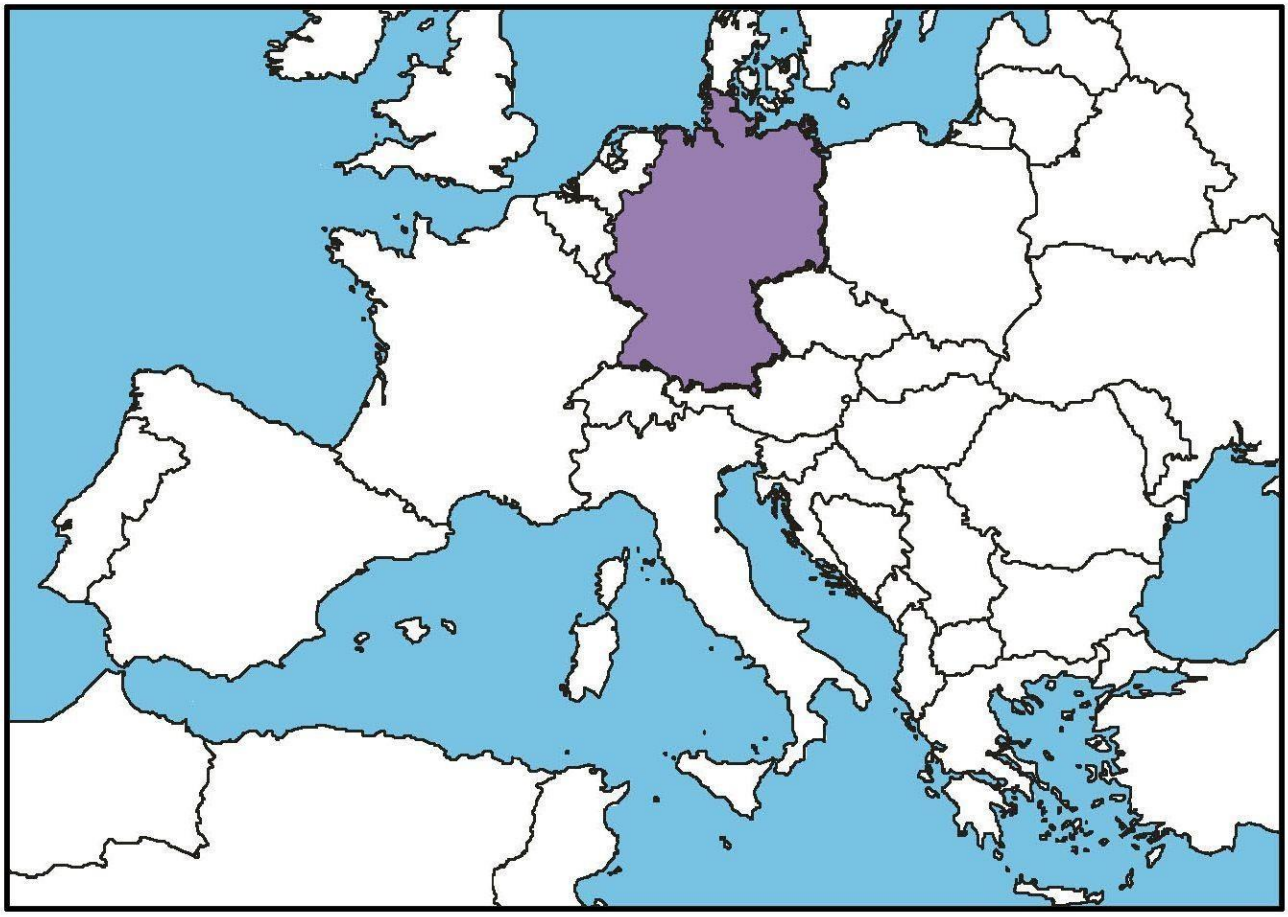
US DEPARTMENT OF DEFENSE

ENVIRONMENTAL FINAL GOVERNING STANDARDS

Germany



September 2020

United States Army Installation Management Command
Europe
Unit 23103
APO AE 09136-3103

DEPARTMENT OF THE ARMY
UNITED STATES ARMY INSTALLATION MANAGEMENT COMMAND
EUROPE
UNIT 23103
APO AE 09136-3103

IMEU-ENV 3 November 2020

MEMORANDUM FOR HQ USEUCOM, Logistics Directorate (ECJ4), Strategic Logistics Division (ECJ4-SL)

SUBJECT: Approval of Updated Final Governing Standards for Belgium, Germany, and the Netherlands

1. References:

   a. DoD Instruction 4715.05, Environmental Compliance at Installations Outside the United States, 1 November 2013.

   b. Memorandum, Office of the Assistant Secretary of the Army, Installations, Energy, and Environment, SAIE, 22 October 2018, Delegation of Lead Environmental Component Responsibilities under DoD Instruction 4715.05 for Belgium, Germany and the Netherlands.

2. The updated chapters of the environmental Final Governing Standards (FGS) for Belgium, Germany, and the Netherlands are approved in accordance with reference 1a and under the authority of reference 1b. The FGS will be distributed for implementation by all DoD entities in Belgium, Germany and the Netherlands in accordance with reference 1a, Encl. 1-3.

3. The point of contact for this memo is Nicole Sikula: DSN: 314-544-4509; civilian phone: +49 (0) 611-143-544-4509 Email: nicole.r.sikula.civ@mail.mil

3 Encls
1. Belgium FGS 2020
2. Germany FGS 2020
3. Netherlands FGS 2020

TOMMY R. MIZE
Director

EXECUTIVE SUMMARY

DoDI 4715.05, *Environmental Compliance at Installations Outside the United States,* establishes policy and assigns responsibilities for managing environmental compliance to protect human health and safety outside the United States on installations under DoD control. The DoDI also assigns the environmental compliance responsibilities to a Lead Environmental Component (LEC). IMCOM-Europe is delegated the authority of representing the Army for LEC responsibilities for Germany, Belgium and the Netherlands.

A major LEC responsibility is to prepare and maintain Final Governing Standards (FGS) that are consistent with DoD 4715.05-G *Overseas Environmental Baseline Guidance Document* (OEBGD), applicable European Community/host-nation environmental laws, the Status of Forces Agreement (SOFA), and other applicable international agreements.

Completion of the German Final Governing Standards (G-FGS) updates was the result of teamwork, cooperation and consultation among all DoD Service component representatives within the USEUCOM area of responsibility and the EUCOM Theater Environmental Coordinator.

G-FGS updates do not address past environmental contamination or abatement standards. These are addressed under DoD Instruction 4715.08, *Remediation of Environmental Contamination Outside the United States,* and USEUCOM Directive 80-2. The GFGS also do not address environmental project planning requirements under Executive Order 12114 and DoD Directive 6050.7, *Environmental Effects Abroad of Major Department of Defense Actions.*

The 2020 GE-FGS update included Chapter 5, “Hazardous Materials” and Chapter 6, “Hazardous Waste.”

In 2010, 2012, 2014, 2016, 2017 and 2019 updates were completed as listed on the following page. The 2010 GFGS update incorporated all changes in the 2007 update to OEBGD. The OEBGD is the basis document for the development of all FGSs.

Revalidations and Updates ***IAW DoDI 4715.05, Encl 3 (4)(f)***		
Action	**Date**	**Posted By**
Revision 0: Full Revision	Feb 2010	IMCOM-AE
Revision 1: Chapters 10 and 13	Jul 2012	IMCOM-ENV
Revision 2: Chapters 2, 5, 6, 7, 8, 10, 15, 18	Jul 2014	IMEU-PWD E
Revision 3: Chapters 3, 11, 12	Aug 2016	IMEU-PWD E
Revision 4: Chapters 2, 7, 9	Jul 2017	IMEU-PWD E
Revision 5: Chapters 1, 14, 17 (Legislative cutoff date of March 2018)	Sept 2019	IMCOM - E
Revision 6: Chapters 5 and 6 (Legislative cutoff date of March 2018)	**Sept 2020**	**IMCOM - E**

CONTENTS

C1.	CHAPTER 1	OVERVIEW	1-1
C2.	CHAPTER 2	AIR EMISSIONS	2-1
C3.	CHAPTER 3	DRINKING WATER	3-1
C4.	CHAPTER 4	WASTEWATER	4-1
C5.	CHAPTER 5	HAZARDOUS MATERIAL	5-1
C6.	CHAPTER 6	HAZARDOUS WASTE	6-1
C7.	CHAPTER 7	SOLID WASTE	7-1
C8.	CHAPTER 8	MEDICAL WASTE MANAGEMENT	8-1
C9.	CHAPTER 9	PETROLEUM, OIL, AND LUBRICANTS	9-1
C10.	CHAPTER 10	ENVIRONMENTAL NOISE	10-1
C11.	CHAPTER 11	PESTICIDES	11-1
C12.	CHAPTER 12	HISTORIC AND CULTURAL RESOURCES	12-1
C13.	CHAPTER 13	NATURAL RESOURCES AND ENDANGERED SPECIES	13-1
C14.	CHAPTER 14	POLYCHLORINATED BIPHENYLS	14-1
C15.	CHAPTER 15	ASBESTOS	15-1
C16.	CHAPTER 16	[RESERVED]	16-1
C17.	CHAPTER 17	LEAD-BASED PAINT	17-1
C18.	CHAPTER 18	SPILL PREVENTION AND RESPONSE PLANNING	18-1
C19.	CHAPTER 19	UNDERGROUND STORAGE TANKS	19-1

APPENDICES

AP1.	APPENDIX 1	HAZARDOUS SUBSTANCES LIST	1-1
AP2.	APPENDIX 2	DETERMINATION OF WORST-CASE DISCHARGE PLANNING VOLUME	2-1

CHAPTER 1 - OVERVIEW

C1.1. PURPOSE

C1.1.1. The primary purpose of these Final Governing Standards (FGS) is to provide environmental compliance criteria at United States (US) Department of Defense (DoD) installations in the Federal Republic of Germany. This document implements DoD Instruction (DoDI) 4715.05, "Environmental Compliance at Installations Outside the United States," dated 1 November 2013, and is based on 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 German national and state environmental laws and regulations, and applicable international agreements. These FGS are consistent with the provisions of Article 53A of the revised Supplemental Agreement (SA) to the North Atlantic Treaty Organization (NATO) Status of Forces Agreement (SOFA), effective 29 March 1998.

C1.2. APPLICABILITY

C1.2.1. These FGS provide environmental compliance criteria applicable to actions of the DoD Components at installations located in the Federal Republic of Germany.

C1.2.2. These FGS represent minimum criteria; DoD Components may impose additional criteria provided those policies and directives do not directly conflict with these FGS.

C1.2.3. Activities and installations shall notify the Lead Environmental Component (LEC) of any directly conflicting DoD Component policies or directives they discover before imposing criteria more protective than provided in these FGS.

C1.2.4. DoD Components shall not enter into agreements with European Union (EU) or German authorities at any level that establishes a criterion for compliance with an environmental criterion different than provided in these FGS without the prior written approval of the LEC.

