be melted and disposed of in a landfill designated by the GoJ to receive treated asbestos waste. All bags will be labeled, in both English and Japanese, with the following information:

C15.3.7.4.1. Whether it is a Type I or Type II Waste ACM; and

C15.3.7.4.2. "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD."

C15.3.7.5. Permanent records documenting the disposal action and site will be maintained.

C15.3.8. DoD schools will comply with applicable requirements of 15 U.S.C. 2643(l) and implementing regulations in 40 CFR Part 763, Subpart E ("Asbestos-Containing Materials in Schools," current edition), replacing all references to "one percent," "1 percent," and "1%" with "0.1%, consistent with the definition of ACM in this chapter.

C15.3.9. Determination of ACM.

C15.3.9.1. In cases where a records review or visual inspection results in a presumption that material is ACM, the material may be designated as ACM, thereby precluding the need for further testing.

C15.3.9.2. For determination of asbestos content by testing methods, bulk samples must be analyzed by an NIST/NVLAP accredited laboratory using polarized light microscopy (PLM)

following US EPA methods for determination of asbestos. The laboratory shall have a working definition of "Trace" amounts of asbestos, and the laboratory shall report any detectable amount of asbestos in a bulk sample that is less than the PLM Limit of Quantification of 1% as a "Trace" concentration. If PLM does not detect the presence of asbestos (e.g. "non-detect"), the material shall be considered <0.1% asbestos. If PLM analysis detects asbestos in any discernible amount (to include "trace" or "less than 1%"), the material shall be considered >0.1% asbestos unless proven to be non-ACM by the use of quantification methods capable of achieving an analytical sensitivity of less than 0.1%, such as Transmission Electron Microscopy (TEM) or 1000 point counting.

# C16. CHAPTER 16

## RESERVED

# C17. CHAPTER 17

# LEAD-BASED PAINT

## C17.1. SCOPE

This Chapter contains criteria to establish and implement a lead hazard management program to identify, control, or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from lead exposure, refer to DoDI 6055.1 "DoD Safety and Occupational Health (SOH) Program," August 19, 1998, DoDI 6055.5 "Industrial Hygiene and Occupational Health," January 10, 1989, and concomitant service instructions.

## C17.2. DEFINITIONS

C17.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, 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.

C17.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

C17.2.3. 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.

C17.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least 2 different days within any week, provided that each days' visit lasts at least 3 hours and 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.

C17.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint 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 the age of 6.

C17.2.6. 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.

C17.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 μg/dl (micrograms of lead per deciliter) for a single test, or 15-19 μg/dl in 2 tests taken at least 3 months apart.

C17.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

C17.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

C17.2.10. Evaluation. 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, lead-based paint, or a lead-based paint hazard.

C17.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

C17.2.12. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through various methods, including interim controls or abatement or a combination of the two.

C17.2.13. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

C17.2.14. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint 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.

C17.2.15. Lead-Based Paint. Paint or other surface coatings that contain lead ≥1.0 milligram per $cm^2$, or 0.5% by weight or 5,000 ppm by weight.

C17.2.16. Lead-based paint hazard includes paint-lead-hazard, dust-lead hazard or soil-lead hazard as identified below:

C17.2.16.1. Paint-lead hazard. A paint-lead hazard is any of the following:

C17.2.16.1.1. Any lead-based paint 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 paragraph C17.2.16.2.

C17.2.16.1.2. Any damaged or otherwise deteriorated lead-based paint 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).

C17.2.16.1.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

C17.2.16.1.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

C17.2.16.2. Dust-lead hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead ≥40 μg/ft$^2$ on floors or 250 μg/ft$^2$ on interior window sills based on wipe samples.

C17.2.16.3. Soil-lead hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead ≥400 ppm (μg/g) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

C17.2.17. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint, and the provision of a report explaining the results of the investigation.

C17.2.18. Permanent. An expected design life of at least 20 years.

C17.2.19. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

C17.2.20. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

C17.2.21. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

C17.2.22. Risk Assessment Screen. A sampling protocol that is used in dwellings that are in relatively good condition and where the probability of finding lead-based hazards are 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.

C17.3. CRITERIA

C17.3.1. Installations will:

C17.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

C17.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement.

C17.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

C17.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 μg/ft$^2$ for floors, >125 μg/ft$^2$ for interior window sills, a lead-based paint risk assessment should be performed.

C17.3.1.3.2. Lead-based paint risk assessments.

C17.3.1.3.3. Routine facility inspection for fire and safety.

C17.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

C17.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

C17.3.1.3.6. Lead-based paint reevaluations.

C17.3.1.3.7. Review of construction, painting, and maintenance histories.

C17.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

C17.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-base paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

C17.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

C17.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, “Hazardous Waste,” paragraph C6.2.6.

# C18. CHAPTER 18

# SPILL PREVENTION AND RESPONSE PLANNING

## C18.1. SCOPE

This Chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998.

## C18.2. DEFINITIONS

C18.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

C18.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

C18.2.3. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in AP1.1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

C18.2.3.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

C18.2.3.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C18.2.4. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

C18.2.5. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

C18.2.6. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

C18.2.7. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

C18.2.8. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

C18.2.8.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

C18.2.8.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 400 liters (110 gallons);

C18.2.8.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

C18.2.8.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

C18.2.8.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

C18.2.9. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

C18.3. CRITERIA

C18.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT.

C18.3.1.1. The plan will be updated at least every 5 years or:

C18.3.1.1.1. Within 6 months of any significant changes to operations.

C18.3.1.1.2. When there have been two significant spills to navigable waters in any 12-month period;

C18.3.1.1.3. When there has been a spill of > 3,800 liters (1,000 gallons).

C18.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification.

C18.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

C18.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate.

C18.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in paragraph C18.3.2.3, critical water resources, land uses, and possible migration pathways.

C18.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure.

C18.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in paragraph C18.3.2.3.

C18.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of nondestructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

C18.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.2.5.

C18.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

C18.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

C18.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground

storage tanks, pesticides, and PCBs provide specific criteria for containment structure requirements.

C18.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

C18.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

C18.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

C18.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

C18.3.2.14. Written procedures for:

C18.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

C18.3.2.14.2. Inspections; and

C18.3.2.14.3. Record keeping requirements.

C18.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

C18.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and to provide assistance to other agencies when requested. At a minimum, this section of the plan will contain:

C18.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills.

C18.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered.

C18.3.3.3. The responsibilities, composition, and training requirements of the FRT.

C18.3.3.4. The command structure that will be established to manage a worst case discharge. Include an organization chart and the responsibilities and composition of the organization.

C18.3.3.5. Procedures for FRT alert and response to include provisions for:

C18.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill.

C18.3.3.5.2. Public affairs involvement.

C18.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours.

C18.3.3.7. The plan will provide for notification of the FIC, installation commander, and local authorities in the event of hazard to human health or environment.

C18.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers.

C18.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills.

C18.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill.

C18.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation.

C18.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation.

C18.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations.

C18.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions.

C18.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

C18.3.4. Reporting Section. The reporting section of the spill plan will address the following:

C18.3.4.1. Recordkeeping when emergency procedures are invoked.

C18.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill. Defense Fuel Support Points shall additionally comply with USFJ Instruction 23-101 (current edition) for DLA Energy capitalized fuel.

C18.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and the EEA and submit a follow-up written report on USFJ Form 50 (current fillable PDF version of the form is available at https://www.usfj.mil/mil/Index.html, under the "USFJ Forms" link) when:

C18.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

C18.3.4.3.2. The spill exceeds 400 liters (110 gallons) of POL;

C18.3.4.3.3. A water resource has been polluted; or

C18.3.4.3.4. The FIC has determined that the spill is significant, as in for example:

C18.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local Japanese drinking water resource, off-base population or property, the appropriate in-theater component commander, EEA and the appropriate GoJ authorities will be notified immediately.

C18.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in paragraph C18.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

C18.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment.

C18.3.6. After completion of the initial response, any remaining free product and/or obviously contaminated soil will be appropriately removed and managed. Further action will be governed by DoD Instruction 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998.

# C19. CHAPTER 19

# UNDERGROUND STORAGE TANKS

## C19.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing hazardous wastes are covered in Chapter 6, "Hazardous Waste." Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, "Petroleum, Oil, and Lubricants."

## C19.2. DEFINITIONS

C19.2.1. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

C19.2.1.1. A hydrant fuel distribution system; or

C19.2.1.2. A field-constructed tank.

C19.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, "Hazardous Material." The term does not include:

C19.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

C19.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C19.2.3. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

C19.2.4. POL. Refined petroleum, oils, and lubricants.

C19.2.5. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

C19.2.6. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, larger than 416 liters (110 gallons), that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10% or more beneath the surface of the ground, but does not include:

C19.2.6.1. Tanks containing heating oil used for consumption on the premises where it is stored;

C19.2.6.2. Septic tanks;

C19.2.6.3. Storm water or wastewater collection systems;

C19.2.6.4. Flow through process tanks;

C19.2.6.5. Surface impoundments, pits, ponds, or lagoons;

C19.2.6.6. Field constructed tanks;

C19.2.6.7. Hydrant fueling systems;

C19.2.6.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

C19.2.6.9. UST containing *de minimis* concentrations of regulated substances, except where paragraph C19.3.2.7 is applicable; and

C19.2.6.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

C19.3. CRITERIA

C19.3.1. All installations will maintain a UST inventory.

C19.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

C19.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

C19.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fill pipe. Overfill prevention will be provided by one of the following methods:

C19.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity).

C19.3.2.2.2. High level alarm (set at 90% of tank capacity).

C19.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or 1% of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

C19.3.2.3.1. USTs will use at least one of the following leak detection methods:

C19.3.2.3.1.1. Automatic tank gauging;

C19.3.2.3.1.2. Vapor monitoring;

C19.3.2.3.1.3. Groundwater monitoring; or

C19.3.2.3.1.4. Interstitial monitoring.

C19.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

C19.3.2.3.3. Suction piping will either have a line tightness test conducted every three years or use monthly monitoring.

C19.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

C19.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

C19.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.8 "Environmental Remediation for DoD Activities Overseas," February 2, 1998. Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

C19.3.2.7. When a UST has not been used for one year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.3.

C19.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

C19.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

C19.3.2.9.1. Vent lines must be left open and functioning; and

C19.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

C19.3.3. UST Recordkeeping. Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

C19.3.4. Hazardous Material USTs

C19.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults.

C19.3.4.2. Leak Detection. The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

C19.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in paragraph C19.3.4.1 shall be immediately removed from service and upgraded or replaced as necessary.

C19.3.5. Deferred USTs. Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

# AP1. APPENDIX 1

# CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

## AP1.1. CHARACTERISTICS OF HAZARDOUS WASTE

### AP1.1.1. General

AP1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

AP1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

AP1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

### AP1.1.2. Characteristic of Ignitability

AP1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

AP1.1.2.1.1. It is a liquid, other than an aqueous solution containing <24% alcohol by volume and has a flash point <70°C (158°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

AP1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

AP1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

AP1.1.2.1.4. It is an oxidizer.

AP1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

AP1.1.3. Characteristic of Corrosivity

AP1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

AP1.1.3.1.1. It is aqueous and has a pH ≤2, or ≥12.5, as determined by a pH meter.

AP1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate >6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

AP1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

AP1.1.4. Characteristic of Reactivity

AP1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

AP1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

AP1.1.4.1.2. It reacts violently with water.

AP1.1.4.1.3. It forms potentially explosive mixtures with water.

AP1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

AP1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

AP1.1.4.1.8. It is a forbidden explosive.

AP1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

AP1.1.5. Toxicity Characteristic

AP1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste

contains any of the contaminants listed in Table AP1.T1, "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section AP1.1 at the concentration ≥ the respective value given in that table. Where the waste contains <0.5% filterable solids, the waste itself is considered to be the extract for the purpose of this section.

AP1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table AP1.T1 or section AP1.2, which corresponds to the toxic contaminant causing it to be hazardous.

## AP1.2. LISTS OF HAZARDOUS WASTES

### AP1.2.1. General

AP1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

AP1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

| | |
|---|---|
| Ignitable Waste | (I) |
| Corrosive Waste | (C) |
| Reactive Waste | (R) |
| Toxicity Characteristic Waste | (E) |
| Acute Hazardous Waste | (H) |
| Toxic Waste | (T) |

AP1.2.1.3. Each hazardous waste listed in section AP1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

AP1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table AP1.T3, "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

AP1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table AP1.T4, annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

AP1.2.4. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.

AP1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel or burned as a fuel.

AP1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

AP1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#, such waste will be listed in paragraph AP1.2.2 above or will be identified as a hazardous waste by the characteristics set forth in section AP1.1 of this Appendix.].

AP1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4, annotated "P" as the first character in the USEPA HW# are hereby identified as acute hazardous waste (H). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA HW#s are listed in Table AP1.T4, annotated "P" as the first character in the USEPA HW#.

AP1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table AP1.T4, paragraphs AP1.2.4.1.1 through AP1.2.4.1.4 of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

Table AP1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

| USEPA HW No.[1] | Contaminant | CAS No. [2] | Regulatory Level (mg/L) |
|---|---|---|---|
| D004 | Arsenic | 7440-38-2 | See Table AP1.T6 |
| D005 | Barium | 7440-39-3 | 100.0 |
| D006 | Cadmium | 7440-43-2 | See Table AP1.T6 |
| D007 | Chromium | 7440-47-3 | See Table AP1.T6 |
| D016 | 2,4-D | 94-75-7 | 10.0 |
| D012 | Endrin | 72-20-8 | 0.02 |
| D008 | Lead | 7439-92-1 | See Table AP1.T6 |
| D013 | Lindane | 58-89-9 | 0.4 |
| D009 | Mercury | 7439-97-6 | See Table AP1.T6 |
| D014 | Methoxychlor | 72-43-5 | 10.0 |
| D010 | Selenium | 7782-49-2 | See Table AP1.T6 |
| D011 | Silver | 7440-22-4 | 5.0 |
| D015 | Toxaphene | 8001-35-2 | 0.5 |
| D017 | 2,4,5-TP (Silvex) | 93-72-1 | 1.0 |

**Notes**

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T2. Maximum Concentration of Contaminants for Non-Wastewater

| USEPA HW No. [1] | Contaminant | CAS No. [2] | Regulatory Level (mg/kg) |
|---|---|---|---|
| D018 | Benzene | 71-43-2 | See Table AP1.T6 |
| D019 | Carbon tetrachloride | 56-23-5 | See Table AP1.T6 |
| D020 | Chlordane | 57-74-9 | 0.03 |
| D021 | Chlorobenzene | 108-90-7 | 100.0 |
| D022 | Chloroform | 67-66-3 | 6.0 |
| D023 | o-Cresol | 95-48-7 | 200.0 |
| D024 | m-Cresol | 108-39-4 | 200.0 |
| D025 | p-Cresol | 106-44-5 | 200.0 |
| D026 | Cresol | | 200.0 |
| D027 | 1,4-Dichlorobenzene | 106-46-7 | 7.5 |
| D028 | 1,2-Dichloroethane | 107-06-2 | See Table AP1.T6 |
| D029 | 1,1-Dichloroethylene | 75-35-4 | See Table AP1.T6 |
| D030 | 2,4-Dinitrotoluene | 121-14-2 | 0.13 |
| D031 | Heptachlor (and its epoxide) | 76-44-8 | 0.008 |
| D032 | Hexachlorobenzene | 118-74-1 | 0.13 |
| DO33 | Hexachlorobutadiene | 87-68-3 | 0.5 |
| DO34 | Hexachloroethane | 67-72-1 | 3.0 |
| DO35 | Methyl Ethyl Ketone | 78-93-3 | 200.0 |
| DO36 | Nitrobenzene | 98-95-3 | 2.0 |
| D037 | Pentachlorophenol | 87-86-5 | 100.0 |
| D038 | Pyridine | 110-86-1 | 5.0 |
| D039 | Tetrachloroethylene | 127-18-4 | See Table AP1.T6 |
| D040 | Trichloroethylene | 79-01-6 | See Table AP1.T6 |
| D041 | 2,4,5-Trichlorophenol | 95-95-4 | 400.0 |
| D042 | 2,4,6-Trichlorophenol | 88-06-2 | 2.0 |
| D043 | Vinyl Chloride | 75-01-4 | 0.2 |

**Notes**

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

| USEPA HW No.[1] | Hazardous Waste | Hazard Code |
|---|---|---|
| F001 | The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F002 | The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F003 | The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10% or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (I) [2] |
| F004 | The following spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (T) |
| F005 | The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | (I,T) |
| F006 | Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum. | (T) |
| F007 | Spent cyanide plating bath solutions from electroplating operations. | (R,T) |
| F008 | Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process. | (R,T) |
| F009 | Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process. | (R,T) |
| F010 | Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process. | (R,T) |
| F011 | Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations. | (R,T) |
| F012 | Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process. | (T) |
| F019 | Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process. | (T) |

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

| USEPA HW No.[1] | Hazardous Waste | Hazard Code |
|---|---|---|
| F020 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (this listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5- trichlorophenol). | (H) |
| F021 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives. | (H) |
| F022 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions. | (H) |
| F023 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (this listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol). | (H) |
| F024 | Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (this listing does not include wastewater, wastewater treatment sludges, spent catalysts, and wastes listed separately in this table or wastes listed in Table AP1.T4 and having a USEPA HW# beginning with "K"). | (T) |
| F025 | Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. | (T) |
| F026 | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions. | (H) |
| F027 | Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (this listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component). | (H) |
| F028 | Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027. | (T) |
| F032 | Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. | (T) |