C1.2.5. Exemptions. These FGS do not apply to:

C1.2.5.1. 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.

C1.2.5.2. 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.

C1.2.5.3. Operations of US military vessels or US military aircraft, or off-installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when US Forces are operating as part of a multinational force not under full control of the US. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DoD Directives (DoDDs) and DoDIs, and environmental annexes incorporated into operation plans or operation orders. However, these FGS do apply to support functions for US military vessels and US military aircraft provided by the DoD Components, including management or disposal of off-loaded waste or material.

C1.2.5.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order 12344, "Naval Nuclear Propulsion Program," and conducted pursuant to 42 United States Code (USC) 7158, "Naval reactor and military application programs."

C1.2.5.5. The determination or conduct of remediation to correct environmental problems caused by the DoD's past activities shall be conducted in accordance with DoDI 4715.08 "Remediation Environmental Contamination Outside the United States."

C1.2.5.6. Environmental analyses conducted under Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions."

C1.3. EXCEPTIONS

C1.3.1. In accordance with international law and agreements, the FGS criteria are the final standards. A DoD Component may request an exception to a standard otherwise applicable accordingly.

C1.3.2. If compliance with an FGS criteria at a particular installation(s) or facility(ies) would seriously impair its mission, adversely affect relations with German authorities, or require substantial expenditure of funds at an installation that has been identified for closure or at an installation that has been identified for a realignment that would remove the requirement, a DoD Component may ask the DoD LEC to provide an exception to the particular criteria. See DoDI 4715.05 and EUCOM Compliance Instruction (ECI) 4804.01A, Environmental Compliance, for complete exception procedures.

C1.4. DEFINITIONS

For purposes of these FGS, unless otherwise indicated, the following definitions apply:

C1.4.1. Criteria. Compliance standards applicable to DoD installations in the Federal Republic of Germany developed through analysis of:

C1.4.1.1. Particular provisions of US law respecting environmental protection on DoD installations.

C1.4.1.2. EU and Federal Republic of Germany laws of general applicability, including those specifically delegated to regional or local governments for implementation, respecting environmental protection and that are generally applied to Federal Republic of Germany military.

C1.4.1.3. Applicable international treaty provisions that are used to determine these FGS. DoD installations in the Federal Republic of Germany shall use these FGS as standards for environmental compliance rather than the individual source documents that have been reconciled by the LEC in the creation of these FGS.

C1.4.2. Existing Facility. Any facility, building, source, or project in use or under construction before 1 October 1994, unless it was subsequently substantially modified.

C1.4.3. New Facility. Any facility, 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.

C1.5. PERMITS AND NOTIFICATIONS

C1.5.1. The construction of a new facility, the modification of an existing facility or the operation of certain equipment may require an authorization by or notification to the competent German authority (e.g. emission control permit, radiation safety permit or water permit, public hygiene permit, etc.).

C1.5.2. Under the principles of international law, DoD Components shall not directly obtain authorizations from or make formal notifications (including, but not limited to licenses and permits) to German authorities.

C1.5.3. The BImA or, as appropriate, the Center of Expertise for Construction Management shall be notified of any DoD action that may require a permit, license, or other form of official permission in accordance with the applicable international agreements. For issues and activities that fall into the area of responsibility of a DoD Component, the BImA shall be the responsible agency to initiate and to process administrative proceedings to obtain the appropriate permit, license, or other form of official permission on behalf of the DoD. For NATO sites owned by the Federal Ministry of Defense, the Center of Expertise for Construction Management shall be the responsible agency to initiate and process administrative proceedings on behalf of the DoD. In connection with military construction, the German public construction authorities shall be the

responsible agency to initiate and process administrative proceedings on behalf of the DoD. DoD Components should assist the appropriate authority in applying for such authorization by providing requested information. However, DoD Components shall not be signatory to any German authorization.

C1.5.4. Any disputes in the authorization process shall be reported to the LEC via the chain of command. The LEC will pursue resolution with higher military headquarters, as needed.

C1.5.5. When an authorization is obtained on behalf of a DoD Component and the authorization requires a more protective standard than prescribed in the FGS, the standard in the authorization shall be the compliance standard. However, if an authorization allows a less protective standard, the FGS will be the compliance standard unless an exception from the LEC is obtained.

C1.5.6. Certificates obtained from certifying organizations (e.g., tank tightness testing) do not fall within the definition of a permit, license, or other form of official permission for which the BImA or Center of Expertise for Construction Management have responsibility. Requests for services (e.g., inspections) shall be forwarded directly to the appropriate organizations without involving the BImA or Center of Expertise for Construction Management.

C1.6. LEGAL PROTECTIONS FOR US FORCES EMPLOYEES

C1.6.1. Legal protections afforded to DoD personnel who are investigated or charged by German authorities with alleged offenses arising out of any act or omission done in the performance of official duty depend on the status of the individual. Under the NATO SOFA and the Supplementary Agreement thereto, the US may assert the primary right to exercise criminal jurisdiction over military service members for offences arising out of any act or omission done in the performance of official duty. In peacetime, there is, however, no such jurisdiction with regard to US civilian DoD employees. US and local national DoD employees are, therefore, fully subject to German criminal jurisdiction. There is no authority under US law for the US government to pay criminal/administrative fines levied against its personnel (either US or local national DoD employee). Based on the above, it is advisable to organize the responsibilities within the organization so that military service members are ultimately responsible for official duty acts or omissions rather than DoD civilians or local national employees, for whom non-compliance with German legal requirements may result in criminal liability.

Regarding civil liability, the NATO SOFA provides that a member of the force or the civilian component is not subject to civil enforcement proceedings. Under the German civil law, a local national employee cannot be held liable for damages caused in connection with the performance of official duty, unless the damage was caused willfully or due to gross negligence.

C1.6.2. Installations, activities, and personnel should immediately contact their servicing legal office when faced with possible or actual German enforcement actions in order to maximize

protections afforded to DoD personnel under the NATO SOFA, bilateral agreements, and US and DoD regulations, and to secure legal representation for the subjects of the enforcement action (including local national employees). Installations will report possible or actual German enforcement actions to the DoD LEC via their chain-of-command.

C1.6.3. If the German authorities seek to question a DoD employee by name regarding his or her official duties, the office normally coordinating with those authorities will contact the German authority to determine the nature of their inquiry and attempt to satisfy their request with official correspondence. If this fails, the head of the branch or division in which the DoD employee works will accompany the employee, if possible. It may not be readily apparent whether the German legal proceeding is criminal or administrative in nature. This point should be clarified as soon as possible since different procedures may apply depending on the answer. If criminal, the employee should be advised to seek personal legal counsel. Installations will report interview by German authorities to the DoD LEC via their chain-of-command.

C1.7. ADDITIONAL INFORMATION

C1.7.1. These FGS shall not expressly indicate the source of the standard, whether domestic, German, or international agreement. The LECs may retain draft working documents and references used in developing these FGS but may not officially issue any compilation of such materials. The DoD LECs shall maintain, for purposes INTERNAL TO THE LEC AND THE DEPARTMENT OF DEFENSE, a record of their decision-making process which clearly identifies the comparative analysis strategy regarding how a particular FGS requirement was derived.

C1.7.2. The DoD Components shall establish and implement an environmental audit program to ensure that DoD installations in Germany assess compliance with these FGS at least once every 3 years at all major installations.

C1.7.3. When developing FGS, the LECs shall ensure that, where a standard must be measured by a laboratory method and would be ambiguous without reference to an analytical method, these FGS include a brief description of the analytical method and appropriate quality assurance/quality control (QA/QC) procedures to be followed. Laboratory analyses necessary to comply with these FGS criteria shall normally be conducted in a laboratory that has been certified by a US or German 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 quality assurance compliance with standards for the applicable test method that are generally recognized by appropriate industry or scientific organizations.

C1.7.4. These FGS do not create any rights or obligations enforceable against the US, 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 in DoDI 4715.05. These FGS do not change other DoDDs or DoDIs or alter DoD policies.

C1.7.5. When these FGS were developed, DoD activities and installations were located in the German states of Baden-Württemberg, Bayern, Hessen, Rheinland-Pfalz and Nordrhein-Westfalen. If DoD activities are, or will be, located in any other state, the LEC shall be contacted to determine if there are any changes in the FGS applicable in those other states.

C1.8. LEAD ENVIRONMENTAL COMPONENT

C1.8.1. The LEC for these FGS is the Region Director, IMCOM-Europe delegated by the Secretary of the Army to represent the Army with responsibilities as delineated in DoDI 4715.05 for Germany, Belgium and the Netherlands. Any questions or comments pertaining to these FGS shall be sent to the following:

DEPARTMENT OF THE ARMY UNITED STATES ARMY INSTALLATION MANAGEMENT COMMAND EUROPE REGION

Sembach Kaserne, Building 112
67681 Sembach Heuberg, Germany
DSN Voice (314) 544-0100
Civilian +49 611-143-544-0100

CHAPTER 2 – AIR EMISSIONS

C2.1. SCOPE

This chapter provides standards for air emissions sources. Criteria addressing open burning of solid waste are in Chapter 7, "Solid Waste." Criteria addressing asbestos are in Chapter 15, "Asbestos." Procedures for obtaining permits or other authorizations are addressed in Chapter 1, "Overview" of these FGS.

C2.2. DEFINITIONS

C2.2.1. Bioethanol. Ethanol of 100 volume percent made from biomass or the biologically degradable portion of waste and which is intended for the use in fuel mixtures.

C2.2.2. 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 (HW) combustion units.

C2.2.3. Electrical Switchgear. Switching devices and their combination with associated control, measuring, protective and regulating equipment, and assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended for usage in connection with the generation, transmission, distribution and conversion of electric energy.

C2.2.4. Emissions. Emissions are air pollution (by dust, smoke, gases, aerosols, steams, or odor), noise, vibrations, light, heat, radiation, or similar effects produced by facilities or activities. Emissions shall be described as:

C2.2.4.1. Mass concentration in g/m^3 or mg/m^3 under standard reference conditions of 32°F (0°C) and 1 atm (1,013 hectopascal);

C2.2.4.2. Mass flow of emitted substances in kg/h, g/h or mg/h (pound/h); or

C2.2.4.3. Mass of emitted substances in kg/t or g/t (pound/ton) of product.

C2.2.5. Existing Filling Station. Filling station built before 1 January 1993.

C2.2.6. Existing Heat Generating Units. Heat generating units installed before 22 March 2010.

C2.2.7. Filling Station. Facility for dispensing gasoline and fuel mixtures from storage tanks into fuel tanks of motor vehicles.

C2.2.8. Flue Gas Cleaning System *(Abgasreinigungseinrichtung)*. A system for gasoline, fuel mixtures, or naphtha vapor recovery or a system for vapor energy recovery, especially in gas engines, including any buffer tank systems.

C2.2.9. Fluorinated Greenhouse Gases. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and other greenhouse gases that contain fluorine, as listed in Table C2.T11., or mixtures containing any of those substances, but excluding substances in Table C2.T10.

C2.2.10. 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.

C2.2.11. 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.

C2.2.12. Fuel Mixtures *(Kraftstoffgemische)*. Crude oil derivatives with a content of > 10 and < 90 volume percent of bioethanol.

C2.2.13. Gasoline *(Ottokraftstoff)*. Crude oil derivatives with a content of up to 10 volume percent of bioethanol and intended for the use as fuel in gasoline engines.

C2.2.14. Global Warming Potential (GWP). The climatic warming potential of a greenhouse gas relative to that of carbon dioxide (CO_2), calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO_2, as set out in Table C2.T11. Method of calculating the total GWP of a mixture is displayed in Table C2.T12.

C2.2.15. Halon Containing New Equipment. Equipment for which, by the halon cut-off date, neither of the following events has occurred: signature of the relevant procurement or development contract or submission of a request for type approval or type certification to the appropriate regulatory authority.

C2.2.16. Halon Cut-off Date. Date after which halons shall not be used for fire extinguishers or fire protection systems in new equipment and new facilities.

C2.2.17. Halon End Date. Date after which halons shall not be used for the application concerned and by which date the fire extinguishers or fire protection systems containing halons shall be decommissioned.

C2.2.18. Heat Generating Unit *(Feuerungsanlage)*. A piece of equipment/unit which generates heat by burning fuels. The unit includes the appliances for heat production, and – if existing – combustion air feed, connecting piece and exhaust system.

C2.2.19. Hermetically Sealed Equipment. Equipment in which all fluorinated greenhouse gas containing parts are made tight by welding, brazing or a similar permanent connection, which may include capped valves or capped service ports that allow proper repair or disposal, and which have a tested leakage rate of < 3 grams per year under a pressure of at least a quarter of the maximum allowable pressure.

C2.2.20. Hydrochlorofluorocarbons (HCFCs). The substances listed as class II ODS in Table C2.T10.

C2.2.21. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for ozone-depleting substances (ODS).

C2.2.22. 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.

C2.2.23. 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.

C2.2.24. 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).

C2.2.25. 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.

C2.2.26. Naphtha *(Rohbenzin)*. Untreated crude oil distillate gained from the refining of crude oil or natural gas.

C2.2.27. New Facilities With Halon Systems. Facilities for which, by the halon cut-off date, neither of the following events has occurred: signature of the relevant development contract or submission of a request for planning consent to the appropriate regulatory authority.

C2.2.28. Normally Occupied Space. Protected space in which it is necessary for persons to be present most or all of the time in order for the equipment or facility to function effectively. For military applications, the occupancy status of the protected space would be the one applicable during a combat situation.

C2.2.29. Normally Unoccupied Space. Protected space occupied for limited periods only, in particular for undertaking maintenance, and where the continual presence of persons is not necessary for the effective functioning of the equipment or facility.

C2.2.30. Operator. The natural or legal person exercising actual power over the technical functioning of products and equipment.

C2.2.31. Organic Rankine Cycle. A cycle containing condensable fluorinated greenhouse gas converting heat from a heat source into power for the generation of electric or mechanical energy.

C2.2.32. Ozone-Depleting Substances (ODS). Those substances listed in Table C2.T10.

C2.2.33. 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).

C2.2.34. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

C2.2.35. 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.

C2.2.36. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

C2.2.37. Rated Capacity. The maximal mass of organic solvent used in a facility, averaged over one day, if the facility is operated under normal working conditions.

C2.2.38. Solvent (or 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 solvent cleaning machines.

C2.2.39. Soot Level *(Rußzahl)*. Characteristic factor for the blackening *(Schwärzung)* caused by the dust emissions contained in the flue gas. Measure for the blackening is the optical reflectivity. An increase of the soot level by 1 equals a decrease of the reflectivity by 10 %.

C2.2.40. Stack. Any stationary point in a source covered by criteria contained in this chapter designed to emit pollutants.

C2.2.41. 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.

C2.2.42. Storage Tank. Stationary tank or stationary container for the storage of gasoline, fuel mixtures, or naphtha in a tank farm or at a filling station.

C2.2.43. Substantial Modification *(wesentliche Änderung)* of a:

C2.2.43.1. Heat Generating Unit. The modification results in a significant increase in air emissions. A substantial modification applies to change of fuel (if the unit is not specifically designed for changing fuel use) and to replacement of boiler in a heat generating unit.

C2.2.43.2. Facility Using Volatile Halogenated Organic Solvents. The modification results in: significant negative impacts on the environment; an emissions increase of volatile organic compounds of > 25% if the rated capacity of facilities with a solvent consumption of ≤ 10 metric tons/year is modified; or an emission increase of volatile organic compounds of > 10% if the rated capacity of facilities with a solvent consumption of > 10 metric tons/year is modified.

C2.2.44. Tank Farm. A facility for the storage and decanting of gasoline, fuel mixtures, or naphtha into or from rail tank cars or inland water vessels, or into road tank vehicles, including all the facility's storage tanks.

C2.2.45. Tonne(s) of CO_2 Equivalent. A quantity of greenhouse gases expressed as the product of the weight of the greenhouse gases in metric tons and of their GWP. Method of calculating tonnes of CO_2 equivalent is displayed in Table C2.T13.

C2.2.46. Undertaking. Any natural person or legal entity who produces, uses, recovers, collects, recycles, reclaims, or destroys fluorinated greenhouse gases; imports or exports fluorinated greenhouse gases or products and equipment that contain such gases; installs, services, maintains, repairs, checks for leaks or decommissions equipment that contains, or whose functioning relies upon, fluorinated greenhouse gases; is the operator of equipment that contains, or whose functioning relies upon, fluorinated greenhouse gases.

C2.2.47. Vapor Cleaning Machine. A batch or inline solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

C2.2.48. Vapor Recovery System *(Gaspendelsystem, Gasrückführungssystem)*. System capturing vapors displaced during fueling a car, or filling a storage tank or mobile container and which are returned to the gas pump, mobile tank, storage tank or buffer system tank via a vapor-tight connection pipe.

C2.3. CRITERIA

C2.3.1. Steam/Hot Water Generating Units.

C2.3.1.1. Burning of waste is prohibited.

C2.3.1.2. Small and Medium-Size Units. The following criteria apply to small and medium-size steam/hot water generating units. Units that will not be operated for > 3 months at the same location are excluded from these criteria.

C2.3.1.2.1. Solid Fuel-Fired Heat Generating Units.

C2.3.1.2.1.1. Heat generating units shall only be operated if they are in proper technical condition.

C2.3.1.2.1.2. Heat generating units installed after 22 March 2010 burning vegetable fuels or renewable resources shall only be operated if documented by the manufacturer that the unit meets the emission limits listed in Table C2.T1.

C2.3.1.2.1.3. Heat generating units with a rated heat output ≥ 4 kW shall meet the emission limits for dust and carbon monoxide (CO) in Table C2.T2.

C2.3.1.2.1.3.1. For units installed between 22 March 2010 and 1 January 2015, the emission values of stage 1 in Table C2.T2. shall also apply after 1 January 2015.

C2.3.1.2.1.3.2. For existing heat generating units (installed before 22 March 2010), operation shall only continue if stage 1 emission limits (Table C2.T2.) are met in accordance with their respective date of installation and the dates listed in Table C2.T3.

C2.3.1.2.1.4. Until the dates listed in Table C2.T3., existing heat generating units with a rated heat output ≥ 15 kW shall meet the emission limits in Table C2.T4.

C2.3.1.2.2. Oil- and Gas-Fired Heat Generating Units.

C2.3.1.2.2.1. The maximum allowable flue gas loss in Table C2.T5. shall not be exceeded.

C2.3.1.2.2.2. Oil- and Gas-fired Units used to Heat Buildings or Rooms, Using Water as Heat Transfer Medium with a Rated Heat Output of:

C2.3.1.2.2.2.1. < 10 MW and installed after 22 March 2010, shall only be operated if the manufacturer of the boiler-burner-units certifies that the emission limits in Table C2.T6. for nitrogen oxides (NO_x) are not exceeded.

C2.3.1.2.2.2.2. NO_x emissions shall be limited by approved commercially available firing techniques.

C2.3.1.2.2.2.3. > 400 kW and installed or modified by replacement of the boiler after 22 March 2010, shall be operated only if the manufacturer of the boiler and burner certifies that the efficiency factor is ≥ 94%.

C2.3.1.2.2.3. Oil-fired Units with a Vaporizing Burner. The units shall be installed and operated according to the following criteria:

C2.3.1.2.2.3.1. The blackening resulting from dust emissions in the flue gas shall not exceed the soot level 2;

C2.3.1.2.2.3.2. The flue gas shall be free of oil derivatives; and

C2.3.1.2.2.3.3. The emissions of CO shall not exceed 1,300 mg/kWh.

C2.3.1.2.2.3.4. For units with a rated heat output ≤ 11 kW and installed before 1 November 1996, the soot level 3 shall not be exceeded.

C2.3.1.2.2.4. Oil-fired Units with an Atomizing Burner. The units shall be installed and operated according to the following criteria:

C2.3.1.2.2.4.1. The blackening resulting from dust emissions in the flue gas shall not exceed the soot level 1;

C2.3.1.2.2.4.2. The flue gas shall be free of oil derivatives; and

C2.3.1.2.2.4.3. The emissions of CO shall not exceed 1,300 mg/kWh.

C2.3.1.2.2.4.4. For units installed before 1 October 1988, the soot level 2 shall not be exceeded, except if the unit has been substantially modified after this date or will be substantially modified.

C2.3.1.2.2.5. Gas-fired Units. If the unit is regularly supplied by the public gas supplier and using extra light heating oil for a maximum of 300 hours/year, the emission limit for NO_x for all operating temperatures during oil feed shall not exceed 250 mg/kWh flue gas.

C2.3.1.2.3. Monitoring.

C2.3.1.2.3.1. Compliance of units newly installed or substantially modified after 22 March 2010 shall be inspected by the chimney sweep within 4 weeks after initial operation. This initial inspection has to be conducted only once for mobile units.

C2.3.1.2.3.2. If a unit is not in compliance, corrective measures shall be taken and the unit shall be re-inspected by the chimney sweep.

C2.3.1.2.3.3. Compliance of units descr.ibed in C2.3.1.2.1.4. shall be inspected by a chimney sweep until 31 December 2011 and once every 2 years thereafter.

C2.3.1.2.3.4. Units with a rated heat output of ≥ 4 kW and burning:

C2.3.1.2.3.4.1. Solid fuels shall not exceed the emission limits in Table C2.T2. in accordance with Table C2.T3. and be monitored by the chimney sweep for compliance once every 2 years starting with the specific dates in Table C2.T3.

C2.3.1.2.3.4.2. Oil or gas shall meet the criteria in C2.3.1.2.2.3. through C2.3.1.2.2.5. and be monitored by the chimney sweep for compliance according to the following schedule:

C2.3.1.2.3.4.2.1. Once every 2 years for units installed or substantially modified (boiler replaced) > 12 years ago,

C2.3.1.2.3.4.2.2. Once every 3 years for units installed or substantially modified (boiler replaced) ≤ 12 years ago, and

C2.3.1.2.3.4.2.3. Once every 5 years for units equipped with a self-calibrating continuous control of the burning process.