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

| USEPA HW No.[1] | Hazardous Waste | Hazard Code |
|---|---|---|
| F034 | Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. | (T) |
| F035 | Wastewater (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. | (T) |
| F037 | Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and storm water units receiving dry weather flow. Sludge generated in storm water units that do not receive dry weather flow, sludges generated from non-contact once-through cooling water segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. | (T) |
| F038 | Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater and oily cooling wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in dissolved air flotation (DAF) units. Sludges generated in storm water units that do not receive dry weather flow; sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing. | (T) |
| F039 | Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste listed in Tables AP1.T3 or AP1.T4 (leachate resulting from the disposal of one or more of the following USEPA hazardous wastes and no other hazardous wastes retains its USEPA HW#(s): F020, F021, F022, F026, F027, and/or F028). | (T) |

Notes:
1. USEPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Acenaphthene | 83329 | | | 100 |
| Acenaphthylene | 208968 | | | 5,000 |
| Acetaldehyde (I) | 75070 | | U001 | 1,000 |
| Acetaldehyde, chloro- | 107200 | | P023 | 1,000 |
| Acetaldehyde, trichloro- | 75876 | | U034 | 5,000 |
| Acetamide | 60355 | | | 100 |
| Acetamide, N-(aminothioxomethyl)- | 591082 | | P002 | 1,000 |
| Acetamide, N-(4-ethoxyphenyl)- | 62442 | | U187 | 100 |
| Acetamide, 2-fluoro- | 640197 | | P057 | 100 |
| Acetamide, N-9H-fluoren-2-yl- | 53963 | | U005 | 1 |
| Acetic acid | 64197 | | | 5,000 |
| Acetic acid (2,4-dichlorophenoxy)-salts and esters | 94757 | | U240 | 100 |
| Acetic acid, lead salt | 301042 | | U144 | 10 |
| Acetic acid, thallium(1+) salt | 563688 | | U214 | 1000 |
| Acetic acid, (2,4,5-trichlorophenoxy) | 93765 | | U232 | 1,000 |
| Acetic acid, ethyl ester (I) | 141786 | | U112 | 5,000 |
| Acetic acid, fluoro-, sodium salt | 62748 | | P058 | 10 |
| Acetic anhydride | 108247 | | | 5,000 |
| Acetone (I) | 67641 | | U002 | 5,000 |
| Acetone cyanohydrin | 75865 | 1,000 | P069 | 10 |
| Acetone thiosemicarbazide | 1752303 | 1,000/10,000 | | 1 |
| Acetonitrile (I,T) | 75058 | | U003 | 5,000 |
| Acetophenone | 98862 | | U004 | 5,000 |
| 2-Acetylaminofluorene | 53963 | | U005 | 1 |
| Acetyl bromide | 506967 | | | 5,000 |
| Acetyl chloride (C,R,T) | 75365 | | U006 | 5,000 |
| 1-Acetyl-2-thiourea | 591082 | | P002 | 1 |
| Acrolein | 107028 | 500 | P003 | 1 |
| Acrylamide | 79061 | 1,000/10,000 | U007 | 5,000 |
| Acrylic acid (I) | 79107 | | U008 | 5,000 |
| Acrylonitrile | 107131 | 10,000 | U009 | 100 |
| Acrylyl chloride | 814686 | 100 | | 1 |
| Adipic acid | 124049 | | | 5,000 |
| Adiponitrile | 111693 | 1,000 | | 1 |
| Aldicarb | 116063 | 100/10,000 | P070 | 1 |
| Aldrin | 309002 | 500/10,000 | P004 | 1 |
| Allyl alcohol | 107186 | 1,000 | P005 | 100 |
| Allylamine | 107119 | 500 | | 1 |
| Allyl chloride | 107051 | | | 1,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Aluminum phosphide (R,T) | 20859738 | 500 | P006 | 100 |
| Aluminum sulfate | 10043013 | | | 5,000 |
| 4-Aminobiphenyl | 92671 | | | 1 |
| 5-(Aminomethyl)-3-isoxazolol | 2763964 | | P007 | 1,000 |
| Aminopterin | 54626 | 500/10,000 | | 1 |
| 4-Aminopyridine | 504245 | | P008 | 1,000 |
| Amiton | 78535 | 500 | | 1 |
| Amiton oxalate | 3734972 | 100/10,000 | | 1 |
| Amitrole | 61825 | | U011 | 10 |
| Ammonia | 7664417 | 500 | | 100 |
| Ammonium acetate | 631618 | | | 5,000 |
| Ammonium benzoate | 1863634 | | | 5,000 |
| Ammonium bicarbonate | 1066337 | | | 5,000 |
| Ammonium bichromate | 7789095 | | | 10 |
| Ammonium bifluoride | 1341497 | | | 100 |
| Ammonium bisulfite | 10192300 | | | 5,000 |
| Ammonium carbamate | 1111780 | | | 5,000 |
| Ammonium carbonate | 506876 | | | 5,000 |
| Ammonium chloride | 12125029 | | | 5,000 |
| Ammonium chromate | 7788989 | | | 10 |
| Ammonium citrate, dibasic | 3012655 | | | 5,000 |
| Ammonium fluoborate | 13826830 | | | 5,000 |
| Ammonium fluoride | 12125018 | | | 100 |
| Ammonium hydroxide | 1336216 | | | 1,000 |
| Ammonium oxalate | 6009707<br>5972736<br>14258492 | | | 5,000 |
| Ammonium picrate (R) | 131748 | | P009 | 10 |
| Ammonium silicofluoride | 16919190 | | | 1,000 |
| Ammonium sulfamate | 7773060 | | | 5,000 |
| Ammonium sulfide | 12135761 | | | 100 |
| Ammonium sulfite | 10196040 | | | 5,000 |
| Ammonium tartrate | 14307438<br>3164292 | | | 5,000 |
| Ammonium thiocyanate | 1762954 | | | 5,000 |
| Ammonium vanadate | 7803556 | | P119 | 1,000 |
| Amphetamlne | 300629 | 1,000 | | 1 |
| Amyl acetate | 628637 | | | 5,000 |
| Iso-Amyl acetate | 123922 | | | |
| Sec-Amyl acetate | 626380 | | | |
| Tert-Amyl acetate | 625161 | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Aniline (I,T) | 62533 | 1,000 | U012 | 5,000 |
| Aniline, 2,4,6- trimethyl | 88051 | 500 | | 1 |
| o-Anisidine | 90040 | | | 100 |
| Anthracene | 120127 | | | 5,000 |
| Antimony++ | 7440360 | | | 5,000 |
| Antimony pentachloride | 7647189 | | | 1,000 |
| Antimony pentafluoride | 7783702 | 500 | | 1 |
| Antimony potassium tartrate | 28300745 | | | 100 |
| Antimony tribromide | 7789619 | | | 1,000 |
| Antimony trichloride | 10025919 | | | 1,000 |
| Antimony trifluoride | 7783564 | | | 1,000 |
| Antimony trioxide | 1309644 | | | 1,000 |
| Antimycin A | 1397940 | 1,000/10,000 | | 1 |
| ANTU (Thiourea 1-Naphthalenyl) | 86884 | 500/10,000 | | 100 |
| Argentate(1-), bis(cyano-C)-, potassium | 506616 | | P099 | 1 |
| Aroclor 1016 | 12674112 | | | 1 |
| Aroclor 1221 | 11104282 | | | 1 |
| Aroclor 1232 | 11141165 | | | 1 |
| Aroclor 1242 | 53469219 | | | 1 |
| Aroclor 1248 | 12672296 | | | 1 |
| Aroclor 1254 | 11097691 | | | 1 |
| Aroclor 1260 | 11096825 | | | 1 |
| Aroclors | 1336363 | | | 1 |
| Arsenic++ | 7440382 | | | 1 |
| Arsenic acid ($H_3AsO_4$) | 1327522<br>7778394 | | P010 | 1 |
| Arsenic disulfide | 1303328 | | | 1 |
| Arsenic oxide ($As_2O_3$) | 1327533 | | P012 | 1 |
| Arsenic oxide ($As_2O_5$) | 1303282 | | P011 | 1 |
| Arsenic pentoxide | 1303282 | 100/10,000 | P011 | 1 |
| Arsenic trichloride | 7784341 | | | 1 |
| Arsenic trioxide | 1327533 | | P012 | 1 |
| Arsenic trisulfide | 1303339 | | | 1 |
| Arsenous oxide | 1327533 | 100/10,000 | P012 | 1 |
| Arsenous trichloride | 7784341 | 500 | | 5,000 |
| Arsine | 7784421 | 100 | | 1 |
| Arsine, diethyl- | 692422 | | P038 | 1 |
| Arsinic acid, dimethyl- | 75605 | | U136 | 1 |
| Arsorous dichloride, phenyl- | 696286 | | P036 | 1 |
| Asbestos+++ | 1332214 | | | 1 |
| Auramine | 492808 | | U014 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Azaserine | 115026 | | U015 | 1 |
| Aziridine | 151564 | | P054 | 1 |
| Azindine, 2-methyl- | 75558 | | P067 | 1 |
| Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1a-alpha, 8-beta, 8a-alpha, 8b-alpha)]- | 50077 | | U010 | 10 |
| Azinphos-ethyl | 2642719 | 100/10,000 | | 100 |
| Azinphos-methyl | 86500 | 10/10,000 | | 1 |
| Barium cyanide | 542621 | | P013 | 10 |
| Benz[j]aceanthrylene, 1,2-dihydro-3-methyl- | 56495 | | U157 | 10 |
| Benz[c]acridine | 225514 | | U016 | 100 |
| Benzal chloride | 98873 | 500 | U017 | 5,000 |
| Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)- | 23950585 | | U192 | 5,000 |
| Benz[a]anthracene | 56553 | | U018 | 10 |
| 1,2-Benzanthracene | 56553 | | U018 | 10 |
| Benz[a]anthracene, 7,12-dimethyl- | 57976 | | U094 | 1 |
| Benzenamine (I,T) | 62533 | | U012 | 5,000 |
| Benzenamine, 3-(Trifluoromethyl) | 98168 | 500 | | 1 |
| Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl- | 492808 | | U014 | 100 |
| Benzenamine, 4-chloro- | 106478 | | P024 | 1,000 |
| Benzenamine, 4-chloro-2-methyl-, hydrochloride | 3165933 | | U049 | 100 |
| Benzenamine, N,N-dimethyl-4-(phenylazo-) | 60117 | | U093 | 10 |
| Benzenamine, 2-methyl- | 95534 | | U328 | 100 |
| Benzenamine, 4-methyl- | 106490 | | U353 | 100 |
| Benzenamine, 4,4'-methylenebis(2-chloro- | 101144 | | U158 | 10 |
| Benzenamine, 2-methyl-, hydrochloride | 636215 | | U222 | 100 |
| Benzenamine, 2-methyl-5-nitro- | 99558 | | U181 | 100 |
| Benzenamine, 4-nitro- | 100016 | | P077 | 5,000 |
| Benzene (I,T) | 71432 | | U109 | 10 |
| Benzene, 1-(Chloromethyl)-4-Nitro- | 100141 | 500/10,000 | | 1 |
| Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester | 510156 | | U038 | 10 |
| Benzene, 1-bromo-4-phenoxy- | 101553 | | U030 | 100 |
| Benzenearsonic Acid | 98055 | 10/10,000 | | 1 |
| Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]- | 305033 | | U035 | 10 |
| Benzene, chloro- | 108907 | | U037 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Benzene, chloromethyl- | 100447 | | P028 | 100 |
| Benzenediamin, ar-methyl- | 25376458<br>95807<br>496720<br>823405 | | U221 | 10 |
| 1,2-Benzenedicarboxylic acid, dioctyl ester | 117840 | | U107 | 5,000 |
| 1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester | 117817 | | U028 | 100 |
| 1,2-Benzenedicarboxylic acid, dibutyl ester | 84742 | | U069 | 10 |
| 1,2-Benzenedicarboxylic acid, diethyl ester | 84662 | | U088 | 1,000 |
| 1,2-Benzenedicarboxylic acid, dimethyl ester | 131113 | | U102 | 5,000 |
| Benzene, 1,2-dichloro- | 95501 | | U070 | 100 |
| Benzene, 1,3-dichloro- | 541731 | | U071 | 100 |
| Benzene, 1,4-dichloro- | 106467 | | U072 | 100 |
| Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro- | 72548 | | U060 | 1 |
| Benzene, dichloromethyl- | 98873 | | U017 | 5,000 |
| Benzene, 1,3-diisocyanotomethyl-(R,T) | 584849<br>91087<br>264716254 | | U223 | 100 |
| Benzene, dimethyl (I,T) | 1330207 | | U239 | 100 |
| m-Benzene, dimethyl | 108383 | | | 1,000 |
| o-Benzene, dimethyl | 95476 | | | 1,000 |
| p-Benzene, dimethyl | 106423 | | | 100 |
| 1,3-Benzenediol | 108463 | | U201 | 5,000 |
| 1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- (R) - | 51434 | | P042 | 1,000 |
| Benzeneethanamine, alpha, alpha-dimethyl- | 122098 | | P046 | 5,000 |
| Benzene, hexachloro- | 118741 | | U127 | 10 |
| Benzene, hexahydro- (I) | 110827 | | U056 | 1,000 |
| Benzene, hydroxy- | 108952 | | U188 | 1,000 |
| Benzene, methyl- | 108883 | | U220 | 1,000 |
| Benzene, 2-methyl-1,3-dinitro- | 606202 | | U106 | 100 |
| Benzene, 1-methyl-2,4-dinitro- | 121142 | | U105 | 10 |
| Benzene, 1-methylethyl-(I) | 98828 | | U055 | 5,000 |
| Benzene, nitro- | 98953 | | U169 | 1,000 |
| Benzene, pentachloro- | 608935 | | U183 | 10 |
| Benzene, pentachloronitro- | 82688 | | U185 | 100 |
| Benzenesulfonic acid chloride (C,R) | 98099 | | U020 | 100 |
| Benzenesulfonyl chloride | 98099 | | U020 | 100 |
| Benzene, 1,2,4,5-tetrachloro- | 95943 | | U207 | 5,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Benzenethiol | 108985 | | P014 | 100 |
| Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro- | 50293 | | U061 | 1 |
| Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy- | 72435 | | U247 | 1 |
| Benzene, (trichloromethyl)- | 98077 | | U023 | 10 |
| Benzene, 1,3,5-trinitro- | 99354 | | U234 | 10 |
| Benzidine | 92875 | | U021 | 1 |
| Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)- | 3615212 | 500/10,000 | | 1 |
| 1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide | 81072 | | U202 | 100 |
| Benzo[a]anthracene | 56553 | | U018 | 10 |
| Benzo[b]fluoranthene | 205992 | | | 1 |
| Benzo[k]fluoranthene | 207089 | | | 5,000 |
| Benzo[j,k]fluorene | 206440 | | U120 | 100 |
| 1,3-Benzodioxole, 5-(1-propenyl)- | 120581 | | U141 | 100 |
| 1,3-Benzodioxole, 5-(2-propenyl)- | 94597 | | U203 | 100 |
| 1,3-Benzodioxole, 5-propyl- | 94586 | | U090 | 10 |
| Benzoic acid | 65850 | | | 5,000 |
| Benzonitrile | 100470 | | | 5,000 |
| Benzo[rst]pentaphene | 189559 | | U064 | 10 |
| Benzo[ghi]perylene | 191242 | | | 5,000 |
| 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations >0.3% | 81812 | | P001 | 100 |
| Benzo[a]pyrene | 50328 | | U022 | 1 |
| 3,4-Benzopyrene | 50328 | | U022 | 1 |
| p-Benzoquinone | 106514 | | U197 | 10 |
| Benzotrichloride (C,R,T) | 98077 | 500 | U023 | 10 |
| Benzoyl chloride | 98884 | | | 1,000 |
| 1,2-Benzphenanthrene | 218019 | | U050 | 100 |
| Benzyl chloride | 100447 | 500 | P028 | 100 |
| Benzyl cyanide | 140294 | 500 | | 1 |
| Beryllium++ | 7440417 | | P015 | 10 |
| Beryllium chloride | 7787475 | | | 1 |
| Beryllium fluoride | 7787497 | | | 1 |
| Beryllium nitrate | 13597994 7787555 | | | 1 |
| alpha-BHC | 319846 | | | 10 |
| beta-BHC | 319857 | | | 1 |
| delta-BHC | 319868 | | | 1 |
| gamma-BHC | 58899 | | U129 | 1 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))- | 15271417 | 500/10,000 | | 1 |
| 2,2'-Bioxirane | 1464535 | | U085 | 10 |
| Biphenyl | 92524 | | | 100 |
| (1,1'-Biphenyl)-4,4'diamine | 92875 | | U021 | 1 |
| (1,1'-Biphenyl)-4,4'diamine, 3,3'dichloro- | 91941 | | U073 | 1 |
| (1,1'-Biphenyl)-4,4'diamine, 3,3'dimethoxy- | 119904 | | U091 | 10 |
| (1,1'-Biphenyl)-4,4'diamine, 3,3'dimethyl- | 119937 | | U095 | 10 |
| Bis(chloromethyl) ketone | 534076 | 10/10,000 | | 1 |
| Bis(2-chloroethyl)ether | 111444 | | U025 | 10 |
| Bis(2-chloroethoxy)methane | 111911 | | U024 | 1,000 |
| Bis(2-ethylhexyl)phthalate | 117817 | | U028 | 100 |
| Bitoscanate | 4044659 | 500/10,000 | | 1 |
| Boron trichloride | 10294345 | 500 | | 1 |
| Boron trifluoride | 7637072 | 500 | | 1 |
| Boron trifluoride compound with methyl ether (1:1) | 353424 | 1,000 | | 1 |
| Bromoacetone | 598312 | | P017 | 1,000 |
| Bromadiolone | 28772567 | 100/10,000 | | 1 |
| Bromine | 7726956 | 500 | | 1 |
| Bromoform | 75252 | | U225 | 100 |
| 4-Bromophenyl phenyl ether | 101553 | | U030 | 100 |
| Brucine | 357573 | | P018 | 100 |
| 1,3-Butadiene | 106990 | | | 10 |
| 1,3-Butadiene, 1,1,2,3,4,4-hexachloro- | 87683 | | U128 | 1 |
| 1-Butanamine, N-butyl-N-nitroso- | 924163 | | U172 | 10 |
| 1-Butanol | 71363 | | U031 | 5,000 |
| 2-Butanone | 78933 | | U159 | 5,000 |
| 2-Butanone peroxide (R,T) | 1338234 | | U160 | 10 |
| 2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamno)carbonyl] oxime | 39196184 | | P045 | 100 |
| 2-Butenal | 123739 4170303 | | U053 | 100 |
| 2-Butene, 1,4-dichloro-(I,T) | 764410 | | U074 | 1 |
| 2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1-oxobutoxy] methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]- | 303344 | | U143 | 10 |
| Butyl acetate | 123864 | | | 5,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| iso-Butyl acetate | 110190 | | | |
| sec-Butyl acetate | 105464 | | | |
| tert-Butyl acetate | 540885 | | | |
| n-Butyl alcohol (I) | 71363 | | U031 | 5,000 |
| Butylamine | 109739 | | | 1,000 |
| iso-Butylamine | 78819 | | | |
| sec-Butylamine | 513495 | | | |
| tert-Butylamine | 13952846 75649 | | | |
| Butyl benzyl phthalate | 85687 | | | 100 |
| n-Butyl phthalate | 84742 | | U069 | 10 |
| Butyric acid | 107926 | | | 5,000 |
| iso-Butyric acid | 79312 | | | |
| Cacodylic acid | 75605 | | U136 | 1 |
| Cadmium++ | 7440439 | | | 10 |
| Cadmium acetate | 543908 | | | 10 |
| Cadmium bromide | 7789426 | | | 10 |
| Cadmium chloride | 10108642 | | | 10 |
| Cadmium oxide | 1306190 | 100/10,000 | | 1 |
| Cadmium stearate | 2223930 | 1,000/10,000 | | 1 |
| Calcium arsenate | 7778441 | 500/10,000 | | 1 |
| Calcium arsenite | 52740166 | | | 1 |
| Calcium carbide | 75207 | | | 10 |
| Calcium chromate | 13765190 | | U032 | 10 |
| Calcium cyanamide | 156627 | | | 1,000 |
| Calcium cyanide $Ca(CN)_2$ | 592018 | | P021 | 10 |
| Calcium dodecylbenzenesulfonate | 26264062 | | | 1,000 |
| Calcium hypochlorite | 7778543 | | | 10 |
| Camphechlor | 8001352 | 500/10,000 | | 1 |
| Camphene, octachloro- | 8001352 | | P123 | 1 |
| Cantharidin | 56257 | 100/10,000 | | 1 |
| Carbachol chloride | 51832 | 500/10,000 | | 1 |
| Captan | 133062 | | | 10 |
| Carbamic acid, ethyl ester | 51796 | | U238 | 100 |
| Carbamic acid, methylnitroso-, ethyl ester | 615532 | | U178 | 1 |
| Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)- | 26419738 | 100/10,000 | | 1 |
| Carbamic chloride, dimethyl- | 79447 | | U097 | 1 |
| Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters | 111546 | | U114 | 5,000 |
| Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester | 2303164 | | U062 | 100 |