C2.3.1.3. Large Units. There are currently no DoD-operated large (> 10 MW) steam/hot water generating units in Germany. If a DoD agency anticipates having operational control of a large steam/hot water generating unit, contact the Lead Environmental Component (LEC) for additional criteria.

C2.3.1.4. Additional Criteria and Exemptions. The appropriate German authority can require additional criteria or grant exemptions from the criteria of C2.3.1. under specific circumstances.

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 (CISWIs). All CISWI units must comply with the applicable emission standards in Table C2.T7. and operating limits in Table C2.T8.

C2.3.2.2. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table C2.T7. and operating limits in Table C2.T8.

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 > 1 ton per day (tpd) of sewage sludge or > 10% sewage sludge must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 pounds/ton dry sludge) and an opacity limit of 20% at all times, except during periods of startup, shutdown, malfunction, or when emergency conditions exist. This also applies to sewage sludge incinerators that underwent modifications after 1 October 1994 resulting in increased air emissions.

C2.3.2.4. Medical Waste Incinerators (MWIs). 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 MWIs 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: 760-870°C (1400-1600°F).

C2.3.2.4.1.3. Minimum temperature in secondary chamber: 980-1200°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.

C2.3.3. 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 > 7,571 liters (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°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°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. Facilities Using Organic Solvents.

C2.3.5.1. The German Federal Authority for Real Estate Matters *(Bundesanstalt für Immobilienaufgaben (BImA))* or, as appropriate, the Center of Expertise for Construction Management *(Kompetenzzentrum für Baumanagement)* shall be notified in writing before initial operation and substantial modification of facilities using organic solvents.

C2.3.5.2. The *BImA* or, as appropriate, the Center of Expertise for Construction Management shall be notified immediately in writing of noncompliance and of measures being initiated to return to compliance.

C2.3.5.3. All appropriate measures shall be taken to minimize emissions during the start-up and shut-down as much as possible.

C2.3.5.4. Halogenated Solvent Cleaning Machines. The following criteria apply to solvent cleaning machines using volatile halogenated hydrocarbons, e.g., those with a boiling point up to 150°C (300°F) at 1 atm (1,013 hectopascal). The criteria do not apply to machines using mixtures of solvents with < 1% volatile halogenated hydrocarbons.

C2.3.5.4.1. All solvent cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion-type solvent cleaning machines must have either a 1-inch water layer or a freeboard ratio of at least 0.75.

C2.3.5.4.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

C2.3.5.4.3. Emissions of volatile halogenated hydrocarbons shall not exceed the threshold value of 20 mg/m^3 at 0°C (32°F) at 1 atm (1,013 hectopascal).

C2.3.5.4.3.1. If teratogenic, carcinogenic, or mutagenic substances or mixtures are used, a threshold value of 2 mg/m^3 shall not be exceeded for volatile halogenated hydrocarbon emissions.

C2.3.5.5. Non-Halogenated Solvents.

C2.3.5.5.1. Facilities for Painting Motor Vehicle Surfaces (Paint Shop Repairs). Closed or at least half closed cleaning equipment shall be used to clean tools used during the process of surface coating at operating sites and stationary facilities.

C2.3.5.5.2. The following criteria apply to those facilities using organic solvents listed in Table C2.T9. that exceed the indicated threshold value for solvent consumption.

C2.3.5.5.2.1. Emissions shall not exceed the threshold values indicated in Table C2.T9.

C2.3.5.5.2.1.1. If teratogenic, carcinogenic, or mutagenic substances or mixtures are used, the mass flow of volatile organic compounds shall not exceed 2.5 g/h (0.005 pounds/h) or the mass concentration of volatile organic compounds shall not exceed 1 mg/m^3.

C2.3.5.5.2.1.2. The mass flow of volatile organic compounds labeled with the risk phrase R40 (“Limited evidence of a carcinogenic effect”) (also referred to as H341) or R68 (“Possible risk of irreversible effects) (also referred to H351) shall not exceed 100 g/h (0.22 pounds/h) or the mass concentration of volatile organic compounds shall not exceed 20 mg/m^3.

C2.3.5.5.2.1.2.1. With effect of 1 June 2015, the emission threshold values in criterion C2.3.5.4.2.1.2. also apply to the emission of volatile organic compounds with hazard statement H341 ("Suspected of causing genetic defects") or H351 ("Suspected of causing cancer") emerging from a facility.

C2.3.5.5.2.1.3. All solvent cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Citrus-based solvent cleaning machines are exempt from this criterion.

C2.3.5.6. Measurements and Reporting.

C2.3.5.6.1. A mass balance sheet (input and output) of solvents, a log of hours of operation (recorded by a meter of operating hours), and a log of maintenance activities shall be maintained.

C2.3.5.6.1.1. Records shall be kept for 3 years and be made available to the appropriate German authority on request.

C2.3.5.6.1.2. If the mass balance sheet compiled by the operator displays major deficiencies and is not corrected within an appropriate period of time, the operator shall assign a licensed inspection agency or a publicly appointed and sworn expert to establish the mass balance sheet. This does not apply to dry cleaning facilities.

C2.3.5.6.2. Initial measurement of volatile organic compound emissions shall be made no earlier than 3 months and not later than 6 months after the date facilities using organic solvents are placed into operation or substantially modified.

C2.3.5.6.3. Measurements of volatile halogenated hydrocarbon emissions shall be made annually. Measurements of volatile non-halogenated hydrocarbon emissions shall be made every 3 years.

C2.3.5.6.4. Initial and periodic measurements are not required if the mass concentration of volatile organic compounds in emissions is continuously measured and recorded. In this case, measuring equipment shall be annually calibrated and its functionality checked by a German Federal State-approved company.

C2.3.5.6.5. All measurements shall be conducted by a licensed organization. If a measurement exceeds a threshold value, a repeat measurement shall be performed within 6 weeks after the original measurement.

C2.3.5.6.6. The initial and annual measurement reports shall be submitted to the *BImA* or, as appropriate, the Center of Expertise for Construction Management within 4 weeks after receipt, be made available to the appropriate German authority on request, and a copy be maintained for 5 years.

C2.3.6. Units Containing Ozone Depleting Substances (ODS) Listed in Table C2.T10. or Fluorinated Greenhouse Gases Listed in Table C2.T11. The following criteria apply to direct atmospheric emissions of ODS, and/or fluorinated greenhouse gases from refrigeration equipment, air conditioning equipment, heat pumps, electrical switchgear, solvent containing equipment and fire suppression equipment.

C2.3.6.1. ODS and Fluorinated Greenhouse Gas 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 and certified personnel. Technicians shall be trained and certified in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or German equivalent.

C2.3.6.2. ODS and Fluorinated Greenhouse Gas Venting Prohibition. Any ODS or fluorinated greenhouse gas 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. ODS and Fluorinated Greenhouse Gas Leak Monitoring and Repair.

C2.3.6.3.1. Units Containing ODS. Monitor units containing ODS for leakage in accordance with the following criteria. If found to be leaking, the entire unit shall immediately be repaired and retrofitted or decommissioned. For retrofitting, the refrigerant gas shall be removed and disposed and replaced by non-ODS gas.

C2.3.6.3.1.1. If the amount of ODS of a unit is ≥ 3 kg (6.6 pounds), then the unit shall be checked for leakage at least once every 12 months. This does not apply to equipment with hermetically sealed systems which are labeled as such and contain < 6 kg (13 pounds) of ODS.

C2.3.6.3.1.2. If the amount of ODS of a unit is ≥ 30 kg (66 pounds), then the unit shall be checked for leakage at least once every 6 months.

C2.3.6.3.1.3. If the amount of ODS of a unit is ≥ 300 kg (661 pounds), then the unit shall be checked for leakage at least once every 3 months.

C2.3.6.3.1.4. Recordkeeping.

C2.3.6.3.1.4.1. Records on inspections, maintenance, tightness tests, and repairs, shall be documented in the operations manual *(Betriebshandbuch)*.

C2.3.6.3.1.4.2. Additional records to be kept shall comprise information on: type and quantity of used or recycled class I or class II ODS, identification of the company or technician which performed the maintenance or servicing, and dates and results of leak inspections.

C2.3.6.3.1.4.3. Records shall be kept for at least 5 years.

C2.3.6.3.1.4.4. Records shall be made available to the appropriate German authority on request.

C2.3.6.3.2. Equipment Containing Fluorinated Greenhouse Gases. Monitor and repair equipment containing fluorinated greenhouse gases for leakage in accordance with the following criteria and repair without undue delay if found to be leaking.

C2.3.6.3.2.1. If the amount of fluorinated greenhouse gas of a unit is ≥ 5 but < 50 tonnes of CO_2 equivalent, and not contained in foams, then the unit shall be checked for leakage at least every 12 months; or where a leakage detection system is installed, at least every 24 months. Hermetically sealed equipment that contains fluorinated greenhouse gases in

quantities of < 10 tonnes of CO_2 equivalent shall not be subject to leakage checks if labeled as hermetically sealed.

C2.3.6.3.2.2. If the amount of fluorinated greenhouse gas of a unit is ≥ 50 but < 500 tonnes of CO_2 equivalent, and not contained in foams, then the unit shall be checked for leakage at least every 6 months or, where a leakage detection system is installed, at least every 12 months.

C2.3.6.3.2.3. If the amount of fluorinated greenhouse gas of a unit is ≥ 500 tonnes of CO_2 equivalent and not contained in foams, then the unit shall be checked for leakage at least every 3 months or, where a leakage detection system is installed, at least every 6 months.

C2.3.6.3.2.4. Electrical switchgear shall not be subject to leak checks provided it complies with one of the following conditions: it has a tested leakage rate of < 0.1 % per year as set out in the technical specification of the manufacturer and is labeled accordingly; it is equipped with a pressure or density monitoring device; or it contains < 6 kg (13 pounds) of fluorinated greenhouse gases.

C2.3.6.3.2.5. Leaks of fluorinated greenhouse gases from equipment shall be prevented and shall not exceed the maximum permissible losses defined in Table C2.T14.; this does not apply to equipment with hermetically sealed systems which are labeled as such and contain < 6 kg (13 pounds) of fluorinated greenhouse gases. A unit with a leak exceeding the maximum permissible loss shall be decommissioned or immediately repaired.

C2.3.6.3.2.6. Recordkeeping.

C2.3.6.3.2.6.1. The quantity and type of fluorinated greenhouse gases installed;

C2.3.6.3.2.6.2. The quantities of fluorinated greenhouse gases added during installation, maintenance or servicing or due to leakage;

C2.3.6.3.2.6.3. Whether the quantities of installed fluorinated greenhouse gases have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number;

C2.3.6.3.2.6.4. The quantity of fluorinated greenhouse gases recovered;

C2.3.6.3.2.6.5. The identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate;

C2.3.6.3.2.6.6. The dates and results of the leakage checks; and

C2.3.6.3.2.6.7. If the equipment was decommissioned, the measures taken to recover and dispose of the fluorinated greenhouse gases.

C2.3.6.3.2.6.8. Records shall be kept for at least 5 years.

C2.3.6.3.2.6.9. Records shall be made available to the appropriate German authority on request.

C2.3.6.3.2.7. Leak Detection System.

C2.3.6.3.2.7.1. A leak detection system which alerts the operator or a service company of any leakage shall be installed on the following equipment containing fluorinated

greenhouse gases in quantities of ≥ 500 tonnes of CO_2 equivalent:

C2.3.6.3.2.7.1.1. Stationary refrigeration equipment, stationary air-conditioning equipment, stationary heat pumps, and stationary fire protection; and

C2.3.6.3.2.7.1.2. Electrical switchgear and organic Rankine cycles, installed from 1 January 2017.

C2.3.6.3.2.7.2. The leak detection systems shall be inspected according to the following schedule:

C2.3.6.3.2.7.2.1. Stationary refrigeration equipment, stationary air-conditioning equipment, stationary heat pumps, stationary fire protection, and organic Rankine cycles: at least once every 12 months to ensure their proper functioning; and

C2.3.6.3.2.7.2.2. Electrical switchgear: at least once every 6 years to ensure their proper functioning.

C2.3.6.3.3. The equipment or system shall be checked for leakage within 1 month after a leak has been repaired to ensure that the repair has been effective.

C2.3.6.3.4. Leak checks shall be performed by U.S. certified personnel or German equivalent.

C2.3.6.4. ODS and Fluorinated Greenhouse Gas Fire Suppression Agent Venting Prohibition. ODS or fluorinated greenhouse gases shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of ODS or fluorinated greenhouse gas-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following ODS or fluorinated greenhouse gas releases:

C2.3.6.4.1. *De minimis* releases associated with good-faith attempts to recycle or recover ODS or fluorinated greenhouse gases (i.e., release of residual ODS or fluorinated greenhouse gas 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.

C2.3.6.5. Class I ODS Use Prohibition. The use of class I ODSs is prohibited, except as provided below:

C2.3.6.5.1. Halons may be used for the critical uses in accordance with their specific cut-off and end dates provided in Table C2.T15.

C2.3.6.5.2. Until 31 March of each year, users who install, use, store, or stop using substances listed in Table C2.T15. shall report to the appropriate German authority the quantity and type of the used halons as well as measures taken to reduce emissions thereof for the past calendar year.

C2.3.6.5.3. Should DoD laboratories or other analytical activities require the use of class I ODS (except HCFC), the LEC shall be consulted for issue resolution.

C2.3.6.5.4. When use of halons in approved applications is discontinued, the halons shall be turned over to the defense reserve at Richmond, VA (http://www.dla.mil/Aviation/Offers/Services/AviationEngineering/OzoneDepRsrv.aspx).

C2.3.6.6. Class II ODS Use Prohibition. The use of class II ODSs is prohibited in the production, maintenance or servicing, including refilling, of products and equipment. An ODS containing unit can continue to be operated as long as inspections are completed IAW C2.3.6.3.1. and the unit is not leaking and does not have to be recharged with an ODS.

C2.3.6.6.1. A time-limited exemption can be granted by the appropriate German authority to allow the use of HCFCs and of products and equipment containing or relying on HCFCs where it is demonstrated that, for a particular use, technically and economically feasible alternative substances or technologies are not available or cannot be used.

C2.3.6.6.1.1. This exemption may not be authorized for a period which extends beyond 31 December 2019.

C2.3.6.7. Fluorinated Greenhouse Gas Prohibitions.

C2.3.6.7.1. The use of sulfur hexafluoride is prohibited in the following cases:

C2.3.6.7.1.1. In magnesium die-casting and in the recycling of magnesium die-casting alloys, except until 31 December 2017 where the quantity of sulfur hexafluoride used is < 850 kg per year.

C2.3.6.7.1.2. For the filling of vehicle tires.

C2.3.6.7.2. From 1 January 2020, the use of fluorinated greenhouse gases with a GWP of ≥ 2,500 to service or maintain refrigeration equipment with a charge size of ≥ 40 tonnes of CO_2 equivalent shall be prohibited. This shall not apply to:

C2.3.6.7.2.1. Military equipment (i.e., arms, munitions and war material);

C2.3.6.7.2.2. Equipment intended for applications designed to cool products to temperatures below –50°C;

C2.3.6.7.2.3. Until 1 January 2030, reclaimed or recycled fluorinated greenhouse gases used for the maintenance or servicing of existing refrigeration equipment, provided that:

C2.3.6.7.2.3.1. They have a label indicating that the substance has been reclaimed or recycled, information on the batch number and the name and address of the reclamation or recycling facility;

C2.3.6.7.2.3.2. They have been recovered from such equipment.

C2.3.6.8. ODS and Fluorinated Greenhouse Gas Recovery and Destruction. This criterion applies to ODS and fluorinated greenhouse gases from refrigeration equipment, air conditioning equipment, heat pumps, fire suppression equipment, solvent containing equipment, and to fluorinated greenhouse gas from switchgears: fluorinated greenhouse gases and ODS shall be properly recovered by U.S. certified personnel or German equivalent to

ensure their recycling, reclamation or turnover to the defense reserve (http://www.dla.mil/Aviation/Offers/Services/AviationEngineering/OzoneDepRsrv.aspx).

C2.3.7. Motor Vehicles. This criterion applies to DoD-owned motor vehicles as defined in paragraph C2.2.23.

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. Gasoline shall contain < 0.15 g/L lead compounds indicated as lead. A more restrictive standard of 0.013 g/L lead compounds indicated as lead is applicable when the motor octane number of the fuel remains under 85 and the research octane number of the fuel remains under 95 (based on German octane numbers).

C2.3.7.3. No chlorine or bromine compounds shall be used as additives in gasoline.

C2.3.7.4. The sulfur content in diesel fuel used to operate diesel engines shall not exceed 10 mg/kg.

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 the emissions from a stack do not result in maximum ground-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 3.2 km (2 miles) if such feature achieves a height (H_t) 0.8 km (0.5 mile) 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 m (85 ft), 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.

C2.3.8.2. For steam/hot water generating units with a rated heat output of ≥ 1 MW and requiring a permit, stacks shall be at least 10 m (33 ft) high, measured from the ground level elevation at the base of the stack, and shall protrude over the roof ridge by at least 3 m (10 ft).

C2.3.8.2.1. For buildings with a flat roof (i.e., if the angle of the roof is below 20°), the elevation of the roof ridge shall be computed based on an angle of the roof of 20°;

however, stacks shall not be higher than twice the height of the building following this computation approach.

C2.3.9. Permits and Notifications.

C2.3.9.1. Procedures for obtaining permits or other authorizations are addressed in Chapter 1, "Overview."

C2.3.9.2. DoD components shall comply with permit conditions. If the permit allows a less-protective standard than prescribed in these FGS, the FGS shall be the compliance standard.

C2.3.9.3. DoD components shall notify the *BImA* or, as appropriate, the Center of Expertise for Construction Management at least 1 month before a modification of a facility requiring a permit.

C2.3.9.4. DoD components shall notify the *BImA* or, as appropriate, the Center of Expertise for Construction Management immediately of the planned closure of a facility requiring a permit.

C2.3.10. Wood Working Facilities. The following criteria apply to the installation and operation of wood working facilities producing wood dust or chips, including installation and operation of transportation and storage equipment:

C2.3.10.1. Equipment to capture and remove wood dust from air emissions shall be installed if the threshold value of 20 mg/m^3 is exceeded.

C2.3.10.2. Wood dust and chips shall be stored in bunkers, silos, or closed rooms.

C2.3.10.3. Filling levels in bunkers and silos shall be controlled regularly.

C2.3.10.4. Storage and dust capture equipment shall be emptied in a manner that minimizes wood dust and chip emissions.

C2.3.11. Fuel Storage. The following criteria apply to facilities used for storage or decanting of fuels, i.e., gasoline, fuel mixtures or naphtha, as well as to mobile facilities used for their transport.

C2.3.11.1. Tank Farms. The following criteria apply to gasoline storage at tank farms. Tank farms may consist of one single tank.

C2.3.11.1.1. The roof and walls of stationary aboveground storage tanks shall be painted with a paint that reflects ≥ 70% of the sun's energy.

C2.3.11.1.2. Storage tanks with fixed-roofs shall be equipped with vacuum/pressure valves unless prohibited for safety or valid technical reasons.

C2.3.11.1.3. Fixed-roof tanks with an internal floating cover shall be equipped and operated with peripheral seals. The emission reduction shall reach at least 97% for the resting tank in comparison to fixed-roof tanks without an internal floating cover.

C2.3.11.1.4. Storage tanks with floating roofs shall be equipped and operated with peripheral seals according to the generally accepted industry standards. The emission reduction shall reach at least 97% for the resting tank in comparison to fixed-roof tanks without an internal floating cover.

C2.3.11.1.5. Storage tanks in tank farms with > 25,000 metric tons or 34,250 m^3 (9 million gallons) annual dispensing capacity shall be installed and operated as fixed-roof tanks with a flue gas cleaning system, fixed-roof tanks with internal floating cover, or floating-roof tanks.

C2.3.11.1.6. If the tank diameter is < 40 m (131 ft), the appropriate German authority can grant exemptions from the 97% emission reduction requirement.

C2.3.11.1.7. Insofar as safety-related aspects are not affected, gases and vapors escaping from the pressure relief valves and the discharging devices shall be conveyed to a gas collection system or flue gas cleaning system.

C2.3.11.1.8. Emissions emerging during inspections or cleaning activities shall be conveyed to an afterburning, or equivalent emission reduction measures shall be applied.

C2.3.11.1.9. Fuel vapors shall be captured and fed to a flue gas cleaning system or vapor recovery system during filling operations.

C2.3.11.1.9.1. Vapor recovery systems shall meet the following technical standards: fuel flow shall be released only when equipment is connected to the vapor recovery system using a locking device and no fuel vapors shall be discharged to the atmosphere during operation (except for safety releases). The locking device is not required for the transfer of fuel at rail tank cars, tank containers or inland tank ships, and at stationary facilities with a volume < 1 m^3 (264 gallons) or a throughput not exceeding 100 m^3/year (26,417 gallons/year).

C2.3.11.1.9.2. Flue gas cleaning systems at facilities with a storage capacity < 5,000 metric tons or 6,850 m^3 (1 million gallons), i.e., facilities not requiring a permit, shall be installed and operated so that the efficiency is ≥ 97% and the emissions of organic substances do not exceed a mass concentration of 12 g/m³ per hour expressed as total carbon without methane.

C2.3.11.1.9.3. Flue gas cleaning systems at facilities with a storage capacity of ≥ 5,000 metric tons or 6,850 m^3 (1 million gallons), i.e., facilities requiring a permit, shall be installed and operated so that the emissions of organic substances do not exceed a mass concentration of 50 mg/m^3 expressed as total carbon without methane if the mass flow is > 0.50 kg/h (0.02 pounds/min), or 1.7 g/m^3 if the mass flow is ≤ 0.50 kg/h (0.02 pounds/min).