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(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Carbaryl | 63252 | | | 100 |
| Carbofuran | 1563662 | 10/10,000 | | 10 |
| Carbon disulfide | 75150 | 10,000 | P022 | 100 |
| Carbon oxyfluoride (R,T) | 353504 | | U033 | 1,000 |
| Carbon tetrachloride | 56235 | | U211 | 10 |
| Carbonic acid, dithallium salt | 6533739 | | U215 | 100 |
| Carbonic dichloride | 75445 | | P095 | 10 |
| Carbonic difluoride | 353504 | | U033 | 1,000 |
| Carbonochloridic acid, methyl ester | 79221 | | U156 | 1,000 |
| Carbonyl Sulfide | 463581 | | | 100 |
| Carbophenothion | 786196 | 500 | | 1 |
| Catechol | 120809 | | | 100 |
| Chloral | 75876 | | U034 | 5,000 |
| Chlorambem | 133904 | | | 100 |
| Chlorambucil | 305033 | | U035 | 10 |
| Chlordane | 57749 | 1,000 | U036 | 1 |
| Chlordane, alpha & gamma isomers | 57749 | | U036 | 1 |
| Chlordane, technical | 57749 | | U036 | 1 |
| Chlorfenvinfos | 470906 | 500 | | 1 |
| Chlorinated champhene (Campheclor) | 8001352 | | | 1 |
| Chlorine | 7782505 | 100 | | 10 |
| Chlormephos | 24934916 | 500 | | 1 |
| Chlormequat chloride | 999815 | 100/10,000 | | 1 |
| Chlornaphazine | 494031 | | U026 | 100 |
| Choroacetaldehyde | 107200 | | P023 | 1,000 |
| Chloroacetophenone | 532274 | | | 100 |
| Chloroacetic acid | 79118 | 100/10,000 | | 100 |
| p-Chloroaniline | 106478 | | P024 | 1,000 |
| Chlorobenzene | 108907 | | U037 | 100 |
| Chlorobenzilate | 510156 | | U038 | 10 |
| p-Chloro-m-cresol (4) | 59507 | | U039 | 5,000 |
| 1-Chloro-2,3-epoxypropane | 106898 | | U041 | 100 |
| Chlorodibromomethane | 124481 | | | 100 |
| Chloroethane | 75003 | | | 100 |
| Chloroethanol | 107073 | 500 | | 1 |
| Chloroethyl chlorofomate | 627112 | 1,000 | | 1 |
| 2-Chloroethyl vinyl ether | 110758 | | U042 | 1,000 |
| Chloroform | 67663 | 10,000 | U044 | 10 |
| Chloromethane | 74873 | | U045 | 100 |
| Chloromethyl ether | 542881 | 100 | P016 | 1 |
| Chloromethyl methyl ether | 107302 | 100 | U046 | 10 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| beta-Chloronaphthalene | 91587 | | U047 | 5,000 |
| 2-Chloronaphthalene | 91587 | | U047 | 5,000 |
| Chlorophacinone | 3691358 | 100/10,000 | | 1 |
| o-Chlorophenol (2) | 95578 | | U048 | 100 |
| 4-Chlorophenyl phenyl ether | 7005723 | | | 5,000 |
| 1-(o-Chlorophenyl)thiourea | 5344821 | | P026 | 100 |
| Chloroprene | 126998 | | | 100 |
| 3-Chloropropionitrile | 542767 | | P027 | 1,000 |
| Chlorosulfonic acid | 7790945 | | | 1,000 |
| 4-Chloro-o-toluidine, hydrochloride | 3165933 | | U049 | 100 |
| Chlorpyrifos | 2921882 | | | 1 |
| Chloroxuron | 1982474 | 500/10,000 | | 1 |
| Chlorthiophos | 21923239 | 500 | | 1 |
| Chromic acetate | 1066304 | | | 1,000 |
| Chromic acid | 11115745<br>7738945 | | | 10 |
| Chromic acid $H_2CrO_4$, calcium salt | 13765190 | | U032 | 10 |
| Chromic chloride (Chromium chloride) | 10025737 | 1/10,000 | | 1 |
| Chromic sulfate | 10101538 | | | 1,000 |
| Chromium++ | 7440473 | | | 5,000 |
| Chromous chloride | 10049055 | | | 1,000 |
| Chrysene | 218019 | | U050 | 100 |
| Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-, | 62207765 | 100/10,000 | | 1 |
| Cobaltous bromide | 7789437 | | | 1,000 |
| Cobalt carbonyl | 10210681 | 10/10,000 | | 1 |
| Cobaltous formate | 544183 | | | 1,000 |
| Cobaltous sulfamate | 14017415 | | | 1,000 |
| Coke Oven Emissions | NA | | | 1 |
| Colchicine | 64868 | 10/10,000 | | 1 |
| Copper++ | 7440508 | | | 5,000 |
| Copper cyanide | 544923 | | P029 | 10 |
| Coumaphos | 56724 | 100/10,000 | | 10 |
| Coumatetralyl | 5836293 | 500/10,000 | | 1 |
| Creosote | 8001589 | | U051 | 1 |
| Cresol(s) (Phenol, Methyl) | 1319773 | | U052 | 100 |
| m-Cresol | 108394 | 1,000/10,000 | | 100 |
| o-Cresol | 95487 | | | 100 |
| p-Cresol | 106445 | | | 100 |
| Cresylic acid | 1319773 | | U052 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| m-Cresylic acid | 108394 | | | 100 |
| o-Cresylic acid | 95487 | | | 100 |
| p-Cresylic acid | 106445 | | | 100 |
| Crimidine | 535897 | 100/10,000 | | 1 |
| Crotonaldehyde | 123739<br>4170303 | 1,000 1,000 | U053 | 100 100 |
| Cumene (I) | 98828 | | U055 | 5,000 |
| Cupric acetate | 142712 | | | 100 |
| Cupric acetoarsenite | 12002038 | | | 1 |
| Cupric chloride | 7447394 | | | 10 |
| Cupric nitrate | 3251238 | | | 100 |
| Cupric oxalate | 5893663 | | | 100 |
| Cupric sulfate | 7758987 | | | 10 |
| Cupric sulfate, ammoniated | 10380297 | | | 100 |
| Cupric tartrate | 815827 | | | 100 |
| Cyanides (soluble salts and complexes) not otherwise specified | 57125 | | P030 | 10 |
| Cyanogen | 460195 | | P031 | 100 |
| Cyanogen bromide | 506683 | 500/10,000 | U246 | 1,000 |
| Cyanogen chloride | 506774 | | P033 | 10 |
| Cyanogen iodide (Iodine cyanide) | 506785 | 1,000/10,000 | | 1 |
| Cyanophos | 2636262 | 1,000 | | 1 |
| Cyanuric fluoride | 675149 | 100 | | 1 |
| 2,5-Cyclohexadiene-1,4-dione | 106514 | | U197 | 10 |
| Cyclohexane (I) | 110827 | | U056 | 1,000 |
| Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)- | 58899 | | U129 | 1 |
| Cyclohexanone (I) | 108941 | | U057 | 5,000 |
| 2-Cyclohexanone | 131895 | | P034 | 100 |
| Cycloheximide | 66819 | 100/10,000 | | 1 |
| Cyclohexylamine | 108918 | 10,000 | | 1 |
| 1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro- | 77474 | | U130 | 10 |
| Cyclophosphamide | 50180 | | U058 | 10 |
| 2,4-D Acid | 94757 | | U240 | 100 |

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(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| 2,4-D Ester | 94111<br>94791<br>94804<br>1320189<br>1928387<br>1928616<br>1929733<br>2971382<br>25168267<br>53467111 | | | 100 |
| 2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid) | 94757 | | U240 | 100 |
| Daunomycin | 20830813 | | U059 | 10 |
| Decarborane(14) | 17702419 | 500/10,000 | | 1 |
| Demeton | 8065483 | 500 | | 1 |
| Demeton-S-Methyl | 919868 | 500 | | 1 |
| DDD, 4,4'DDD | 72548 | | U060 | 1 |
| DDE, 4,4'DDE | 72559 | | | 1 |
| DDT, 4,4'DDT | 50293 | | U061 | 1 |
| DEHP (Diethylhexyl phthalate) | 117817 | | U028 | 100 |
| Diallate | 2303164 | | U062 | 100 |
| Dialifor | 10311849 | 100/10,000 | | 1 |
| Diazinon | 333415 | | | 1 |
| Diazomethane | 334883 | | | 100 |
| Dibenz[a,h]anthracene | 53703 | | U063 | 1 |
| 1,2:5,6-Dibenzanthracene | 53703 | | U063 | 1 |
| Dibenzo[a,h]anthracene | 53703 | | U063 | 1 |
| Dibenzofuran | 132649 | | | 100 |
| Dibenz[a,i]pyrene | 189559 | | U064 | 10 |
| 1,2-Dibromo-3-chloropropane | 96128 | | U066 | 1 |
| Dibromoethane | 106934 | | U067 | 1 |
| Diborane | 19287457 | 100 | | 1 |
| Dibutyl phthalate | 84742 | | U069 | 10 |
| Di-n-butyl phthalate | 84742 | | U069 | 10 |
| Dicamba | 1918009 | | | 1,000 |
| Dichlobenil | 1194656 | | | 100 |
| Dichlone | 117806 | | | 1 |
| Dichlorobenzene | 25321226 | | | 100 |
| m-Dichlorobenzene (1,3) | 541731 | | U071 | 100 |
| o-Dichlorobenzene (1,2) | 95501 | | U070 | 100 |
| p-Dichlorobenzene (1,4) | 106467 | | U072 | 100 |
| 3,3'-Dichlorobenzidine | 91941 | | U073 | 1 |

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| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Dichlorobromomethane | 75274 | | | 5,000 |
| 1,4-Dichloro-2-butene (I,T) | 764410 | | U074 | 1 |
| Dichlorodifluoromethane | 75718 | | U075 | 5,000 |
| 1,1-Dichloroethane | 75343 | | U076 | 1,000 |
| 1,2-Dichloroethane | 107062 | | U077 | 100 |
| 1,1-Dichloroethylene | 75354 | | U078 | 100 |
| 1,2-Dichloroethylene | 156605 | | U079 | 1,000 |
| Dichloroethyl ether | 11444 | 10,000 | U025 | 10 |
| Dichloroisopropyl ether | 108601 | | U027 | 1,000 |
| Dichloromethoxy ethane | 111911 | | U024 | 1,000 |
| Dichloromethyl ether | 542881 | | P016 | 10 |
| Dichloromethylphenylsilane | 149746 | 1,000 | | 1 |
| 2,4-Dichlorophenol | 120832 | | U081 | 100 |
| 2,6-Dichlorophenol | 87650 | | U082 | 100 |
| Dichlorophenylarsine | 696286 | | P036 | 1 |
| Dichloropropane | 26638197 | | | 1,000 |
| 1,1-Dichloropropane | 78999 | | | |
| 1,3-Dichloropropane | 142289 | | | |
| 1,2-Dichloropropane | 78875 | | U083 | 1,000 |
| Dichloropropane--Dichloropropene (mixture) | 8003198 | | | 100 |
| Dichloropropene | 26952238 | | | 100 |
| 2,3-Dichloropropene | 78886 | | | |
| 1,3-Dichloropropene | 542756 | | U084 | 100 |
| 2,2-Dichloropropionic acid | 75990 | | | 5,000 |
| Dichlorvos | 62737 | 1,000 | | 10 |
| Dicofol | 115322 | | | 10 |
| Dicrotophos | 141662 | 100 | | 1 |
| Dieldrin | 60571 | | P037 | 1 |
| 1,2:3,4-Diepoxybutane (I,T) | 1464535 | 500 | U085 | 10 |
| Diethanolamine | 111422 | | | 100 |
| Diethyl chlorophosphate | 814493 | 500 | | 1 |
| Diethylamine | 109897 | | | 1,000 |
| Diethylarsine | 692422 | | P038 | 1 |
| Diethylcarbmazine citrate | 1642542 | 100/10,000 | | 1 |
| 1,4-Diethylenedioxide | 123911 | | U108 | 100 |
| Diethylhexyl phthalate | 117817 | | U028 | 100 |
| N,N-Diethylaniline | 91667 | | | 1,000 |
| N,N'-Diethylhydrazine | 1615801 | | U086 | 10 |
| O,O-Diethyl S-methyl dithiophosphate | 3288582 | | U087 | 5,000 |
| Diethyl-p-nitrophenyl phosphate | 311455 | | P041 | 100 |
| Diethyl phthalate | 84662 | | U088 | 1,000 |