C2.3.11.1.10. Facilities shall be operated so that dispensing is interrupted immediately if vapors are emitted.

C2.3.11.1.11. During filling activities, the fill nozzle shall be kept close to the bottom of the container to avoid splattering.

C2.3.11.2. Mobile Tanks. Mobile tanks shall be equipped with systems that hold back vapors and allow the vapor recovery connection at a filling station or tank farm.

C2.3.11.3. Filling Stations. Storage tanks at filling stations shall be equipped with a vapor recovery system. This criterion does not apply to filling stations constructed before 4 June 1998 with a dispensing capacity of < 100 m^3 (26,417 gallons) per year.

C2.3.11.4. Monitoring.

C2.3.11.4.1. The following monitoring criteria apply to facilities not requiring a permit, i.e., with a storage capacity < 5,000 metric tons or 6,850 m^3 (1 million gallons):

C2.3.11.4.1.1. The *BImA* or, as appropriate, the Center of Expertise for Construction Management shall be notified in writing before initial operation of a stationary facility storing fuel.

C2.3.11.4.1.2. At facilities equipped with a vapor recovery system, an initial measurement shall be performed before operating the facility. Thereafter, the facility shall be inspected every 2.5 years for fuel mixtures and every 5 years for gasoline and naphtha. The inspection shall be performed by a licensed inspection agency *(zugelassene Überwachungsstelle)* or a publicly appointed and sworn expert *(öffentlich bestellter und vereidigter Sachverständiger)*. Deficiencies shall be corrected immediately by a licensed organization *(Fachbetrieb)*.

C2.3.11.4.1.3. At facilities equipped with a flue gas cleaning system, compliance shall be verified by measurements not earlier than 3 months and not later than 6 months after initial operation of the system. Thereafter, the system shall be inspected at least every 3 years. The measurements shall be performed by a publicly announced body *(Stelle)*.

C2.3.11.4.1.4. A written report on initial and periodic measurements, as set out in C2.3.11.4.1.2. and C2.3.11.4.1.3., shall be prepared and kept at the facility for 5 years from the issuance date.

C2.3.11.4.1.5. For stationary facilities, a copy of the reports shall be sent to the *BImA* or, as appropriate, the Center of Expertise for Construction Management within 4 weeks. For mobile facilities, reports shall be made available to the appropriate German authority on request.

C2.3.11.4.1.6. Connecting pipes and tubes shall be regularly inspected for leaks.

C2.3.11.4.2. Facilities requiring a permit, i.e., with a storage capacity of ≥ 5,000 metric tons or 6,850 m^3 (1 million gallons), shall obtain a facility operating permit and comply with the criteria outlined therein.

C2.3.11.5. Exemptions. Under certain circumstances (e.g., if a requirement cannot be met without disproportionate burden and no harmful effects on environment, employees and third parties are expected), the facility operator can apply to the appropriate German authorities, through the LEC to the BImA or the Center of Expertise for Construction Management, for exemptions from criteria of C2.3.11.

C2.3.12. Filling Stations. The following criteria apply to filling stations for motor vehicles (gasoline or fuel mixtures):

C2.3.12.1. Installation and Operation.

C2.3.12.1.1. When filling the tank of a motor vehicle, vapors shall be captured and returned to the storage tank using an approved commercially available vapor recovery system. Existing filling stations shall comply with this by 1 January 2019 at the latest, if they have a throughput of > 500 m^3/year (132,086 gallons/year) to 1,000 m^3/year (264,172 gallons/year), or are situated under permanent living quarters or working areas and have a throughput of > 100 m^3/year (26,417 gallons/year) to 1,000 m^3/year (264,172 gallons/year). Filling stations installed between 1 January 1993 and 27 April 2012 have to comply with this requirement from 1 January 2019 if they dispense fuel mixtures.

C2.3.12.1.2. Filling stations shall be operated only if the vapor recovery system is certified by the manufacturer and the efficiency of the system is at least 85%, determined by a licensed inspection agency *(zugelassene Überwachungsstelle)* or a publicly appointed and sworn expert *(öffentlich bestellter und vereidigter Sachverständiger)*. The certificate shall be maintained at the facility and shall be made available to the appropriate German authority on request.

C2.3.12.1.3. Alternatively, filling stations can be operated if all fuel vapors are captured and processed via a flue gas cleaning system of at least 97% efficiency.

C2.3.12.2. Monitoring.

C2.3.12.2.1. The *BImA*, or as appropriate, the Center of Expertise for Construction Management shall be notified in writing before the initial operation of a filling station.

C2.3.12.2.2. The condition of a vapor recovery system with or without negative-pressure support shall be inspected by a licensed inspection agency or a publicly appointed and sworn expert according to the following schedule and extent:

C2.3.12.2.2.1. At the latest 6 weeks after the initial operation of the vapor recovery system, and then:

C2.3.12.2.2.1.1. Every 2.5 years for fuel mixtures, or

C2.3.12.2.2.1.2. Every 5 years for gasoline.

C2.3.12.2.2.2. A tightness test of the entire vapor recovery system before the initial operation, after every significant change of the system, and at least as stated in C2.3.12.2.2.1.1. and C2.3.12.2.2.1.2.

C2.3.12.2.3. Compliance with the degree of purification as stated in C2.3.12.1.3. shall be inspected by a publicly announced body *(Stelle)*. The measurements shall be conducted according to the following schedule:

C2.3.12.2.3.1. At the earliest 3 months and at the latest 6 months after the initial operation of the flue gas cleaning system, and thereafter

C2.3.12.2.3.2. Every 3 years.

C2.3.12.2.4. If the requirements of C2.3.12.2.2. or C2.3.12.2.3. are not met, the following shall apply:

C2.3.12.2.4.1. The filling station shall be repaired immediately, and

C2.3.12.2.4.2. A re-inspection shall be conducted by a licensed inspection agency, a publicly appointed and sworn expert, or a publicly announced body within 6 weeks after the inspection.

C2.3.12.2.5. Reports. Reports shall be prepared presenting the results of the inspections and corrective actions as detailed in C2.3.12.2.3. through C2.3.12.2.4. Reports shall be kept for at least 5 years at the facility and a copy shall be sent to the BImA, or as appropriate, the Center of Expertise for Construction Management.

C2.3.12.2.6. Regardless of the requirements of C2.3.12.2.2. and C2.3.12.2.4., the vapor recovery system shall be inspected by a qualified person *(befähigte Person)* who has the

necessary knowledge due to their professional education, work experience and current professional activity according to the following intervals:

C2.3.12.2.6.1. At least once every 2.5 years if a negative-pressure supported vapor recovery system with an automatic monitoring system is used,

C2.3.12.2.6.2. At least once every 3 months if a vapor recovery system without a negative-pressure support is used.

C2.3.12.2.7. Regardless of the requirements of C2.3.12.2.3. and C2.3.12.2.4., flue gas cleaning systems as described in C2.3.12.1.3. shall be inspected every 2.5 years by a qualified person.

C2.3.12.2.8. The inspection results of C2.3.12.2.6. and C2.3.12.2.7. and the conducted corrective actions shall be recorded and presented to the licensed inspection agency or the publicly appointed and sworn expert during the inspections as described in C2.3.12.2.2.

C2.3.12.2.9. Deficiencies identified during the inspections as described in C2.3.12.2.6. and C2.3.12.2.7. shall be immediately corrected by a licensed organization *(Fachbetrieb)*.

C2.3.12.2.10. Deficiencies identified by an automatic monitoring system of a vapor recovery system with negative pressure support shall be immediately corrected by a licensed organization. Signalized deficiency and conducted corrective actions shall be recorded in writing. The reports shall be kept at the facility for at least 3 years from the issuance date and shall be made available to the appropriate German authority on request.

C2.3.12.3. Labeling. A visible sign, label, or other posting shall be affixed in the area of the fuel dispenser to inform the user about the presence of the vapor recovery system and the automatic monitoring system. This criterion does not apply to existing filling stations dispensing ≤ 500 m^3/year (132,086 gallons/year) of gasoline or fuel mixtures, or situated under permanent living quarters or working areas and a throughput of gasoline or fuel mixtures of ≤ 100 m^3/year (26,417 gallons/year), or to the refueling of vehicles which cannot be refueled via a vapor recovery system.

C2.3.12.4. Exemptions. Upon request of the operator, the appropriate German authority can grant exemptions from the criteria of C2.3.12. if certain requirements cannot be met. This does not apply if an exemption would create hazards to the employees, third parties, or the environment.

C2.3.12.5. Delivery Notes *(Lieferscheine, Lieferzeugnis)*. Delivery notes shall be kept at the filling station and shall be made available to the appropriate German authority on request.

C2.3.13. Emissions Declaration *(Emissionserklärung)*. The following criteria apply to air emissions from facilities requiring a permit:

C2.3.13.1. Emission reports shall be electronically delivered to the *BImA* or, as appropriate, the Center of Expertise for Construction Management in the format and content specified.

C2.3.13.2. Emissions shall be declared every 4 years for 1 calendar year, starting with calendar year 2008. Declarations shall be submitted by 31 May of the year after the declaration period.

C2.3.13.3. The emissions declaration shall include information on the period covered by the declaration, the operator of the facility, the facility and related equipment, emission sources, materials used that are relevant to emissions, activities causing emissions, the emissions of pollutants, and the methodology with which these emissions were determined (i.e., measurements, calculation, or estimates).

C2.3.13.4. The emissions declaration shall detail emissions of the substances detailed in Table C2.T16.

Table C2.T1. Emission Limits for Heat Generating Units Using Vegetable Fuels or Renewable Resources

Emission	**Emission Limit**
Dioxins and furans	0.1 ng/m^3
Nitrogen oxide:	
- units installed from 22 March 2010	0.6 g/m^3
- units installed after 31 December 2014	0.5 g/m^3
Carbon monoxide	0.25 g/m^3

Table C2.T2. Emission Limits [1] forHeatGeneratingUnitswithaRatedHeatOutput≥4kW Using Solid Fuels

	Fuel Type	**Rated Heat Output [kW]**	**Dust [g/m^3]**	**CO [g/m^3]**
Stage 1: Units installed after 22 March 2010	Black coal, brown coal, fuel peat, charcoal and charcoal briquettes for barbecue	≥ 4 ≤ 500	0.09	1.0
		> 500	0.09	0.5
	Natural finish wood in pieces (including bark, split logs, wood chips, brush wood, cones); natural finish wood not in pieces (saw dust, shavings, abrasive dust, bark) [2]	≥ 4 ≤ 500	0.10	1.0
		> 500	0.10	0.5
	Briquettes and pellets of natural finish wood	≥ 4 ≤ 500	0.06	0.8
		> 500	0.06	0.5
	Painted, lacquered, coated wood, plywood, chipboards, fiber boards or wood glued otherwise, offcuts thereof if not containing wood preservatives, halogen-organic compounds, or heavy metals [3]	≥ 30 ≤ 100	0.10	0.8
		> 100 ≤ 500	0.10	0.5
		> 500	0.10	0.3
	Straw and similar vegetable materials, corn not intended as foodstuff, pellets thereof; other renewable resources	≥ 4 ≤ 100	0.10	1.0
Stage 2: Units installed after 31 December 2014	Black coal, brown coal, fuel peat, charcoal and charcoal briquettes for barbecue; natural finish wood in pieces (including bark, split logs, wood chips, brush wood, cones); natural finish wood not in pieces (saw dust, shavings, abrasive dust, bark); briquettes and pellets of natural finish wood	≥ 4	0.02	0.4
	Painted, lacquered, coated wood, plywood, chipboards, fiber boards or wood glued otherwise, offcuts thereof if not containing wood preservatives, halogen-organic compounds, or heavy metals [3]	≥ 30 ≤ 100	0.02	0.4
		> 500	0.02	0.3
	Straw and similar vegetable materials, corn not intended as foodstuff, pellets thereof; other renewable resources	≥ 4 ≤ 100	0.02	0.4

Table C2.T2. Emission Limits [1] forHeatGeneratingUnitswithaRatedHeatOutput≥4kW Using Solid Fuels (continued)

Notes:

[1] The emission limits refer to 13% oxygen content by volume in the exhaust gas.

[2] For heat generating units using only split logs, the emission limits of stage 2 only apply to units installed after 31 December 2016.

[3] Burning of these fuel types is only allowed in heat generating units with a rated heat output ≥ 30 kW in wood working or wood processing shops.

Table C2.T3. Interim Dates and Associated Emission Limits for Existing Heat Generating Units

Date of Installation	**Date to Meet Emission Limits of Stage 1 in Table** C2.T2.
Through 31 December 1994	1 January 2015
1 January 1995 through 31 December 2004	1 January 2019
1 January 2005 through 21 March 2010	1 January 2025

Table C2.T4. Emission Limits for Heat Generating Units Using Solid Fuels and with a Rated Heat Output > 15 kW

Fuel Type	**Black coal, brown coal, fuel peat, charcoal and charcoal briquettes for barbecue [1]**	**Natural finish wood in pieces (including bark; split logs, wood chips, brush wood, cones); natural finish wood not in pieces (saw dust, shavings, abrasive dust, bark), briquettes and pellets of natural finish wood**	
Rated Heat Output [kW]	**Dust [g/m^3]**	**Dust [g/m^3]**	**CO [g/m^3]**
> 15 ≤ 50	0.15	0.15	4
> 50 ≤ 150			2
> 150 ≤ 500			1
> 500			0.5
Fuel Type	**Painted, lacquered, coated wood, plywood, chipboards, fiber boards or wood glued otherwise, offcuts thereof if not containing wood preservatives, halogen-organic compounds, or heavy metals**		
Rated Heat Output [kW]	**Dust [g/m^3]**	**CO [g/m^3]**	
> 50 ≤ 100	0.15	0.8	
> 100 ≤ 500		0.5	
> 500		0.3	
Fuel Type	**Straw and similar vegetable materials, corn not intended as foodstuff, pellets thereof**		
Rated Heat Output [kW]	**Dust [g/m^3]**	**Rated Heat Output [kW]**	
> 15 ≤ 100	0.15	> 15 ≤ 100	

Note:

[1] The emission limits refer to 8% oxygen content by volume in the exhaust gas.

Table C2.T5. Maximum Allowable Flue Gas Loss for Oil- and Gas-fired Units

Rated Heat Output [kW]	Allowable Flue Gas Loss [%]
≥ 4 ≤ 25	11
> 25 ≤ 50	10
> 50	9

Table C2.T6. Emission Limits for Oil- and Gas-fired Units

Rated Heat Output [kW]	Emissions [mg/kWh] [1]
Extra light heating oil, methanol, ethanol, natural finish vegetable oil or vegetable oil methyl ester	
≤ 120	110
> 120 ≤ 400	120
> 400 < 10,000	185
Gas from public gas supplier	
≤ 120	60
> 120 ≤ 400	80
> 400 < 10,000	120

Note:

[1] The emission limits refer to nitrogen oxides (NO_x) measured as nitrogen dioxide (NO_2).

Table C2.T7. 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**	**> 250 tpd**	**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 25ppmv	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 existing (or previous) FGS are not subject to these requirement. 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.T8. 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**	**35-250 tpd**	**35-250 tpd**	**> 250 tpd**	**All units**
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		157 ppmv
Fluidized bed, mixed fuel, (wood/refuse-derived fuel)	200 ppmv (24-hr average)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)	100 ppmv (4-hr avg)	100 ppmv (24-hr avg)		
Mass burn rotary waterwall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		
Mass burn waterwall 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	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		

Notes:

[1] Compliance is determined by continuous emission monitoring systems.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirement. These criteria are not intended to require retrofitting of MWC units.

Table C2.T9. Threshold Values for Facilities Using Organic Solvents

Facility	**Solvent Consumption (metric tons/year)** [1]	**Waste Gas Threshold Value (mg C/m³)**	**Diffuse Emissions Threshold Values (% of used solvents)** [2]
Printing facilities using heat set roll offset printing technology	≤ 15	-	-
	> 15 to ≤ 25	50 [3]	30
	> 25	20	30
Printing facilities using gravure printing	≤ 25	-	-
	> 25	50 [4]	5
Other printing facilities	≤ 15	-	-
	> 15 to ≤ 25	50 [3,5]	25
	> 25		20
Facilities for painting motor vehicles (paint shop repairs)	0	50	25
Facilities for coating other metal or synthetic materials including bulky goods (e.g., aircraft)	≤ 5	-	-
	> 5 to ≤ 15	100	25
	> 15	50 [3]	20
Facilities using solvent cleaning machines	≤ 1	-	-
	> 1 to ≤ 10	75 [6]	20 [6,7]
	> 10		15 [6,7]

Notes:

[1] 1 metric ton = 2204.623 pounds

[2] Diffuse emissions include volatile organic solvents contained in the untreated waste gas.

[3] A threshold value of 20 mg C/m³ is applicable for facilities using after burners for waste gas treatment.

[4] Not applicable to facilities operating with fully recirculated air.

[5] A threshold value of 90 mg C/m³ is applicable for facilities using biological processes for waste gas treatment.

[6] The threshold value is not applicable if only substances with < 20% of organic solvent content are used for cleaning if such substances are neither teratogenic, carcinogenic, assumed carcinogenic, nor mutagenic.

[7] The threshold value is reduced to 10% of used solvents if substances are teratogenic, carcinogenic, assumed carcinogenic, or mutagenic only as long as these substances cannot be replaced by less harmful substances or mixtures.

Table C2.T10. 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_2H_4FBr	$C_3H_2F_3Br_3$	$C_3H_4F_3Br$
$C_2HF_2Br_3$	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
$C_2H_2FBr_3$	$C_3HF_4Br_3$	$C_3H_3F_2Br_3$	Halon 1011 (Chlorobromomethane)
$C_2H_2F_2Br_2$	$C_3HF_5Br_2$	$C_3H_3F_3Br_2$	Halon 1202 (Dibromodifluoromethane)
Class II			
HCFC - 21	HCFC - 133	HCFC - 224	HCFC - 241
HCFC - 22	HCFC - 133a	HCFC - 225	HCFC - 242
HCFC - 31	HCFC - 141	HCFC - 225ca	HCFC - 243
HCFC - 121	HCFC - 141b	HCFC - 225cb	HCFC - 244
HCFC - 122	HCFC - 142	HCFC - 226	HCFC - 251
HCFC - 123	HCFC - 142b	HCFC - 231	HCFC - 252
HCFC - 124	HCFC - 151	HCFC - 232	HCFC - 253
HCFC - 131	HCFC - 221	HCFC - 233	HCFC - 261
HCFC - 132	HCFC - 222	HCFC - 234	HCFC - 262
HCFC - 132b	HCFC - 223	HCFC - 235	HCFC - 271

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.T11. Fluorinated Greenhouse Gases and their GWP

Substance			GWP
Industrial Designation	**Chemical Name (Common Name)**	**Chemical Formula**	
Section 1: Hydrofluorocarbons (HFCs)			
HFC-23	Trifluoromethane (fluoroform)	CHF_3	14,800
HFC-32	Difluoromethane	CH_2F_2	675
HFC-41	Fluoromethane (methyl fluoride)	CH_3F	92
HFC-125	Pentafluoroethane	CHF_2CF_3	3,500
HFC-134	1,1,2,2-tetrafluoroethane	CHF_2CHF_2	1,100
HFC-134a	1,1,1,2-tetrafluoroethane	CH_2FCF_3	1,430
HFC-143	1,1,2-trifluoroethane	CH_2FCHF_2	353
HFC-143a	1,1,1-trifluoroethane	CH_3CF_3	4,470
HFC-152	1,2-difluoroethane	CH_2FCH_2F	53
HFC-152a	1,1-difluoroethane	CH_3CHF_2	124
HFC-161	Fluoroethane (ethyl fluoride)	CH_3CH_2F	12
HFC-227ea	1,1,1,2,3,3,3-heptafluoropropane	CF_3CHFCF_3	3,220
HFC-236cb	1,1,1,2,2,3-hexafluoropropane	$CH_2FCF_2CF_3$	1,340
HFC-236ea	1,1,1,2,3,3-hexafluoropropane	CHF_2CHFCF_3	1,370
HFC-236fa	1,1,1,3,3,3-hexafluoropropane	$CF_3CH_2CF_3$	9,810
HFC-245ca	1,1,2,2,3-pentafluoropropane	$CH_2FCF_2CHF_2$	693
HFC-245fa	1,1,1,3,3-pentafluoropropane	$CHF_2CH_2CF_3$	1,030
HFC-365 mfc	1,1,1,3,3-pentafluorobutane	$CF_3CH_2CF_2CH_3$	794
HFC-43-10 mee	1,1,1,2,2,3,4,5,5,5-decafluoropentane	$CF_3CHFCHFCF_2CF_3$	1,640
Section 2: Perfluorocarbons (PFCs)			
PFC-14	Tetrafluoromethane (perfluoromethane, carbon tetrafluoride)	CF_4	7,390
PFC-116	Hexafluoroethane (perfluoroethane)	C_2F_6	12,200
PFC-218	Octafluoropropane (perfluoropropane)	C_3F_8	8,830
PFC-3-1-10 (R-31-10)	Decafluorobutane (perfluorobutane)	C_4F_{10}	8,860
PFC-4-1-12 (R-41-12)	Dodecafluoropentane (perfluoropentane)	C_5F_{12}	9,160
PFC-5-1-14 (R-51-14)	Tetradecafluorohexane (perfluorohexane)	C_6F_{14}	9,300
PFC-c-318	Octafluorocyclobutane (perfluorocyclobutane)	$c\text{-}C_4F_8$	10,300
Section 3: Other Perfluorinated Compounds			
	Sulphur hexafluoride	SF_6	22,800

Table C2.T12. Method of Calculating the Total GWP of a Mixture

The GWP of a mixture is calculated as a weighted average, derived from the sum of the weight fractions of the individual substances multiplied by their GWP, unless otherwise specified, including substances that are not fluorinated greenhouse gases.