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| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| O,O-Diethyl O-pyrazinyl phosphorothioate | 297972 | | P040 | 100 |
| Diethylstilbestrol | 56531 | | U089 | 1 |
| Diethyl sulfate | 64675 | | | 10 |
| Digitoxin | 71636 | 100/10,000 | | 1 |
| Diglycidyl ether | 2238075 | 1,000 | | 1 |
| Digoxin | 20830755 | 10/10,000 | | 1 |
| Dihydrosafrole | 94586 | | U090 | 10 |
| Diisopropyfluorophosphate | 55914 | | P043 | 100 |
| Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a-beta)- | 309002 | | P004 | 1 |
| 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)- | 465736 | | P060 | 1 |
| 2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)- | 60571 | | P037 | 1 |
| 2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1a-alpha, 2-beta, 2a-beta, 3-alpha, 6-alpha, 6a-beta, 7-beta, 7a-alpha)- | 72208 | | P051 | 1 |
| Dimethoate | 60515 | | P044 | 10 |
| 3,3'-Dimethoxybenzidine | 119904 | | U091 | 10 |
| Dimefox | 115264 | 500 | | 1 |
| Dimethoate | 60515 | 500/10,000 | | 10 |
| Dimethyl Phosphorochloridothioate | 2524030 | 500 | | 1 |
| Dimethyl sulfate | 77781 | 500 | | 100 |
| Dimethylamine (I) | 124403 | | U092 | 1,000 |
| p-Dimethylaminoazobenzene | 60117 | | U093 | 10 |
| 7,12-Dimethylbenz[a]anthracene | 57976 | | U094 | 1 |
| 3,3'-Dimethylbenzidine | 119937 | | U095 | 10 |
| alpha,alpha-Dimethylbenzylhydroperoxide(R) | 80159 | | U096 | 10 |
| Dimethylcarbamoyl chloride | 79447 | | U097 | 1 |
| Dimethylformamide | 68122 | | | 100 |
| Dimethyldichlorosilane | 75785 | 500 | | 1 |
| 1,1-Dimethylhydrazine | 57147 | 1,000 | U098 | 10 |
| 1,2-Dimethylhydrazine | 540738 | | U099 | 1 |
| alpha, alpha-Dimethylphenethylamine | 122098 | | P046 | 5,000 |

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| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Dimethyl-p-phenylenediamine | 99989 | 10/10,000 | | 1 |
| 2,4-Dimethylphenol | 105679 | | U101 | 100 |
| Dimethyl phthalate | 131113 | | U102 | 5,000 |
| Dimethyl sulfate | 77781 | | U103 | 100 |
| Dimetilan | 644644 | 500/10,000 | | 1 |
| Dinitrobenzene (mixed) | 25154545 | | | 100 |
| m-Dinitrobenzene | 99650 | | | |
| o-Dinitrobenzene | 528290 | | | |
| p-Dinitrobenzene | 100254 | | | |
| 4,6-Dinitro-o-cresol and salts | 534521 | 10/10,000 | P047 | 10 |
| Dinitrophenol | 25550587 | | | 10 |
| 2,5-Dinitrophenol | 329715 | | | |
| 2,6-Dinitrophenol | 573568 | | | |
| 2,4-Dinitrophenol | 51285 | | P048 | 10 |
| Dinitrotoluene | 25321146 | | | 10 |
| 3,4-Dinitrotoluene | 610399 | | | |
| 2,4-Dinitrotoluene | 121142 | | U105 | 10 |
| 2,6-Dinitrotoluene | 606202 | | U106 | 100 |
| Dinoseb | 88857 | 100/10,000 | P020 | 1,000 |
| Dinoterb | 1420071 | 500/10,000 | | 1 |
| Di-n-octyl phthalate | 117840 | | U107 | 5,000 |
| 1,4-Dioxane | 123911 | | U108 | 100 |
| Dioxathion | 78342 | 500 | | 1 |
| Diphacinone | 82666 | 10/10,000 | | 1 |
| 1,2-Diphenylhydrazine | 122667 | | U109 | 10 |
| Diphosphoramide, octamethyl- | 152169 | 100 | P085 | 100 |
| Diphosphoric acid, tetraethyl ester | 107493 | | P111 | 10 |
| Dipropylamine | 142847 | | U110 | 5,000 |
| Di-n-propylnitrosamine | 621647 | | U111 | 10 |
| Diquat | 85007<br>2764729 | | | 1,000 |
| Disulfoton | 298044 | 500 | P039 | 1 |
| Dithiazanine iodide | 514738 | 500/10,000 | | 1 |
| Dithiobiuret | 541537 | 100/10,000 | P049 | 100 |
| Diuron | 330541 | | | 100 |
| Dodecylbenzenesulfonic acid | 27176870 | | | 1,000 |
| Emetine, Dihydrochloride | 316427 | 1/10,000 | | 1 |
| Endosulfan | 115297 | 10/10,000 | P050 | 1 |
| alpha-Endosulfan | 959988 | | | 1 |
| beta-Endosulfan | 33213659 | | | 1 |
| Endosulfant sulfate | 1031078 | | | 1 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Endothall | 145733 | | P088 | 1,000 |
| Endothion | 2778043 | 500/10,000 | | 1 |
| Endrin | 72208 | 500/10,000 | P051 | 1 |
| Endrin aldehyde | 7421934 | | | 1 |
| Endrin & metabolites | 72208 | | P051 | 1 |
| Epichlorohydrin | 106898 | 1,000 | U041 | 100 |
| Epinephrine | 51434 | | P042 | 1,000 |
| EPN | 2104645 | 100/10,000 | | 1 |
| 1,2-Epoxybutane | 106887 | | | 100 |
| Ergocalciferol | 50146 | 1,000/10,000 | | 1 |
| Ergotamine tartrate | 379793 | 500/10,000 | | 1 |
| Ethanal | 75070 | | U001 | 1,000 |
| Ethanamine, N-ethyl-N-nitroso- | 55185 | | U174 | 1 |
| 1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)- | 91805 | | U155 | 5,000 |
| Ethane, 1,2-dibromo- | 106934 | | U067 | 1 |
| Ethane, 1,1-dichloro- | 75343 | | U076 | 1,000 |
| Ethane, 1,2-dichloro- | 107062 | | U077 | 100 |
| Ethanedinitrile | 460195 | | P031 | 100 |
| Ethane, hexachloro- | 67721 | | U131 | 100 |
| Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro- | 111911 | | U024 | 1,000 |
| Ethane, 1,1'-oxybis- | 60297 | | U117 | 100 |
| Ethane, 1,1'-oxybis(2-chloro- | 111444 | | U025 | 10 |
| Ethane, pentachloro- | 76017 | | U184 | 10 |
| Ethanesulfonyl chloride, 2-chloro | 1622328 | 500 | | 1 |
| Ethane, 1,1,1,2-tetrachloro- | 630206 | | U208 | 100 |
| Ethane, 1,1,2,2-tetrachloro- | 79345 | | U209 | 100 |
| Ethanethioamide | 62555 | | U218 | 10 |
| Ethane, 1,1,1-trichloro- | 71556 | | U226 | 1,000 |
| Ethane, 1,1,2-trichloro- | 79005 | | U227 | 100 |
| Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester | 16752775 | | P066 | 100 |
| Ethanol, 1,2-Dichloro-, acetate | 10140871 | 1,000 | | 1 |
| Ethanol, 2-ethoxy- | 110805 | | U359 | 1,000 |
| Ethanol, 2,2'-(nitrosoimino)bis- | 1116547 | | U173 | 1 |
| Ethanone, 1-phenyl- | 98862 | | U004 | 5,000 |
| Ethene, chloro- | 75014 | | U043 | 1 |
| Ethene, 2-chloroethoxy- | 110758 | | U042 | 1,000 |
| Ethene, 1,1-dichloro- | 75354 | | U078 | 100 |
| Ethene, 1,2-dichloro- (E) | 156605 | | U079 | 1,000 |
| Ethene, tetrachloro- | 127184 | | U210 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Ethene, trichloro- | 79016 | | U228 | 100 |
| Ethion | 563122 | 1,000 | | 10 |
| Ethoprophos | 13194484 | 1,000 | | 1 |
| Ethyl acetate (I) | 141786 | | U112 | 5,000 |
| Ethyl acrylate (I) | 140885 | | U113 | 1,000 |
| Ethylbenzene | 100414 | | | 1,000 |
| Ethylbis(2-Chloroethyl)amine | 538078 | 500 | | 1 |
| Ethyl carbamate (urethane) | 51796 | | U238 | 100 |
| Ethyl chloride | 75003 | | | 100 |
| Ethyl cyanide | 107120 | | P101 | 10 |
| Ethylenebisdithiocarbamic acid, salts & esters | 111546 | | U114 | 5,000 |
| Ethylenediamine | 107153 | | | 5,000 |
| Ethylenediamine-tetraacetic acid (EDTA) | 60004 | | | 5,000 |
| Ethylene dibromide | 106934 | | U067 | 1 |
| Ethylene dichloride | 107062 | | U077 | 100 |
| Ethylene fluorohydrin | 371620 | 10 | | 1 |
| Ethylene glycol | 107211 | | | 5,000 |
| Ethylene glycol monoethyl ether | 110805 | | U359 | 1,000 |
| Ethylene oxide (I,T) | 75218 | 1,000 | U115 | 10 |
| Ethylenediamine | 107153 | 10,000 | | 5,000 |
| Ethylenethiourea | 96457 | | U116 | 10 |
| Ethyleneimine | 151564 | 500 | P054 | 1 |
| Ethyl ether (I) | 60297 | | U117 | 100 |
| Ethylthiocyanate | 542905 | 10,000 | | 1 |
| Ethylidene dichloride | 75343 | | U076 | 1,000 |
| Ethyl methacrylate | 97632 | | U118 | 1,000 |
| Ethyl methanesulfonate | 62500 | | U119 | 1 |
| Famphur | 52857 | | P097 | 1,000 |
| Fenamlphos | 22224926 | 10/10,000 | | 1 |
| Fenltrothion | 122145 | 500 | | 1 |
| Fensulfothion | 115902 | 500 | | 1 |
| Ferric ammonium citrate | 1185575 | | | 1,000 |
| Ferric ammonium oxalate | 2944674<br>55488874 | | | 1,000 |
| Ferric chloride | 7705080 | | | 1,000 |
| Ferric fluoride | 7783508 | | | 100 |
| Ferric nitrate | 10421484 | | | 1,000 |
| Ferric sulfate | 10028225 | | | 1,000 |
| Ferrous ammonium sulfate | 10045893 | | | 1,000 |
| Ferrous chloride | 7758943 | | | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Ferrous sulfate | 7720787<br>7782630 | | | 1,000 |
| Fluenetil | 4301502 | 100/10,000 | | 1 |
| Fluoranthene | 206440 | | U120 | 100 |
| Fluorene | 86737 | | | 5,000 |
| Fluorine | 7782414 | 500 | P056 | 10 |
| Fluoroacetamide | 640197 | 100/10,000 | P057 | 100 |
| Fluoracetic acid | 144490 | 10/10,000 | | 1 |
| Fluoroacetic acid, sodium salt | 62786 | | P058 | 10 |
| Fluoroacetyl chloride | 359068 | 10 | | 1 |
| Fluorouracil | 51218 | 500/10,000 | | 1 |
| Fonofos | 944229 | 500 | | 1 |
| Formaldehyde | 50000 | 500 | U122 | 100 |
| Formaldehyde cyanohydrin | 107164 | 1,000 | | 1 |
| Formetanate hydrochloride | 23422539 | 500/10,000 | | 1 |
| Formothion | 2540821 | 100 | | 1 |
| Formparanate | 17702577 | 100/10,000 | | 1 |
| Formic acid (C,T) | 64186 | | U123 | 5,000 |
| Fosthletan | 21548323 | 500 | | 1 |
| Fubendazole | 3878191 | 100/10,000 | | 1 |
| Fulminic acid, mercury(2-) salt (R,T) | 628864 | | P065 | 10 |
| Fumaric acid | 110178 | | | 5,000 |
| Furan (I) | 110009 | 500 | U124 | 100 |
| Furan, tetrahydro-(I) | 109999 | | U213 | 1,000 |
| 2-Furancarboxaldehyde (I) | 98011 | | U125 | 5,000 |
| 2,5-Furandione | 108316 | | U147 | 5,000 |
| Furfural (I) | 98011 | | U125 | 5,000 |
| Furfuran (I) | 110009 | | U124 | 100 |
| Gallium trichloride | 13450903 | 500/10,000 | | 1 |
| Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)- | 18883664 | | U206 | 1 |
| D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]- | 18883664 | | U206 | 1 |
| Glycidylaldehyde | 765344 | | U126 | 10 |
| Glycol ethers [4] | | | | |
| Guanidine, N-methyl-N'-nitro-N-nitroso- | 70257 | | U163 | 10 |
| Guthion | 86500 | | | 1 |
| Heptachlor | 76448 | | P059 | 1 |
| Heptachlor epoxide | 1024573 | | | 1 |
| Hexachlorobenzene | 118741 | | U127 | 10 |
| Hexachlorobutadiene | 87683 | | U128 | 1 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Hexachlorocyclohexane (gamma isomer) | 58899 | | U129 | 1 |
| Hexachlorocyclopentadiene | 77474 | 100 | U130 | 10 |
| Hexachloroethane | 67721 | | U131 | 100 |
| Hexachlorophene | 70304 | | U132 | 100 |
| Hexachloropropene | 1888717 | | U243 | 1,000 |
| Hexaethyl tetraphosphate | 757584 | | P062 | 100 |
| Hexamethylene-1, 6-diisocyanate | 822060 | | | 100 |
| Hexamethylphosphoramide | 680319 | | | 1 |
| Hexamethylenediamine, N,N'-Dibutyl | 4835114 | 500 | | 1 |
| Hexane | 110543 | | | 5,000 |
| Hexone (Methyl isobutyl ketone) | 108101 | | U161 | 5,000 |
| Hydrazine (R,T) | 302012 | 1,000 | U133 | 1 |
| Hydrazine, 1,2-diethyl- | 1615801 | | U086 | 10 |
| Hydrazine, 1,1-dimethyl- | 57147 | | U098 | 10 |
| Hydrazine, 1,2-dimethyl- | 540738 | | U099 | 1 |
| Hydrazine, 1,2-diphenyl- | 122667 | | U109 | 10 |
| Hydrazine, methyl- | 60344 | | P068 | 10 |
| Hydrazinecarbothioamide | 79196 | | P116 | 100 |
| Hydrochloric acid | 7647010 | | | 5,000 |
| Hydrocyanic acid | 74908 | 100 | P063 | 10 |
| Hydrofluoric acid | 7664393 | | U134 | 100 |
| Hydrogen chloride (gas only) | 7647010 | 500 | | 5,000 |
| Hydrogen cyanide | 74908 | | P063 | 10 |
| Hydrogen fluoride | 7664393 | 100 | U134 | 100 |
| Hydrogen peroxide (Conc. >52%) | 7722841 | 1,000 | | 1 |
| Hydrogen phosphide | 7803512 | | P096 | 100 |
| Hydrogen selenide | 7783075 | 10 | | 1 |
| Hydrogen sulfide | 7783064 | 500 | U135 | 100 |
| Hydroperoxide, 1-methyl-1-phenylethyl- | 80159 | | U096 | 10 |
| Hydroquinone | 123319 | 500/10,000 | | 100 |
| 2-Imidazolidinethione | 96457 | | U116 | 10 |
| Indeno(1,2,3-cd)pyrene | 193395 | | U137 | 100 |
| Iodomethane | 74884 | | U138 | 100 |
| Iron, Pentacarbonyl- | 13463406 | 100 | | 1 |
| Isobenzan | 297789 | 100/10,000 | | 1 |
| 1,3-Isobenzofurandione | 85449 | | U190 | 5,000 |
| Isobutyronitrile | 78820 | 1,000 | | 1 |
| Isobutyl alcohol (I,T) | 78831 | | U140 | 5,000 |
| Isocyanic acid, 3,4-Dichlorophenyl ester | 102363 | 500/10,000 | | 1 |
| Isodrin | 465736 | 100/10,000 | P060 | 1 |
| Isofluorphate | 55914 | 100 | | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Isophorone | 78591 | | | 5,000 |
| Isophorone Diisocyanate | 4098719 | 500 | | 1 |
| Isoprene | 78795 | | | 100 |
| Isopropanolamine dodecylbenzene sulfonate | 42504461 | | | 1,000 |
| Isopropyl chloroformate | 108236 | 1,000 | | 1 |
| Isopropylmethylpryrazolyl dimethylcarbamate | 119380 | 500 | | 1 |
| Isosafrole | 120581 | | U141 | 100 |
| 3(2H)-Isoxazolone, 5-(aminomethyl)- | 2763964 | | P007 | 1,000 |
| Kepone | 143500 | | U142 | 1 |
| Lactonitrile | 78977 | 1,000 | | 1 |
| Lasiocarpine | 303344 | | U143 | 10 |
| Lead acetate | 301042 | | U144 | |
| Lead arsenate | 7784409<br>7645252<br>10102484 | | | 1 |
| Lead, bis(acetato-O)tetrahydroxytri | 1335326 | | U146 | 10 |
| Lead chloride | 7758954 | | | 10 |
| Lead fluoborate | 13814965 | | | 10 |
| Lead fluoride | 7783462 | | | 10 |
| Lead iodide | 10101630 | | | 10 |
| Lead nitrate | 10099748 | | | 10 |
| Lead phosphate | 7446277 | | U145 | 10 |
| Lead stearate | 7428480<br>1072351<br>52652592<br>56189094 | | | 10 |
| Lead subacetate | 1335326 | | U146 | 10 |
| Lead sulfate | 15739807<br>7446142 | | | 10 |
| Lead sulfide | 1314870 | | | 10 |
| Lead thiocyanate | 592870 | | | 10 |
| Leptophos | 21609905 | 500/10,000 | | 1 |
| Lewisite | 541253 | 10 | | 1 |
| Lindane | 58899 | 1,000/10,000 | U129 | 1 |
| Lithium chromate | 14307358 | | | 10 |
| Lithium hydride | 7580678 | 100 | | 1 |
| Malathion | 121755 | | | 100 |
| Maleic acid | 110167 | | | 5,000 |
| Maleic anhydride | 108316 | | U147 | 5,000 |
| Maleic hydrazide | 123331 | | U148 | 5,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Malononitrile | 109773 | 500/10,000 | U149 | 1,000 |
| Manganese, tricarbonyl methylcyclopentadienyl | 12108133 | 100 | | 1 |
| MDI (Methylene diphenyl diisocyanate) | 101688 | | | 5,000 |
| Mechlorethamine | 51752 | 10 | | 1 |
| MEK (Methyl ethyl ketone) | 78933 | | U159 | 5,000 |
| Melphalan | 148823 | | U150 | 1 |
| Mephosfolan | 950107 | 500 | | 1 |
| Mercaptodimethur | 2032657 | | | 10 |
| Mercuric acetate | 1600277 | 500/10,000 | | 1 |
| Mercuric chloride | 7487947 | 500/10,000 | | 1 |
| Mercuric cyanide | 592041 | | | 1 |
| Mercuric nitrate | 10045940 | | | 10 |
| Mercuric oxide | 21908532 | 500/10,000 | | 1 |
| Mercuric sulfate | 7783359 | | | 10 |
| Mercuric thiocyanate | 592858 | | | 10 |
| Mercurous nitrate | 10415755 7782867 | | | 10 |
| Mercury | 7439976 | | U151 | 1 |
| Mercury (acetate-O)phenyl- | 62384 | | P092 | 100 |
| Mercury fulminate | 628864 | | P065 | 10 |
| Methacrolein diacetate | 10476956 | 1,000 | | 1 |
| Methacrylic anhydride | 760930 | 500 | | 1 |
| Methacrylonitrile (I,T) | 126987 | 500 | U152 | 1,000 |
| Methacryloyl chloride | 920467 | 100 | | 1 |
| Methacryloyloxyethyl isocyanate | 30674807 | 100 | | 1 |
| Methamidophos | 10265926 | 100/10,000 | | 1 |
| Methanamine, N-methyl- | 124403 | | U092 | 1,000 |
| Methanamine, N-methyl-N-nitroso- | 62759 | | P082 | 10 |
| Methane, bromo- | 74839 | | U029 | 1,000 |
| Methane, chloro- (I,T) | 74873 | | U045 | 100 |
| Methane, chloromethoxy- | 107302 | | U046 | 10 |
| Methane, dibromo- | 74953 | | U068 | 1,000 |
| Methane, dichloro- | 75092 | | U080 | 1,000 |
| Methane, dichlorodifluoro- | 75718 | | U075 | 5,000 |
| Methane, iodo- | 74884 | | U138 | 100 |
| Methane, isocyanato- | 624839 | | P064 | 10 |
| Methane, oxybis(chloro- | 542881 | | P016 | 10 |
| Methanesulfenyl chloride, trichloro- | 594423 | | P118 | 100 |
| Methanesulfonyl fluoride | 558258 | 1,000 | | 1 |
| Methanesulfonic acid, ethyl ester | 62500 | | U119 | 1 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Methane, tetrachloro- | 56235 | | U211 | 10 |
| Methane, tetranitro- (R) | 509148 | | P112 | 10 |
| Methane, tribromo- | 75252 | | U225 | 100 |
| Methane, trichloro- | 67663 | | U044 | 10 |
| Methane, trichlorofluoro- | 75694 | | U121 | 5,000 |
| Methanethiol (I,T) | 74931 | | U153 | 100 |
| 6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide | 115297 | | P050 | 1 |
| 1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one,1,1a,3,3a,4,5,5a,5b,6-decachloroctahydro- | 143500 | | U142 | 1 |
| 4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro- | 76448 | | P059 | 1 |
| 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro- | 57749 | | U036 | 1 |
| Methanol (I) | 67561 | | U154 | 5,000 |
| Methapyrilene | 91805 | | U155 | 5,000 |
| Methidathion | 950378 | 500/10,000 | | 1 |
| Methiocarb | 2032657 | 500/10,000 | P199 | 10 |
| Methomyl | 16752775 | 500/10,000 | P066 | 100 |
| Methoxychlor | 72435 | | U247 | 1 |
| Methoxyethylmercuric acetate | 151382 | 500/10,000 | | 1 |
| Methyl alcohol (I) | 67561 | | U154 | 5,000 |
| Methyl aziridine | 75558 | | P067 | 1 |
| Methyl bromide | 74839 | 1,000 | U029 | 1,000 |
| 1-Methylbutadiene (I) | 504609 | | U186 | 100 |
| Methyl chloride (I,T) | 74873 | | U045 | 100 |
| Methyl 2-chloroacrylate | 80637 | 500 | | 1 |
| Methyl chlorocarbonate (I,T) | 79221 | | U156 | 1,000 |
| Methyl chloroform | 71556 | | U226 | 1,000 |
| Methyl chloroformate | 79221 | 500 | U156 | 1,000 |
| 3-Methylcholanthrene | 56495 | | U157 | 10 |
| 4,4'-Methylenebis(2-chloroaniline) | 101144 | | U158 | 10 |
| Methylene bromide | 74953 | | U068 | 1,000 |
| Methylene chloride | 75092 | | U080 | 1,000 |
| 4,4’-Methylenedianiline | 101779 | | | 10 |
| Methylene diphenyl diisocyanate (MDI) | 101688 | | | 5,000 |
| Methyl ethyl ketone (MEK) (I,T) | 78933 | | U159 | 5,000 |
| Methyl ethyl ketone peroxide (R,T) | 1338234 | | U160 | 10 |
| Methyl hydrazine | 60344 | 500 | P068 | 10 |
| Methyl iodide | 74884 | | U138 | 100 |
| Methyl isobutyl ketone | 108101 | | U161 | 5,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Methyl isocyanate | 624839 | 500 | P064 | 10 |
| Methyl isothiocyanate | 556616 | 500 | | 1 |
| 2-Methyllactonitrile | 75865 | | P069 | 10 |
| Methyl mercaptan | 74931 | 500 | U153 | 100 |
| Methyl methacrylate (I,T) | 80626 | | U162 | 1,000 |
| Methyl parathion | 298000 | | P071 | 100 |
| Methyl phenkapton | 3735237 | 500 | | 1 |
| Methyl phosphonic dichloride | 676971 | 100 | | 1 |
| 4-Methyl-2-pentanone (I) | 108101 | | U161 | 5,000 |
| Methyl tert-butyl ether | 1634044 | | | 1,000 |
| Methyl thiocyanate | 556649 | 10,000 | | 1 |
| Methylthiouracil | 56042 | | U164 | 10 |
| Methyl vinyl ketone | 78944 | 10 | | 1 |
| Methylmercuric dicyanamide | 502396 | 500/10,000 | | 1 |
| Methyltrichlorosilane | 75796 | 500 | | 1 |
| Metolcarb | 1129415 | 100/10,000 | | 1 |
| Mevinphos | 7786347 | 500 | | 10 |
| Mexacarbate | 315184 | 500/10,000 | | 1,000 |
| Mitomycin C | 50077 | 500/10,000 | U010 | 10 |
| MNNG | 70257 | | U163 | 10 |
| Monocrotophos | 6923224 | 10/10,000 | | 1 |
| Monoethylamine | 75047 | | | 100 |
| Monomethylamine | 74895 | | | 100 |
| Muscimol | 2763964 | 500/10,000 | P007 | 1,000 |
| Mustard gas | 505602 | 500 | | 1 |
| Naled | 300765 | | | 10 |
| 5,12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)- | 20830813 | | U059 | 10 |
| 1-Naphthalenamine | 134327 | | U167 | 100 |
| 2-Naphthalenamine (beta-Naphthylamine) | 91598 | | U168 | 1 |
| Naphthalenamine, N,N'-bis(2-chloroethyl)- | 494031 | | U026 | 100 |
| Naphthalene | 91203 | | U165 | 100 |
| Naphthalene, 2-chloro- | 91587 | | U047 | 5,000 |
| 1,4-Naphthalenedione | 130154 | | U166 | 5,000 |
| 2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-tetrasodium salt | 72571 | | U236 | 10 |
| Naphthenic acid | 1338245 | | | 100 |
| 1,4-Naphthoquinone | 130154 | | U166 | 5,000 |
| alpha-Naphthylamine | 134327 | | U167 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| beta-Naphthylamine (2-Naphthalenamine) | 91598 | | U168 | 1 |
| alpha-Naphthylthiourea | 86884 | | P072 | 100 |
| Nickel++ | 7440020 | | | 100 |
| Nickel ammonium sulfate | 15699180 | | | 100 |
| Nickel carbonyl | 13463393 | 1 | P073 | 10 |
| Nickel carbonyl $Ni(CO)_4$, (T-4)- | 13463393 | | P073 | 10 |
| Nickel chloride | 7718549<br>37211055 | | | 100 |
| Nickel cyanide | 557197 | | P074 | 10 |
| Nickel hydroxide | 12054487 | | | 10 |
| Nickel nitrate | 14216752 | | | 100 |
| Nickel sulfate | 7786814 | | | 100 |
| Nicotine & salts | 54115 | 100 | P075 | 100 |
| Nicotine sulfate | 65305 | 100/10,000 | | 1 |
| Nitric acid | 7697372 | 1,000 | | 1,000 |
| Nitric acid, thallium salt | 10102451 | | U217 | 100 |
| Nitric oxide | 10102439 | 100 | P076 | 10 |
| p-Nitroaniline | 100016 | | P077 | 5,000 |
| Nitrobenzene (I,T) | 98953 | 10,000 | U169 | 1,000 |
| 4-Nitrobiphenyl | 92933 | | | 10 |
| Nitrocyclohexane | 1122607 | 500 | | 1 |
| Nitrogen dioxide | 10102440<br>10544726 | 100 | P078 | 10 |
| Nitrogen oxide | 10102439 | | P076 | 10 |
| Nitroglycerine | 55630 | | P081 | 10 |
| Nitrophenol (mixed) | 25154556 | | | 100 |
| m-Nitrophenol | 554847 | | | 100 |
| o-Nitrophenol (2) | 88755 | | | 100 |
| p-Nitrophenol (4) | 100027 | | U170 | 100 |
| 2-Nitropropane (I,T) | 79469 | | U171 | 10 |
| N-Nitrosodi-n-butylamine | 924163 | | U172 | 10 |
| N-Nitrosodiethanolamine | 1116547 | | U173 | 1 |
| N-Nitrosodiethylamine | 55185 | | U174 | 1 |
| N-Nitrosodimethylamine | 62759 | 1,000 | P082 | 10 |
| N-Nitrosodiphenylamine | 86306 | | | 100 |
| N-Nitroso-N-ethylurea | 759739 | | U176 | 1 |
| N-Nitroso-N-methylurea | 684935 | | U177 | 1 |
| N-Nitroso-N-methylurethane | 615532 | | U178 | 1 |
| N-Nitrosomethylvinylamine | 4549400 | | P084 | 10 |
| N-Nitrosomorpholine | 59892 | | | 1 |
| N-Nitrosopiperidine | 100754 | | U179 | 10 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| N-Nitrosopyrrolidine | 930552 | | U180 | 1 |
| Nitrotoluene | 1321126 | | | 1,000 |
| m-Nitrotoluene | 99081 | | | |
| o-Nitrotoluene | 88722 | | | |
| p-Nitrotoluene | 99990 | | | |
| 5-Nitro-o-toluidine | 99558 | | U181 | 100 |
| Norbromide | 991424 | 100/10,000 | | 1 |
| Octamethylpyrophosphoramide | 152169 | | P085 | 100 |
| Organorhodium complex (PMN-82-147) | 0 | 10/10,000 | | 1 |
| Osmium tetroxide | 20816120 | | P087 | 1,000 |
| Ouabain | 630604 | 100/10,000 | | 1 |
| 7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid | 145733 | | P088 | 1,000 |
| Oxamyl | 23135220 | 100/10,000 | P194 | 1 |
| 1,2-Oxathiolane, 2,2-dioxide | 1120714 | | U193 | 10 |
| 2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide | 50180 | | U058 | 10 |
| Oxetane, 3,3-bis(chloromethyl)- | 78717 | 500 | | 1 |
| Oxirane (I,T) | 75218 | | U115 | 10 |
| Oxiranecarboxyaldehyde | 765344 | | U126 | 10 |
| Oxirane, (chloromethyl)- | 106898 | | U041 | 100 |
| Oxydisulfoton | 2497076 | 500 | | 1 |
| Ozone | 10028156 | 100 | | 1 |
| Paraformaldehyde | 30525894 | | | 1,000 |
| Paraldehyde | 123637 | | U182 | 1,000 |
| Paraquat | 1910425 | 10/10,000 | | 1 |
| Paraquat methosulfate | 2074502 | 10/10,000 | | 1 |
| Parathion | 56382 | 100 | P089 | 10 |
| Parathion-methyl | 298000 | 100/10,000 | | 100 |
| Paris green | 12002038 | 500/10,000 | | 100 |
| PCBs | 1336363 | | | |
| Aroclor 1016 | 12674112 | | | 1 |
| Aroclor 1221 | 11104282 | | | 1 |
| Aroclor 1232 | 11141165 | | | 1 |
| Aroclor 1242 | 53469219 | | | 1 |
| Aroclor 1248 | 12672296 | | | 1 |
| Aroclor 1254 | 11097691 | | | 1 |
| Aroclor 1260 | 11096825 | | | 1 |
| PCNB (Pentachloronitrobenzene) | 82688 | | U185 | 100 |
| Pentaborane | 19624227 | 500 | | 1 |
| Pentachlorobenzene | 608935 | | U183 | 10 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Pentachloroethane | 76017 | | U184 | 10 |
| Pentachlorophenol | 87865 | | U242 | 10 |
| Pentachloronitrobenzene (PCNB) | 82688 | | U185 | 100 |
| Pentadecylamine | 2570265 | 100/10,000 | | 1 |
| Paracetic acid | 79210 | 500 | | 1 |
| 1,3-Pentadiene (I) | 504609 | | U186 | 100 |
| Perachloroethylene | 127184 | | U210 | 100 |
| Perchloromethylmercaptan | 594423 | 500 | | 100 |
| Phenacetin | 62442 | | U187 | 100 |
| Phenanthrene | 85018 | | | 5,000 |
| Phenol | 108952 | 500/10,000 | U188 | 1,000 |
| Phenol, 2-chloro- | 95578 | | U048 | 100 |
| Phenol, 4-chloro-3-methyl- | 59507 | | U039 | 5,000 |
| Phenol, 2-cyclohexyl-4,6-dinitro- | 131895 | | P034 | 100 |
| Phenol, 2,4-dichloro- | 120832 | | U081 | 100 |
| Phenol, 2,6-dichloro- | 87650 | | U082 | 100 |
| Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E) | 56531 | | U089 | 1 |
| Phenol, 2,4-dimethyl- | 105679 | | U101 | 100 |
| Phenol, 2,4-dinitro- | 51285 | | P048 | 10 |
| Phenol, methyl- | 1319773 | | U052 | 1,000 |
| m-Cresol | 108394 | | | |
| o-Cresol | 95487 | | | |
| p-Cresol | 106445 | | | |
| Phenol, 2-methyl-4,6-dinitro-and salts | 534521 | | P047 | 10 |
| Phenol, 2,2'-methylenebis[3,4,6-trichloro- | 70304 | | U132 | 100 |
| Phenol, 2,2'-thiobis(4-chloro-6-methyl)- | 4418660 | 100/10,000 | | 1 |
| Phenol, 2-(1-methylpropyl)-4,6-dinitro | 88857 | | P020 | 1,000 |
| Phenol, 3-(1-methylethyl)-, methylcarbamate | 64006 | 500/10,000 | | 1 |
| Phenol, 4-nitro- | 100027 | | U170 | 100 |
| Phenol, pentachloro- | 87865 | | U242 | 10 |
| Phenol, 2,3,4,6-tetrachloro- | 58902 | | U212 | 10 |
| Phenol, 2,4,5-trichloro- | 95954 | | U230 | 10 |
| Phenol, 2,4,6-trichloro- | 88062 | | U231 | 10 |
| Phenol, 2,4,6-trinitro-, ammonium salt | 131748 | | P009 | 10 |
| Phenoxarsine, 10,10'-oxydi- | 58366 | 500/10,000 | | 1 |
| L-Phenylalanine, 4-[bis(2-chloroethyl)aminol] | 148823 | | U150 | 1 |
| Phenyl dichloroarsine | 696286 | 500 | | 1 |
| 1,10-(1,2-Phenylene)pyrene | 193395 | | U137 | 100 |
| p-Phenylenediamine | 106503 | | | 5,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Phenylhydrazine hydrochloride | 59881 | 1,000/10,000 | | 1 |
| Phenylmercury acetate | 62384 | 500/10,000 | P092 | 100 |
| Phenylsilatrane | 2097190 | 100/10,000 | | 1 |
| Phenylthiourea | 103855 | 100/10,000 | P093 | 100 |
| Phorate | 298022 | 10 | P094 | 10 |
| Phosacetim | 4104147 | 100/10,000 | | 1 |
| Phosfolan | 947024 | 100/10,000 | | 1 |
| Phosgene | 75445 | 10 | P095 | 10 |
| Phosmet | 732116 | 10/10,000 | | 1 |
| Phosphamidon | 13171216 | 100 | | 1 |
| Phosphine | 7803512 | 500 | | 100 |
| Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester | 2587908 | 500 | | 1 |
| Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester | 2703131 | 500 | | 1 |
| Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester | 50782699 | 100 | | 1 |
| Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester | 2665307 | 500 | | 1 |
| Phosphoric acid | 7664382 | | | 5,000 |
| Phosphoric acid, diethyl 4-nitrophenyl ester | 311455 | | P041 | 100 |
| Phosphoric acid, dimethyl 4-(methylthio) phenyl ester | 3254635 | 500 | | 1 |
| Phosphoric acid, lead salt (2:3) | 7446277 | 500 | U145 | 10 |
| Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester | 298044 | | P039 | 1 |
| Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester | 298022 | | P094 | 10 |
| Phosphorodithioic acid, O,O-diethyl S-methyl ester | 3288582 | | U087 | 5,000 |
| Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester | 60515 | | P044 | 10 |
| Phosphorofluondic acid, bis(1-methylethyl) ester | 55914 | | P043 | 100 |
| Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester | 56382 | | P089 | 10 |
| Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester | 52857 | | P097 | 1,000 |
| Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester | 298000 | | P071 | 100 |
| Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester | 297972 | | P040 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Phosphorus | 7723140 | 100 | | 1 |
| Phosphorus oxychloride | 10025873 | 500 | | 1,000 |
| Phosphorous pentachloride | 10026138 | 500 | | 1 |
| Phosphorus pentasulfide (R) | 1314803 | | U189 | 100 |
| Phosphorus pentoxide | 1314563 | 10 | | 1 |
| Phosphorus trichloride | 7719122 | 1,000 | | 1,000 |
| Phthalic anhydride | 85449 | | U190 | 5,000 |
| Physostigmine | 57476 | 100/10,000 | P204 | 1 |
| Phosostigmine, salicylate (1:1) | 57647 | 100/10,000 | | 1 |
| 2-Picoline | 109068 | | U191 | 5,000 |
| Picotoxin | 124878 | 500/10,000 | | 1 |
| Piperidine | 110894 | 1,000 | | 1 |
| Piperidine, 1-nitroso- | 100754 | | U179 | 10 |
| Pirimifos-ethyl | 23505411 | 1,000 | | 1 |
| Plumbane, tetraethyl- | 78002 | | P110 | 10 |
| Polychlorinated biphenyls (See PCBs or Aroclor) | 1336363 | | | 1 |
| Potassium arsenate | 7784410 | | | 1 |
| Potassium arsenite | 10124502 | 500/10,000 | | 1 |
| Potassium bichromate | 7778509 | | | 10 |
| Potassium chromate | 7789006 | | | 10 |
| Potassium cyanide | 151508 | 100 | P098 | 10 |
| Potassium hydroxide | 1310583 | | | 1,000 |
| Potassium permanganate | 7722647 | | | 100 |
| Potassium silver cyanide | 506616 | 500 | P099 | 1 |
| Promecarb | 2631370 | 500/10,000 | | 1 |
| Pronamide | 23950585 | | U192 | 5,000 |
| Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime | 116063 | | P070 | 1 |
| 1-Propanamine (I,T) | 107108 | | U194 | 5,000 |
| 1-Propanamine, N-propyl- | 142847 | | U110 | 5,000 |
| 1-Propanamine, N-nitroso-N-propyl- | 621647 | | U111 | 10 |
| Propane, 1,2-dibromo-3-chloro | 96128 | | U066 | 1 |
| Propane, 2-nitro- (I,T) | 79469 | | U171 | 10 |
| 1,3-Propane sultone | 1120714 | | U193 | 10 |
| Propane 1,2-dichloro- | 78875 | | U083 | 1,000 |
| Propanedinitrile | 109773 | | U149 | 1,000 |
| Propanenitrile | 107120 | | P101 | 10 |
| Propanenitrile, 3-chloro- | 542767 | | P027 | 1,000 |
| Propanenitrile, 2-hydroxy-2-methyl- | 75865 | | P069 | 10 |
| Propane, 2,2'-oxybis[2-chloro- | 108601 | | U027 | 1,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| 1,2,3-Propanetnol, trinitrate- (R) | 55630 | | P081 | 10 |
| 1-Propanol, 2,3-dibromo-, phosphate (3:1) | 126727 | | U235 | 10 |
| 1-Propanol, 2-methyl- (I,T) | 78831 | | U140 | 5,000 |
| 2-Propanone (I) | 67641 | | U002 | 5,000 |
| 2-Propanone, 1-bromo- | 598312 | | P017 | 1,000 |
| Propargite | 2312358 | | | 10 |
| Propargyl alcohol | 107197 | | P102 | 1,000 |
| Propargyl bromide | 106967 | 10 | | 1 |
| 2-Propenal | 107028 | | P003 | 1 |
| 2-Propenamide | 79061 | | U007 | 5,000 |
| 1-Propene, 1,1,2,3,3,3-hexachloro- | 1888717 | | U243 | 1,000 |
| 1-Propene, 1,3-dichloro- | 542756 | | U084 | 100 |
| 2-Propenenitrile | 107131 | | U009 | 100 |
| 2-Propenenitrile, 2-methyl- (I,T) | 126987 | | U152 | 1,000 |
| 2-Propenoic acid (I) | 79107 | | U008 | 5,000 |
| 2-Prepenoic acid, ethyl ester (I) | 140885 | | U113 | 1,000 |
| 2-Prepenoic acid, 2-methyl-, ethyl ester | 97632 | | U118 | 1,000 |
| 2-Prepenoic acid, 2-methyl-, methyl ester (I,T) | 80626 | | U162 | 1,000 |
| 2-Propen-1-o1 | 107186 | | P005 | 100 |
| Propiolactone, beta- | 57578 | 500 | | 1 |
| Propionaldehyde | 123386 | | | 1,000 |
| Propionic acid | 79094 | | | 5,000 |
| Propionic acid, 2-(2,4,5-trichlorophenoxyl)- | 93721 | | U233 | 100 |
| Propionic anhydride | 123626 | | | 5,000 |
| Propoxor (Baygon) | 114261 | | U411 | 100 |
| Propionitrile | 107120 | 500 | | 10 |
| Propionitrile, 3-chloro- | 542767 | 1,000 | | 1,000 |
| Propiophenone, 1, 4-amino phenyl | 70699 | 100/10,000 | | 1 |
| n-Propylamine | 107108 | | U194 | 5,000 |
| Propyl chloroformate | 109615 | 500 | | 1 |
| Propylene dichloride | 78875 | | U083 | 1,000 |
| Propylene oxide | 75569 | 10,000 | | 100 |
| 1,2-Propylenimine | 75558 | 10,000 | P067 | 1 |
| 2-Propyn-1-o1 | 107197 | | P102 | 1,000 |
| Prothoate | 2275185 | 100/10,000 | | 1 |
| Pyrene | 129000 | 1,000/10,000 | | 5,000 |
| Pyrethrins | 121299<br>121211<br>8003347 | | | 1 |
| 3,6-Pyridazinedione, 1,2-dihydro- | 123331 | | U148 | 5,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| 4-Pyridinamine | 504245 | | P008 | 1,000 |
| Pyridine | 110861 | | U196 | 1,000 |
| Pyridine, 2-methyl- | 109068 | | U191 | 5,000 |
| Pyridine, 2-methyl-5-vinyl- | 140761 | 500 | | 1 |
| Pyridine, 4-amino- | 504245 | 500/10,000 | | 1,000 |
| Pyridine, 4-nitro-, 1-oxide | 1124330 | 500/10,000 | | 1 |
| Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S) | 54115 | | P075 | 100 |
| 2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]- | 66751 | | U237 | 10 |
| 4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo- | 56042 | | U164 | 10 |
| Pyriminil | 53558251 | 100/10,000 | | 1 |
| Pyrrolidine, 1-nitroso- | 930552 | | U180 | 1 |
| Quinoline | 91225 | | | 5,000 |
| Quinone (p-Benzoquinone) | 106514 | | U197 | 10 |
| Quintobenzene | 82688 | | U185 | 100 |
| Reserpine | 50555 | | U200 | 5,000 |
| Resorcinol | 108463 | | U201 | 5,000 |
| Saccharin and salts | 81072 | | U202 | 100 |
| Salcomine | 14167181 | 500/10,000 | | 1 |
| Sarin | 107448 | 10 | | 1 |
| Safrole | 94597 | | U203 | 100 |
| Selenious acid | 7783008 | 1,000/10,000 | U204 | 10 |
| Selenious acid, dithallium salt | 12039520 | | P114 | 1,000 |
| Selenium ++ | 7782492 | | | 100 |
| Selenium dioxide | 7446084 | | U204 | 10 |
| Selenium oxychloride | 7791233 | 500 | | 1 |
| Selenium sulfide (R,T) | 7488564 | | U205 | 10 |
| Selenourea | 630104 | | P103 | 1,000 |
| Semicarbazide hydrochloride | 563417 | 1,000/10,000 | | 1 |
| L-Serine, diazoacetate (ester) | 115026 | | U015 | 1 |
| Silane, (4-aminobutyl)diethoxymethyl- | 3037727 | 1,000 | | 1 |
| Silver ++ | 7440224 | | | 1,000 |
| Silver cyanide | 506649 | | P104 | 1 |
| Silver nitrate | 7761888 | | | 1 |
| Silvex (2,4,5-TP) | 93721 | | U233 | 100 |
| Sodium | 7440235 | | | 10 |
| Sodium arsenate | 7631892 | 1,000/10,000 | | 1 |
| Sodium arsenite | 7784465 | 500/10,000 | | 1 |
| Sodium azide | 26628228 | 500 | P105 | 1,000 |
| Sodium bichromate | 10588019 | | | 10 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Sodium bifluoride | 1333831 | | | 100 |
| Sodium bisulfite | 7631905 | | | 5,000 |
| Sodium cacodylate | 124652 | 100/10,000 | | 1 |
| Sodium chromate | 7775113 | | | 10 |
| Sodium cyanide | 143339 | 100 | P106 | 10 |
| Sodium dodecylbenzenesulfonate | 25155300 | | | 1,000 |
| Sodium fluoride | 7681494 | | | 1,000 |
| Sodium fluoroacetate | 62748 | 10/10,000 | | 10 |
| Sodium hydrosulfide | 16721805 | | | 5,000 |
| Sodium hydroxide | 1310732 | | | 1,000 |
| Sodium hypochlorite | 7681529<br>10022705 | | | 100 |
| Sodium methylate | 124414 | | | 1,000 |
| Sodium nitrite | 7632000 | | | 100 |
| Sodium prentachlorophenate | 131522 | 100/10,000 | | 1 |
| Sodium phosphate, dibasic | 7558794<br>10039324<br>10140655 | | | 5,000 |
| Sodium phosphate, tribasic | 7601549<br>7758294<br>7785844<br>10101890<br>10124568<br>10361894 | | | 5,000 |
| Sodium selenate | 13410010 | 100/10,000 | | 1 |
| Sodium selenite | 10102188<br>7782823 | 100/10,000 | | 100 |
| Sodium tellurite | 10102202 | 500/10,000 | | 1 |
| Stannane, acetoxytriphenyl | 900958 | 500/10,000 | | 1 |
| Streptozotocin | 18883664 | | U206 | 1 |
| Strontium chromate | 7789062 | | | 10 |
| Strychnidin-10-one | 57249 | | P108 | 10 |
| Strychnidin-10-one, 2,3-dimethoxy- | 357573 | | P018 | 100 |
| Strychnine, & salts | 572494 | 100/10,000 | P108 | 10 |
| Strychnine sulfate | 60413 | 100/10,000 | | 1 |
| Styrene | 100425 | | | 1,000 |
| Styrene oxide | 96093 | | | 100 |
| Sulfotep | 3689245 | 500 | | 100 |
| Sulfoxide, 3-chloropropyl octyl | 3569571 | 500 | | 1 |
| Sulfur monochloride | 12771083 | | | 1,000 |
| Sulfur dioxide | 7446095 | 500 | | 1 |
| Sulfur phosphide (R) | 1314803 | | U189 | 100 |

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(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Sulfur tetrafluoride | 7783600 | 100 | | 1 |
| Sulfur trioxide | 7446119 | 100 | | 1 |
| Sulfuric acid | 7664939<br>8014957 | 1,000 | | 1,000 |
| Sulfuric acid, dithallium salt | 7446186<br>10031591 | | P115 | 100 |
| Sulfuric acid, dimethyl ester | 77781 | | U103 | 100 |
| Tabun | 77816 | 10 | | 1 |
| 2,4,5-T acid | 93765 | | U232 | 1,000 |
| 2,4,5-T amines | 2008460<br>1319728<br>3813147<br>6369966<br>6369977 | | | 5,000 |
| Tellurium | 13494809 | 500/10,000 | | 1 |
| Tellurium hexafluoride | 7783804 | 100 | | 1 |
| 2,4,5-T esters | 93798<br>1928478<br>2545597<br>25168154<br>61792072 | | | 1,000 |
| 2,4,5-T salts | 13560991 | | | 1,000 |
| 2,4,5-T | 93765 | | U232 | 1,000 |
| TDE (Dichloro diphenyl dichloroethane) | 72548 | | U060 | 1 |
| TEPP (Tetraethyl ester diphosphoric acid) | 107493 | 100 | | 10 |
| Terbufos | 13071799 | 100 | | 1 |
| 1,2,4,5-Tetrachlorobenzene | 95943 | | U207 | 5,000 |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | 1746016 | | | 1 |
| 1,1,1,2-Tetrachloroethane | 630206 | | U208 | 100 |
| 1,1,2,2-Tetrachloroethane | 79345 | | U209 | 100 |
| Tetrachloroethene | 127184 | | U210 | 100 |
| Tetrachloroethylene | 127184 | | U210 | 100 |
| 2,3,4,6-Tetrachlorophenol | 58902 | | U212 | 10 |
| Tetraethyl lead | 78002 | 100 | P110 | 10 |
| Tetraethyl pyrophosphate | 107493 | | P111 | 10 |
| Tetraethyldithiopyrophosphate | 3689245 | | P109 | 100 |
| Tetraethyltin | 597648 | 100 | | 1 |
| Tetramethyllead | 75741 | 100 | | 1 |
| Tetrahydrofuran (I) | 109999 | | U213 | 1,000 |
| Tetranitromethane (R) | 509148 | 500 | P112 | 10 |
| Tetraphosphoric acid, hexaethyl ester | 757584 | | P062 | 100 |
| Thallic oxide | 1314325 | | P113 | 100 |

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(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Thallium ++ | 7440280 | | | 1,000 |
| Thallium acetate | 563688 | | U214 | 100 |
| Thallium carbonate | 6533739 | | U215 | 100 |
| Thallium chloride | 7791120 | | U216 | 100 |
| Thallium nitrate | 10102451 | | U217 | 100 |
| Thallium oxide | 1314325 | | P113 | 100 |
| Thallium selenite | 12039520 | | P114 | 1,000 |
| Thallium sulfate | 7446186<br>10031591 | 100/10,000 | P115 | 100 |
| Thallous carbonate (Thallium (I) carbonate) | 6533739 | 100/10,000 | U215 | 100 |
| Thallous chloride (Thallium (I) chloride) | 7791120 | 100/10,000 | U216 | 100 |
| Thallous malonate (Thallium (I) malonate) | 2757188 | 100/10,000 | | 1 |
| Thallous sulfate (Thallium (I) sulfate) | 7446186 | 100/10,000 | P115 | 100 |
| Thioacetamide | 62555 | | U218 | 10 |
| Thiocarbazide | 2231574 | 1,000/10,000 | | 1 |
| Thiodiphosphoric acid, tetraethyl ester | 3689245 | | P109 | 100 |
| Thiofanox | 39196184 | 100/10,000 | P045 | 100 |
| Thioimidodicarbonic diamide [(H2N)C(S)] 2NH | 541537 | | P049 | 100 |
| Thiomethanol (I,T) | 74931 | | U153 | 100 |
| Thionazin | 297972 | 500 | | 100 |
| Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl- | 137268 | | U244 | 10 |
| Thiophenol | 108985 | 500 | P104 | 100 |
| Thiosemicarbazide | 79196 | 100/10,000 | P116 | 100 |
| Thiourea | 62566 | | U219 | 10 |
| Thiourea, (2-chlorophenyl)- | 5344821 | 100/10,000 | P026 | 100 |
| Thiourea, (2-methylphenyl)- | 614788 | 500/10,000 | | 1 |
| Thiourea, 1-naphthalenyl- | 86884 | | P072 | 100 |
| Thiourea, phenyl- | 103855 | | P093 | 100 |
| Thiram | 137268 | | U244 | 10 |
| Titanium tetrachloride | 7550450 | 100 | | 1,000 |
| Toluene | 108883 | | U220 | 1,000 |
| Toluenediamine | 95807<br>496720<br>823405<br>25376458 | | U221 | 10 |
| Toluene diisocyanate (R,T) | 584849<br>91087<br>26471625 | 500 100 | U223 | 100 100 |
| o-Toluidine | 95534 | | U328 | 100 |
| p-Toluidine | 106490 | | U353 | 100 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| o-Toluidine hydrochloride | 636215 | | U222 | 100 |
| Toxaphene | 8001352 | | P123 | 1 |
| 2,4,5-TP acid | 93721 | | U233 | 100 |
| 2,4,5-TP acid esters | 32534955 | | | 100 |
| 1H-1,2,4-Triazol-3-amine | 61825 | | U011 | 10 |
| Trans-1,4-dichlorobutene | 110576 | 500 | | 1 |
| Triamiphos | 1031476 | 500/10,000 | | 1 |
| Triazofos | 24017478 | 500 | | 1 |
| Trichloroacetyl chloride | 76028 | 500 | | 1 |
| Trichlorfon | 52686 | | | 100 |
| 1,2,4-Trichlorobenzene | 120821 | | | 100 |
| 1,1,1-Trichloroethane | 71556 | | U226 | 1,000 |
| 1,1,2-Trichloroethane | 79005 | | U227 | 100 |
| Trichloroethene | 79016 | | U228 | 100 |
| Trichloroethylene | 79016 | | U228 | 100 |
| Trichloroethylsilane | 115219 | 500 | | 1 |
| Trichloronate | 327980 | 500 | | 1 |
| Trichloromethanesulfenyl chloride | 594423 | | P118 | 100 |
| Trichloromonofluoromethane | 75694 | | U121 | 5,000 |
| Trichlorophenol | 21567822 | | | 10 |
| 2,3,4-Trichlorophenol | 15950660 | | | |
| 2,3,5-Trichlorophenol | 933788 | | | |
| 2,3,6-Trichlorophenol | 933755 | | | |
| 2,4,5-Trichlorophenol | 95954 | | U230 | 10 |
| 2,4,6-Trichlorophenol | 88062 | | U231 | 10 |
| 3,4,5-Trichlorophenol | 609198 | | | |
| Trichlorophenylsilane | 98135 | 500 | | 1 |
| Trichloro(chloromethyl)silane | 1558254 | 100 | | 1 |
| Trichloro(dichlorophenyl)silane | 27137855 | 500 | | 1 |
| Triethanolamine dodecylbenzene-sulfonate | 27323417 | | | 1,000 |
| Triethoxysilane | 998301 | 500 | | 1 |
| Trifluralin | 1582098 | | | 10 |
| Triethylamine | 121448 | | | 5,000 |
| Trimethylamine | 75503 | | | 100 |
| Trimethylchlorsilane | 75774 | 1,000 | | 1 |
| 2,2,4-Trimethylpentane | 540841 | | | 1,000 |
| Trimethylolpropane phosphite | 824113 | 100/10,000 | | 1 |
| Trimethyiltin chloride | 1066451 | 500/10,000 | | 1 |
| 1,3,5-Trinitrobenzene (R,T) | 99354 | | U234 | 10 |
| 1,3,5-Trioxane, 2,4,6-trimethyl- | 123637 | | U182 | 1,000 |
| Triphenyltin chloride | 639587 | 500/10,000 | | 1 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Tris(2-chloroethyl)amine | 555771 | 100 | | 1 |
| Tris(2,3-dibromopropyl) phosphate | 126727 | | U235 | 10 |
| Trypan blue | 72571 | | U236 | 10 |
| Unlisted Hazardous Wastes Characteristic of **Ignitability** | NA | | D001 | 100 |
| Unlisted Hazardous Wastes Characteristic of **Corrosivity** | NA | | D002 | 100 |
| Unlisted Hazardous Wastes Characteristic of **Reactivity** | NA | | D003 | 100 |
| Unlisted Hazardous Wastes Characteristic of **Toxicity** | | | | |
| Arsenic | | | D004 | 1 |
| Barium | | | D005 | 1,000 |
| Benzene | | | D018 | 10 |
| Cadmium | | | D006 | 10 |
| Carbon Tetrachloride | | | D019 | 10 |
| Chlordane | | | D020 | 1 |
| Chlorobenzene | | | D021 | 100 |
| Chloroform | | | D022 | 10 |
| Chromium | | | D007 | 10 |
| o-Cresol | | | D023 | 100 |
| m-Cresol | | | D024 | 100 |
| p-Cresol | | | D025 | 100 |
| Cresol | | | D026 | 100 |
| 2,4-D (Dichlorophenoxyacetic acid) | | | D016 | 100 |
| 1,4-Dichlorobenzene | | | D027 | 100 |
| 1,2-Dichloroethane | | | D028 | 100 |
| 1,1-Dichloroethylene | | | D029 | 100 |
| 2,4-Dinitrotoluene | | | D030 | 10 |
| Endrin | | | D012 | 1 |
| Heptachlor (and epoxide) | | | D031 | 1 |
| Hexachlorobenzene | | | D032 | 10 |
| Hexachlorobutadiene | | | D033 | 1 |
| Hexachloroethane | | | D034 | 100 |
| Lead | | | D008 | 10 |
| Lindane | | | D013 | 1 |
| Mercury | | | D009 | 1 |
| Methoxychlor | | | D014 | 1 |
| Methyl ethyl ketone | | | D035 | 5,000 |
| Nitrobenzene | | | D036 | 1,000 |
| Pentachlorophenol | | | D037 | 10 |
| Pyridine | | | D038 | 1,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Selenium | | | D010 | 10 |
| Silver | | | D011 | 1 |
| Tetrachloroethylene | | | D039 | 100 |
| Toxaphene | | | D015 | 1 |
| Trichloroethylene | | | D040 | 100 |
| 2,4,5 Trichlorophenol | | | D041 | 10 |
| 2,4,5-TP | | | D017 | 100 |
| Vinyl chloride | | | D043 | 1 |
| Uracil mustard | 66751 | | U237 | 10 |
| Uranyl acetate | 541093 | | | 100 |
| Uranyl nitrate | 10102064<br>36478769 | | | 100 |
| Urea, N-ethyl-N-nitroso | 759739 | | U176 | 1 |
| Urea, N-methyl-N-nitroso | 684935 | | U177 | 1 |
| Urethane (Carbamic acid ethyl ester) | 51796 | | U238 | 100 |
| Valinomycin | 2001958 | 1,000/10,000 | | 1 |
| Vanadic acid, ammonium salt | 7803556 | | P119 | 1,000 |
| Vanadic oxide $V_20_5$ | 1314621 | | P120 | 1,000 |
| Vanadic pentoxide | 1314621 | | P120 | 1,000 |
| Vanadium pentoxide | 1314621 | 100/10,000 | | 1,000 |
| Vanadyl sulfate | 27774136 | | | 1,000 |
| Vinyl chloride | 75014 | | U043 | 1 |
| Vinyl acetate | 108054 | | | 5,000 |
| Vinyl acetate monomer | 108054 | 1,000 | | 5,000 |
| Vinylamine, N-methyl-N-nitroso- | 4549400 | | P084 | 10 |
| Vinyl bromide | 593602 | | | 100 |
| Vinylidene chloride | 75354 | | U078 | 100 |
| Warfarin, & salts, when present at concentrations >0.3% | 81812 | 500/10,000 | P001 | 100 |
| Warfarin sodium | 129066 | 100/10,000 | | 100 |
| Xylene (mixed) | 1330207 | | U239 | 100 |
| m-Benzene, dimethyl | 108383 | | | 1,000 |
| o-Benzene, dimethyl | 95476 | | | 1,000 |
| p-Benzene, dimethyl | 106423 | | | 100 |
| Xylenol | 1300716 | | | 1,000 |
| Xylylene dichloride | 28347139 | 100/10,000 | | 1 |
| Yohimban-16-carboxylic acid, 11,17 dimethoxy-18-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,17-alpha,18-beta,20-alpha)- | 50555 | | U200 | 5,000 |
| Zinc ++ | 7440666 | | | 1,000 |
| Zinc acetate | 557346 | | | 1,000 |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| Zinc ammonium chloride | 52628258<br>14639975<br>14639986 | | | 1,000 |
| Zinc borate | 1332076 | | | 1,000 |
| Zinc bromide | 7699458 | | | 1,000 |
| Zinc carbonate | 3486359 | | | 1,000 |
| Zinc chloride | 7646857 | | | 1,000 |
| Zinc cyanide | 557211 | | P121 | 10 |
| Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)- | 58270089 | 100/10,000 | | 1 |
| Zinc fluoride | 7783495 | | | 1,000 |
| Zinc formate | 557415 | | | 1,000 |
| Zinc hydrosulfite | 7779864 | | | 1,000 |
| Zinc nitrate | 7779886 | | | 1,000 |
| Zinc phenosulfonate | 127822 | | | 5,000 |
| Zinc phosphide | 1314847 | 500 | P122 | 100 |
| Zinc phosphide $Zn_3P_2$, when present at concentrations >10% | 1314847 | | P122 | 100 |
| Zinc silicofluoride | 16871719 | | | 5,000 |
| Zinc sulfate | 7733020 | | | 1,000 |
| Zirconium nitrate | 13746899 | | | 5,000 |
| Zirconium potassium fluoride | 16923958 | | | 1,000 |
| Zirconium sulfate | 14644612 | | | 5,000 |
| Zirconium tetrachloride | 10026116 | | | 5,000 |
| **F001** | | | **F001** | **10** |
| The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, ≥10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | | | | |
| (a) Tetrachloroethylene | 127184 | | U210 | 100 |
| (b) Trichloroethylene | 79016 | | U228 | 100 |
| (c) Methylene chloride | 75092 | | U080 | 1,000 |
| (d) 1,1,1-Trichloroethane | 71556 | | U226 | 1,000 |
| (e) Carbon tetrachloride | 56235 | | U211 | 10 |
| (f) Chlorinated fluorocarbons | NA | | | 5,000 |
| **F002** | | | **F002** | **10** |
| The following spent halogenated solvents:all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| (a) Tetrachloroethylene | 127184 | | U210 | 100 |
| (b) Methylene chloride | 75092 | | U080 | 1,000 |
| (c) Trichloroethylene | 79016 | | U228 | 100 |
| (d) 1,1,1-Trichloroethane | 71556 | | U226 | 1,000 |
| (e) Chlorobenzene | 108907 | | U037 | 100 |
| (f) 1,1,2-Trichloro-1,2,2 trifluoroethane | 76131 | | | 5,000 |
| (g) o-Dischlorobenzene | 95501 | | U070 | 100 |
| (h) Trichlorofluoromethane | 75694 | | U121 | 5,000 |
| (i) 1,1,2-Trichloroethane | 79005 | | U227 | 100 |
| **F003** | | | **F003** | **100** |
| The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents: | | | | |
| (a) Xylene | 1330207 | | | 1,000 |
| (b) Acetone | 67641 | | | 5,000 |
| (c) Ethyl acetate | 141786 | | | 5,000 |
| (d) Ethylbenzene | 100414 | | | 1,000 |
| (e) Ethyl ether | 60297 | | | 100 |
| (f) Methyl isobutyl ketone | 108101 | | | 5,000 |
| (g) n-Butyl alcohol | 71363 | | | 5,000 |
| (h) Cyclohexanone | 108941 | | | 5,000 |
| (i) Methanol | 67561 | | | 5,000 |
| **F004** | | | **F004** | **100** |
| The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents: | | | | |
| (a) Cresols/Cresylic acid | 1319773 | | U052 | 100 |
| (b) Nitrobenzene | 98953 | | U169 | 1,000 |
| **F005** | | | **F005** | **100** |
| The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents: | | | | |
| (a) Toluene | 108883 | | U220 | 1,000 |
| (b) Methyl ethyl ketone | 78933 | | U159 | 5,000 |
| (c) Carbon disulfide | 75150 | | P022 | 100 |
| (d) Isobutanol | 78831 | | U140 | 5,000 |
| (e) Pyndine | 110861 | | U196 | 1,000 |
| **F006** | | | **F006** | **10** |
| Wastewater treatment sludges from electroplating operations, except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum. | | | | |
| **F007** | | | **F007** | **10** |
| Spent cyanide plating bath solutions from electroplating operations. | | | | |
| **F008** | | | **F008** | **10** |
| Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process. | | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| **F009** | | | **F009** | **10** |
| Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process. | | | | |
| **F010** | | | **F010** | **10** |
| Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process. | | | | |
| **F011** | | | **F011** | **10** |
| Spent cyanide solution from salt bath pot cleaning from metal heat treating operations. | | | | |
| **F012** | | | **F012** | **10** |
| Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process. | | | | |
| **F019** | | | **F019** | **10** |
| Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process. | | | | |
| **F020** | | | **F020** | **1** |
| Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.) | | | | |
| **F021** | | | **F021** | **1** |
| Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives. | | | | |
| **F022** | | | **F022** | **1** |
| Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions. | | | | |
| **F023** | | | **F023** | **1** |
| Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.) | | | | |
| **F024** | | | **F024** | **1** |
| Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent desicants, wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in separately in Table AP1.T3 or wastes listed in Table AP1.T4 and having a USEPA HW No. beginning with "K.") | | | | |
| **F025** | | | **F025** | **1** |
| Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. | | | | |
| **F026** | | | **F026** | **1** |
| Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions. | | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| **F027** | | | **F027** | **1** |
| Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.) | | | | |
| **F028** | | | **K028** | **1** |
| Residues resulting from the incineration or thermal treatment of soil contaminated with EPA HW# F020, F021, F022, F023, F026, and F027. | | | | |
| **F032** | | | **F032** | **1** |
| Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. | | | | |
| **F034** | | | **F034** | **1** |
| Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. | | | | |
| **F035** | | | **F035** | **1** |
| Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. | | | | |
| **F037** | | | **F037** | **1** |
| Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and storm water units receiving dry weather flow. Sludge generated in storm water units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. | | | | |
| **F038** | | | **F038** | **1** |
| Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in storm water units that do not receive dry weather flow; sludges generated from once-through noncontact cooling water segregated from treatment from other process or oil cooling wastes, ; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing. | | | | |
| **K001** | | | **K001** | **1** |
| Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or | | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| pentachlorophenol. | | | | |
| **K002** | | | **K002** | **10** |
| Wastewater treatment sludge from the production of chrome yellow and orange pigments. | | | | |
| **K003** | | | **K003** | **10** |
| Wastewater treatment sludge from the production of molyodate orange pigments. | | | | |
| **K004** | | | **K004** | **10** |
| Wastewater treatment sludge from the production of zinc yellow pigments. | | | | |
| **K005** | | | **K005** | **10** |
| Wastewater treatment sludge from the production of chrome green pigments. | | | | |
| **K006** | | | **K006** | **10** |
| Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated). | | | | |
| **K007** | | | **K007** | **10** |
| Wastewater treatment sludge from the production of iron blue pigments. | | | | |
| **K008** | | | **K008** | **10** |
| Oven residue from the production of chrome oxide green pigments. | | | | |
| **K009** | | | **K009** | **10** |
| Distillation bottoms from the production of acetaldehyde from ethylene. | | | | |
| **K010** | | | **K010** | **10** |
| Distillation side cuts from the production of acetaldehyde from ethylene. | | | | |
| **K011** | | | **K011** | **10** |
| Bottom stream from the wastewater stripper in the production of acrylonitrile. | | | | |
| **K013** | | | **K013** | **10** |
| Bottom stream from the acetonitrile column in the production of acrylonitrile. | | | | |
| **K014** | | | **K014** | **5,000** |
| Bottoms from the acetonitrile purification column in the production of acrylonitrile. | | | | |
| **K015** | | | **K015** | **10** |
| Still bottoms from the distillation of benzyl chloride. | | | | |
| **K016** | | | **K016** | **1** |
| Heavy ends or distillation residues from the production of carbon tetrachloride. | | | | |
| **K017** | | | **K017** | **10** |
| Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin. | | | | |
| **K018** | | | **K018** | **1** |
| Heavy ends from the fractionation column in ethyl chloride production. | | | | |
| **K019** | | | **K019** | **1** |
| Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production. | | | | |
| **K020** | | | **K020** | **1** |
| Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production. | | | | |
| **K021** | | | **K021** | **10** |
| Aqueous spent antimony catalyst waste from fluoromethanes production. | | | | |
| **K022** | | | **K022** | **1** |
| Distillation bottom tars from the production of phenol/acetone from cumene. | | | | |

| Table AP1.T4. List of Hazardous Waste/Substances/Materials<br>(All notes appear at the end of the table) | | | | |
|---|---|---|---|---|
| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
| **K023** | | | **K023** | **5,000** |
| Distillation light ends from the production of ophthalic anhydride from naphthalene. | | | | |
| **K024** | | | **K024** | **5,000** |
| Distillation bottoms from the production of phthalic anhydride from naphthalene. | | | | |
| **K025** | | | **K025** | **10** |
| Distillation bottoms from the production of nitrobenzene by the nitration of benzene. | | | | |
| **K026** | | | **K026** | **1,000** |
| Stripping still tails from the production of methyl ethyl pyridines. | | | | |
| **K027** | | | **K027** | **10** |
| Centrifuge and distillation residues from toluene diisocyanate production. | | | | |
| **K028** | | | **K028** | **1** |
| Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane. | | | | |
| **K029** | | | **K029** | **1** |
| Waste from the product steam stripper in the production of 1,1,1-trichloroethane. | | | | |
| **K030** | | | **K030** | **1** |
| Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene. | | | | |
| **K031** | | | **K031** | **1** |
| By-product salts generated in the production of MSMA and cacodylic acid. | | | | |
| **K032** | | | **K032** | **10** |
| Wastewater treatment sludge from the production of chlordane. | | | | |
| **K033** | | | **K033** | **10** |
| Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane. | | | | |
| **K034** | | | **K034** | **10** |
| Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane. | | | | |
| **K035** | | | **K035** | **1** |
| Wastewater treatment sludges generated in the production of creosote. | | | | |
| **K036** | | | **K036** | **1** |
| Still bottoms from toluene reclamation distillation in the production of disulfoton. | | | | |
| **K037** | | | **K037** | **1** |
| Wastewater treatment sludges from the production of disulfoton. | | | | |
| **K038** | | | **K038** | **10** |
| Wastewater from the washing and stripping of phorate production. | | | | |
| **K039** | | | **K039** | **10** |
| Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate. | | | | |
| **K040** | | | **K040** | **10** |
| Wastewater treatment sludge from the production of phorate. | | | | |
| **K041** | | | **K041** | **1** |
| Wastewater treatment sludge from the production of toxaphene. | | | | |
| **K042** | | | **K042** | **10** |
| Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T. | | | | |

| Table AP1.T4. List of Hazardous Waste/Substances/Materials<br>(All notes appear at the end of the table) | | | | |
|---|---|---|---|---|
| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
| **K043** | | | **K043** | **10** |
| 2,6-Dichlorophenol waste from the production of 2,4-D. | | | | |
| **K044** | | | **K044** | **10** |
| Wastewater treatment sludges from the manufacturing and processing of explosives. | | | | |
| **K045** | | | **K045** | **10** |
| Spent carbon from the treatment of wastewater containing explosives. | | | | |
| **K046** | | | **K046** | **10** |
| Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds. | | | | |
| **K047** | | | **K047** | **10** |
| Pink/red water from TNT operations. | | | | |
| **K048** | | | **K048** | **10** |
| Dissolved air flotation (DAF) float from the petroleum refining industry. | | | | |
| **K049** | | | **K049** | **10** |
| Slop oil emulsion solids from the petroleum refining industry. | | | | |
| **K050** | | | **K050** | **10** |
| Heat exchanger bundle cleaning sludge from the petroleum refining industry. | | | | |
| **K051** | | | **K051** | **10** |
| API separator sludge from the petroleum refining industry. | | | | |
| **K052** | | | **K052** | **10** |
| Tank bottoms (leaded) from the petroleum refining industry. | | | | |
| **K060** | | | **K060** | **1** |
| Ammonia still lime sludge from coking operations. | | | | |
| **K061** | | | **K061** | **10** |
| Emission control dust/sludge from the primary production of steel in electric furnaces. | | | | |
| **K062** | | | **K062** | **10** |
| Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332). | | | | |
| **K064** | | | **K064** | **10** |
| Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production. | | | | |
| **K065** | | | **K065** | **10** |
| Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities. | | | | |
| **K066** | | | **K066** | **10** |
| Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production. | | | | |
| **K069** | | | **K069** | **10** |
| Emission control dust/sludge from secondary lead smelting. | | | | |
| **K071** | | | **K071** | **1** |
| Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used. | | | | |
| **K073** | | | **K073** | **10** |
| Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production. | | | | |

| Table AP1.T4. List of Hazardous Waste/Substances/Materials<br>(All notes appear at the end of the table) | | | | |
|---|---|---|---|---|
| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
| **K083** | | | **K083** | **100** |
| Distillation bottoms from aniline extraction. | | | | |
| **K084** | | | **K084** | **1** |
| Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. | | | | |
| **K085** | | | **K085** | **10** |
| Distillation or fractionation column bottoms from the production of chlorobenzenes. | | | | |
| **K086** | | | **K086** | **10** |
| Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead. | | | | |
| **K087** | | | **K087** | **100** |
| Decanter tank tar sludge from coking operations. | | | | |
| **K088** | | | **K088** | **10** |
| Spent potliners from primary aluminum reduction. | | | | |
| **K090** | | | **K090** | **10** |
| Emission control dust or sludge from ferrochromiumsilicon production. | | | | |
| **K091** | | | **K091** | **10** |
| Emission control dust or sludge from ferrochromium production. | | | | |
| **K093** | | | **K093** | **5,000** |
| Distillation light ends from the production of phthalic anhydride from ortho-xylene. | | | | |
| **K094** | | | **K094** | **5,000** |
| Distillation bottoms from the production of phthalic anhydride from ortho-xylene. | | | | |
| **K095** | | | **K095** | **100** |
| Distillation bottoms from the production of 1,1,1-trichloroethane. | | | | |
| **K096** | | | **K096** | **100** |
| Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane. | | | | |
| **K097** | | | **K097** | **1** |
| Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane. | | | | |
| **K098** | | | **K098** | **1** |
| Untreated process wastewater from the production of toxaphene. | | | | |
| **K099** | | | **K099** | **10** |
| Untreated wastewater from the production of 2,4-D. | | | | |
| **K100** | | | **K100** | **10** |
| Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting. | | | | |
| **K101** | | | **K101** | **1** |
| Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. | | | | |
| **K102** | | | **K102** | **1** |
| Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. | | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| **K103** | | | **K103** | **100** |
| Process residues from aniline extraction from the production of aniline. | | | | |
| **K104** | | | **K104** | **10** |
| Combined wastewater streams generated from nitrobenzene/aniline production. | | | | |
| **K105** | | | **K105** | **10** |
| Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes. | | | | |
| **K106** | | | **K106** | **1** |
| Wastewater treatment sludge from the mercury cell process in chlorine production. | | | | |
| **K107** | | | **K107** | **10** |
| Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines. | | | | |
| **K108** | | | **K108** | **10** |
| Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. | | | | |
| **K109** | | | **K109** | **10** |
| Spent filter cartridges from product purification from the production of 1.1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. | | | | |
| **K110** | | | **K110** | **10** |
| Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. | | | | |
| **K111** | | | **K111** | **10** |
| Product washwaters from the production of dinitrotoluene via nitration of toluene. | | | | |
| **K112** | | | **K112** | **10** |
| Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene. | | | | |
| **K113** | | | **K113** | **10** |
| Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. | | | | |
| **K114** | | | **K114** | **10** |
| Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. | | | | |
| **K115** | | | **K115** | **10** |
| Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. | | | | |
| **K116** | | | **K116** | **10** |
| Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine. | | | | |
| **K117** | | | **K117** | **1** |
| Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene. | | | | |
| **K118** | | | **K118** | **1** |
| Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide. | | | | |
| **K123** | | | **K123** | **10** |
| Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts. | | | | |

| Table AP1.T4. List of Hazardous Waste/Substances/Materials<br>(All notes appear at the end of the table) | | | | |
|---|---|---|---|---|
| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
| **K124** | | | **K124** | **10** |
| Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts. | | | | |
| **K125** | | | **K125** | **10** |
| Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts. | | | | |
| **K126** | | | **K126** | **10** |
| Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts. | | | | |
| **K131** | | | **K131** | **100** |
| Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide. | | | | |
| **K132** | | | **K132** | **1,000** |
| Spent absorbent and wastewater solids from the production of methyl bromide. | | | | |
| **K136** | | | **K136** | **1** |
| Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene. | | | | |
| **K141** | | | **K141** | **1** |
| Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations). | | | | |
| **K142** | | | **K142** | **1** |
| Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal. | | | | |
| **K143** | | | **K143** | **1** |
| Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal. | | | | |
| **K144** | | | **K144** | **1** |
| Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal. | | | | |
| **K145** | | | **K145** | **1** |
| Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal. | | | | |
| **K147** | | | **K147** | **1** |
| Tar storage tank residues from coal tar refining. | | | | |
| **K148** | | | **K148** | **1** |
| Residues from coal tar distillation, including, but not limited to, still bottoms. | | | | |
| **K149** | | | **K149** | **10** |
| Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.] | | | | |
| **K150** | | | **K150** | **10** |
| Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. | | | | |
| **K151** | | | **K151** | **10** |
| Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl | | | | |

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table)

| Hazardous Waste/Substance/Material | CAS No. [1] | Threshold Planning Quantity (Pounds) | USEPA HW No. [2] | RQ (Pounds) [3] |
|---|---|---|---|---|
| chlorides, and compounds with mixtures of these functional groups. | | | | |
| **K157** | | | **K157** | ++ |
| Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.) | | | | |
| **K158** | | | **K158** | ++ |
| Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. | | | | |
| **K159** | | | **K159** | ++ |
| Organics from the treatment of thiocarbamate wastes. | | | | |
| **K160** | | | **K160** | ++ |
| Solids (including filter wastes, separation solids, and spent catalysts) from the production of thio-carbamates and solids from the treatment of thiocarbamate wastes. | | | | |
| **K161** | | | **K161** | ++ |
| Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.) | | | | |

**Notes:**

1. Chemical Abstract Service (CAS) Registry Number.
2. USEPA Hazardous Waste Number.
3. Reportable quantity release that requires notification. (See Chapter 18, "Spill Prevention and Response Planning").
4. Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR'. Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.

++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.

Table AP1.T5: Classification of Specially Controlled Wastes for Purposes of Ultimate Disposal in Japan (not to be used for HW management within a DoD installation)

| Classification | | | Waste Items | JEGS HW Number |
|---|---|---|---|---|
| Specially Controlled General Waste | Components containing PCB's | | PCB's contained in parts of air conditioners, TV's and microwaves | |
| | Dust | | Dust collected by a dust collection facility at a waste disposal facility | |
| | Dioxin contained material | | Dust, cinder dust, and sludge, ≥3ng/g of dioxin from a dioxin-regulated waste incineration facility | |
| | Infectious general waste | | Infectious general wastes suspected of containing infectious pathogens from a medical institution | |
| Specially Controlled Industrial Waste | Waste Oil | | Volatile oils, gasoline, kerosene type, and diesel type fuels (except nonflammable tar pitch) with a flashpoint <70° C (158° F) | J001 |
| | Waste Acid | | pH ≤2.0 | J002 |
| | Waste Alkali | | pH ≥12.5 | J002 |
| | Infectious industrial waste | | Infectious industrial wastes suspected of containing infectious pathogens from a medical institution | |
| | Specified Hazardous Industrial Waste | Waste PCB | Waste PCB and waste PCB contaminated oil | |
| | | PCB contaminated substances | PCB contaminated sludge, paper trash, waste woods, fibers, plastics, metals, waste ceramic, debris | |
| | | Substances treated for PCB | Waste PCB oil and PCB contaminated substances that have been treated to reduce PCB concentrations | |
| | | Slag | Slag containing heavy metals above regulatory levels provided in Table AP1.T6 | |
| | | Waste Asbestos | Waste asbestos that are suspected to scatter in building materials subject for demolition or facilities that generate asbestos dust | J029 |
| | | Dust, Cinder dust | Dust and cinder dust containing heavy metals and dioxin which are above regulatory levels provided in Table AP1.T6 | |
| | | Waste Oil | Waste oil (solvent) containing chlorinated organic compounds which exceed the criteria in Table AP1.T6. | |
| | | Waste sludge, Acid, Alkali | Waste sludge, waste acid and waste alkali containing heavy metals, chlorinated organic compounds, PCB, pesticide, selenium and dioxin which are above regulatory levels in Table AP1.T6 | |

Table AP1.T6. Specially Controlled Industrial Waste Criteria to be used for Ultimate Disposal in Japan (not to be used for HW management within an installation unless specifically directed to the table by Table AP1.T1 or Table AP1.T2)

| JEGS HW Number | Contaminant | CAS No. | Concentration Level (mg/L) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Leaching Methods | | | | | | | Content Methods | |
| | | | Cinder Dust, Dust, Slag | | | Waste Oil (Solvent Only) | | Waste Sludge, Acid, Alkali | | | |
| | | | Dust, Cinder dust, Slag | Processed material (Waste acid, waste alkali) | Processed material (except waste alkali, waste acid) | Processed material (Waste acid, waste alkali) | Processed material (except waste alkali, waste acid) | Sludge | Processed material (except waste alkali, waste acid) | Waste acid, waste alkali | Processed material ( waste alkali, waste acid) |
| | | | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) | (mg/L) |
| J004 | Alkyl Mercury | - | ND | ND | ND | - | - | ND | ND | ND | ND |
| J005 | Mercury | 7439-97-6 | 0.005 | 0.05 | 0.005 | - | - | 0.005 | 0.005 | 0.05 | 0.05 |
| J006 | Cadmium | 7440-43-9 | 0.3 | 1.0 | 0.3 | - | - | 0.3 | 0.3 | 1.0 | 1.0 |
| J007 | Lead | 7439-92-1 | 0.3 | 1.0 | 0.3 | - | - | 0.3 | 0.3 | 1.0 | 1.0 |
| J008 | Organic Phosphorus | - | - | - | - | - | - | 1.0 | 1.0 | 1.0 | 1.0 |
| J009 | Chromium Hexavalent | 7440-47-3 | 1.5 | 5.0 | 1.5 | - | - | 1.5 | 1.5 | 5.0 | 5.0 |
| J010 | Arsenic | 7440-38-2 | 0.3 | 1.0 | 0.3 | - | - | 0.3 | 0.3 | 1.0 | 1.0 |
| J011 | Total Cyanide | - | - | - | - | - | - | 1.0 | 1.0 | 1.0 | 1.0 |
| J012 | PCB | 7440-22-4 | - | - | - | Waste Oil: 0.5 mg/Kg) | | 0.003 | 0.003 | 0.03 | 0.03 |
| J013 | Trichloroethylene | 79-01-6 | - | - | - | 3.0 | 0.3 | 0.3 | 0.3 | 3.0 | 3.0 |
| J014 | Tetrachloroethylene | 127-18-4 | - | - | - | 1.0 | 0.1 | 0.1 | 0.1 | 1.0 | 1.0 |
| J015 | Dichloromethane | 75-09-2 | - | - | - | 2.0 | 0.2 | 0.2 | 0.2 | 2.0 | 2.0 |
| J016 | Carbon Tetrachloride | 56-23-5 | - | - | - | 0.2 | 0.02 | 0.02 | 0.02 | 0.2 | 0.2 |
| J017 | 1,2-Dichloroethane | 107-06-2 | - | - | - | 0.4 | 0.04 | 0.04 | 0.04 | 0.4 | 0.4 |
| J018 | 1,1-Dichloroethylene | 75-35-4 | - | - | - | 2.0 | 0.2 | 0.2 | 0.2 | 2.0 | 2.0 |
| J019 | cis-1,2-Dichloroethylene | 156-59-2 | - | - | - | 4.0 | 0.4 | 0.4 | 0.4 | 4.0 | 4.0 |
| J020 | 1,1,1-Trichloroethane | 71-55-6 | - | - | - | 30.0 | 3.0 | 3.0 | 3.0 | 30.0 | 30.0 |
| J021 | 1,1,2-Trichloroethane | 79-00-5 | - | - | - | 0.6 | 0.06 | 0.06 | 0.06 | 0.6 | 0.6 |
| J022 | 1,3-Dichloropropene | 542-75-6 | - | - | - | 0.2 | 0.02 | 0.02 | 0.02 | 0.2 | 0.2 |
| J023 | Thiuram | 137-26-8 | - | - | - | - | - | 0.06 | 0.06 | 0.6 | 0.6 |
| J024 | Simazine | 122-34-9 | - | - | - | - | - | 0.03 | 0.03 | 0.3 | 0.3 |
| J025 | Thiobencarb | 28249-77-6 | - | - | - | - | - | 0.2 | 0.2 | 2.0 | 2.0 |
| J026 | Benzene | 71-43-2 | - | - | - | 1.0 | 0.1 | 0.1 | 0.1 | 1.0 | 1.0 |
| J027 | Selenium & its Compounds | 7782-49-2 | 0.3 | 1.0 | 0.3 | - | - | 0.3 | 0.3 | 1.0 | 1.0 |
| J028 | Dioxins (TEQ) | 1746-01-6 | 3 ng/g | 100 pg/L | 3 ng/g | - | - | 3 ng/g | 3 ng/g | 100 pg/L | 100 pg/L |

Table AP1.T7. Contaminated Soil Disposal Criteria

| Soil Contaminant | Total Soil Concentration Standard (mg/kg) | Soil Primary Leachate Standard (mg/L) |
|---|---|---|
| Carbon Tetrachloride | | 0.002 |
| 1,2-Dichloroethane | | 0.004 |
| 1,1-Dichloroethylene | | 0.02 |
| cis-1,2 Dichloroethylene | | 0.04 |
| 1,3-Dichloropropene | | 0.002 |
| Dichloromethane | | 0.02 |
| Tetrachloroethylene | | 0.01 |
| 1,1,1-Trichloroethane | | 1.0 |
| 1,1,2-Trichloroethane | | 0.006 |
| Trichloroethylene | | 0.03 |
| Benzene | | 0.01 |
| Cadmium, and its compounds | 150 | 0.01 |
| Hexavalent Chromium compounds | 250 | 0.05 |
| Cyanide compounds | 50 (as isolated cyanides) | ND |
| Total Mercury, and its compounds | 15 | 0.0005 |
| Alkyl Mercury | | ND |
| Selenium, and its compounds | 150 | 0.01 |
| Lead, and its compounds | 150 | 0.01 |
| Arsenic, and its compounds | 150 | 0.01 |
| Fluorine, and its compounds | 4000 | 0.8 |
| Boron, and its compounds | 4000 | 1.0 |
| Simazine | | 0.003 |
| Thiuram | | 0.006 |
| Thiobencarb | | 0.02 |
| PCB | | ND |
| Organic phosphorus compounds | | ND |

**IMPORTANT: These criteria are NOT to be used as Environmental Quality Standards for Soil**

# AP2. APPENDIX 2

## DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

AP2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

AP2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

AP2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

AP2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

AP2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

AP2.4. For installations with POL Storage Containers:

AP2.4.1. Single POL Storage Container Facilities. For facilities containing only one aboveground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

AP2.4.2. Multiple POL Storage Container Facilities

AP2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

AP2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume

equals the capacity of the largest single above ground oil or hazardous substance storage container.

AP2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

AP2.4.2.3.1. The total capacity of the above ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

AP2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

AP2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.

**CRITICAL: DO NOT INSERT ANYTHING HERE, AND DO NOT DELETE THIS LINE!!!**