Σ (Substance X % x GWP) + (Substance Y % x GWP) + … (Substance N % x GWP),

where % is the contribution by weight with a weight tolerance of +/– 1 %.

For example: applying the formula to a blend of gases consisting of 60 % dimethyl ether, 10 % HFC-152a and 30 % isobutane:

Σ (60 % x 1) + (10 % x 124) + (30 % x 3)

→ Total GWP = 13.9

The GWP of the following non-fluorinated substances are used to calculate the GWP of mixtures. For other substances not listed in this table a default value of 0 applies.

Substance			**GWP**
Common name	**Industrial designation**	**Chemical Formula**	
Methane		CH_4	25
Nitrous oxide		N_2O	298
Dimethyl ether		CH_3OCH_3	1
Methylene chloride		CH_2Cl_2	9
Methyl chloride		CH_3Cl	13
Chloroform		$CHCl_3$	31
Ethane	R-170	CH_3CH_3	6
Propane	R-290	$CH_3CH_2CH_3$	3
Butane	R-600	$CH_3CH_2CH_2CH_3$	4
Isobutane	R-600a	$CH(CH_3)_2CH_3$	3
Pentane	R-601	$CH_3CH_2CH_2CH_2CH_3$	5
Isopentane	R-601a	$(CH_3)_2CHCH_2CH_3$	5
Ethoxyethane (diethyl ether)	R-610	$CH_3CH_2OCH_2CH_3$	4
Methyl formate	R-611	$HCOOCH_3$	25
Hydrogen	R-702	H_2	6
Ammonia	R-717	NH_3	0
Ethylene	R-1150	C_2H_4	4
Propylene	R-1270	C_3H_6	2
Cyclopentane		C_5H_{10}	5

Table C2.T13. Method of Calculating Tonnes of CO_2 Equivalent

The following formula can be used to calculate tonnes of CO_2 equivalent of a substance or a mixture.
Table C2.T11. provides an overview of fluorinated greenhouse gases and their GWP.

$$\text{[illegible]}_2 = \frac{\text{GWP Refrigerant x Amount of refrigerant [kg]}}{1{,}000}$$

Examples:

Refrigerant	**Amount [kg]**	**GWP**	**CO_2 equivalent [tonnes]**
R-410A	5.9	2,088	12.3
R407C	18.7	1,774	33.2
R131A	71	1,430	101.5

Table C2.T14. Maximum Permissible Losses of Fluorinated Greenhouse Gases

Stationary Facility	**Maximum Permissible Loss Per Year**
Containing ≥ 3 kg refrigerant	1%
Containing < 10 kg refrigerant	3% [1]
	6% [2]
	8% [3]
Containing 10 to 100 kg refrigerant	2% [1]
	4% [2]
	6% [3]
Containing ≥ 100 kg refrigerant	1% [1]
	2% [2]
	4% [3]

Notes:

[1] Equipment installed on site after 30 June 2008.

[2] Equipment installed on site after 30 June 2005 but before 1 July 2008.

[3] Equipment installed on site before 1 July 2005.

Table C2.T15. Cut-off Dates and End Dates for Critical Uses of Halons

Application				Halon Cut-Off Date (31 December of the stated year)	Halon End Date (31 December of the stated year)
Category of Equipment or Facility	**Purpose**	**Type of Extinguisher**	**Type of Halon**		
On military ground vehicles	For the protection of engine compartments	Fixed system	1301 1211 2402	2010	2035
	For the protection of crew compartments	Fixed system	1301 2402	2011	2040
	For the protection of crew compartments	Portable extinguisher	1301 1211	2011	2020
On military surface ships	For the protection of normally occupied machinery spaces	Fixed system	1301 2402	2010	2040
	For the protection of normally unoccupied engine spaces	Fixed system	1301 1211 2402	2010	2035
	For the protection of normally unoccupied electrical compartments	Fixed system	1301 1211	2010	2030
	For the protection of command centers	Fixed system	1301	2010	2030
	For the protection of fuel pump rooms	Fixed system	1301	2010	2030
	For the protection of flammable liquid storage compartments	Fixed system	1301 1211 2402	2010	2030

C2.T15. Cut-off Dates and End Dates for Critical Uses of Halons (continued)

Application				Halon Cut-Off Date (31 December of the stated year)	Halon End Date (31 December of the stated year)
Category of Equipment or Facility	**Purpose**	**Type of Extinguisher**	**Type of Halon**		
On aircraft	For the protection of normally unoccupied cargo compartments	Fixed system	1301 1211 2402	2018	2040
	For the protection of cabins and crew compartments	Portable extinguisher	1211 2402	2014	2025
	For the protection of engine nacelles and auxiliary power units	Fixed system	1301 1211 2402	2014	2040
	For the inerting of fuel tanks	Fixed system	1301 2402	2011	2040
	For the protection of lavatory waste receptacles	Fixed system	1301 1211 2402	2011	2020
	For the protection of dry bays	Fixed system	1301 1211 2402	2011	2040
In land-based command and communications facilities essential to national security	For the protection of normally occupied spaces	Fixed system	1301 2402	2010	2025
	For the protection of normally unoccupied spaces	Fixed system	1301 2402	2010	2020

Table C2.T16. Substances to be Included in the Emissions Declaration

Item	Substance	Comment
1	Mercury and its compounds, indicated as Hg	If emissions per substance exceed 0.01 kg/h (0.022 pounds/h) or 0.25 kg (0.55 pounds) during the declaration period
	Thallium and its compounds, indicated as Tl	
	Arsenic and its compounds, except for arsine	
	Cyanogen chloride	
	Phosgene	
	Hydrogen phosphide	
	Carcinogenic, mutagenic, or teratogenic substances	
	Other very toxic substances	
	Dioxins, furans, and substances with a comparable toxic effect	For any emission
2	Sulfur hexafluoride	If emissions per substance exceed 50 kg (110 pounds) during the declaration period
	Non-carcinogenic nickel compounds	
	Polycyclic aromatic hydrocarbons excluding those covered by item 1	
	Trichlorobenzene	If emissions per substance exceed 10 kg (22 pounds) during the declaration period
	Hexachlorobenzene	
	Hexachlorocyclohexane	
3	Other substances	If emissions per substance exceed 100 kg (220 pounds) during the declaration period

CHAPTER 3 – DRINKING WATER

C3.1. SCOPE

This chapter provides 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 milligrams per liter (mg/L) determined before or at the first customer, and the corresponding disinfectant contact time (T) in minutes. CT values appear in Table C3.T11. through Table 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 water system (PWS) or non-public water system (NPWS).

C3.2.9. 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.

C3.2.10. 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.

C3.2.11. Haloacetic Acids (HAA5). The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to 2 significant figures after addition.

C3.2.12. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

C3.2.13. 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.

C3.2.14. 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 PWS 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.

C3.2.15. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap that may not be exceeded without the unacceptable possibility of adverse health effects.

C3.2.16. 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.

C3.2.17. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

C3.2.18. 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.

C3.2.19. 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":

C3.2.19.1. 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.

C3.2.19.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

C3.2.19.2.1. 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.

C3.2.19.2.2. 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.

C3.2.20. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a PWS to evaluate the adequacy of such elements for producing and distributing potable water.

C3.2.21. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity [36.6 cm/hr (1.2 ft/hr)], resulting in particulate removal by physical and biological mechanisms.

C3.2.22. Total Trihalomethanes. The sum of the concentration in milligrams per liter of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

C3.2.23. Use of a Water Body. Actions that cause significant changes to the physical, chemical, or biological properties of a water body. Examples include the following:

C3.2.23.1. Raising, lowering, withdrawing, or diverting surface, coastal, or ground waters.

C3.2.23.2. Removing solid substances (mud, sand, gravel) from surface or coastal waters.

C3.2.23.3. Introducing or discharging substances into surface, coastal, or ground waters.

C3.2.23.4. Measures that may cause significant adverse impacts to physical, chemical, or biological properties of the water.

C3.2.24. 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 provides a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

C3.2.25. Water Protection Area. An area designated by the German Federal States *(Bundesländer)* to protect drinking water resources, typically consisting of three distinct zones:

C3.2.25.1. Water Protection Zone I: Well field protection zone *(Fassungsbereich)*, extending 10 meters from the well heads, 20 meters from springs, and 30 meters for wells located in karst aquifers, intended to provide protection against contamination and interference.

C3.2.25.2. Water Protection Zone II: Narrow protection zone *(Engere Schutzzone)*, extending from the boundary of zone I to a line from which the groundwater takes approximately 50 days to reach the well head, intended to provide protection against contamination by pathogenic bacteria and viruses.

C3.2.25.3. Water Protection Zone III: Wide protection zone *(Weitere Schutzzone)*, from the boundary of zone II up to the limit of the catchment area of the water supply, intended to provide protection against contamination by nondegradable or less readily degradable substances.

C3.2.25.3.1. If the boundary of water protection zone II is > 2 kilometers distant from the limit of the catchment area, a zone III area may be divided into zone IIIA and zone IIIB, with the latter zone encompassing the remainder of the catchment area which extends beyond 2 kilometers from the zone II boundary.

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 on-site treatment units, and by appropriate land use management on DoD installations.

C3.3.1.3.1. If the boundaries of any water protection zone extend into a DoD installation, all measures shall be taken to ensure these areas are protected as required by such designation.

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 locally responsible German Federal Authority for Real Estate Matters *(Bundesanstalt für Immobilienaufgaben (BImA))* or, as appropriate, the regional Center of Expertise for Construction Management *(Kompetenzzentrum Baumanagement)*.

C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment criteria 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 1.38 bar [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. The discharge or injection of any substance to groundwater resources requires a permit obtained through the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management (see Chapter 1, C1.6.). Manage all regulated injections or discharges to the groundwater in accordance with the permit.

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 used in the event of an intentional or unintentional 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 that may be taken.

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological and chemical results for at least 10 years.

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least 3 years. In the case of *Legionella*, records of corrective actions shall be kept for 10 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 that 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 used 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 on only the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining ≥ 40 samples a month, and no more than one positive sample per month when a system analyzes < 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 five service connections of the original tap. Any additional repeat sampling that 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 paragraph 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, 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 4.0 mg/L, as stated in Table C3.T3., "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting one 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 > 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 German) 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 ensure:

C3.3.2.6.1.1. The MCL of 0.080 mg/L for total trihalomethanes (TTHM), the MCL of 0.060 mg/L for haloacetic acids (HAA5), the MCL of 1.0 mg/L for chlorite, and the MCL of 0.010 mg/L for bromate are met in drinking water.

C3.3.2.6.1.2. 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 met 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, stormwater 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 of 0.080 mg/L, or the MCL for HAA5 of 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 for radium 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 as a minimum, and disinfectant residuals periodically.

C3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only use alternative water sources, including POE/POU treatment devices and bottled water supplies that 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 German) 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 German Federal State 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.

C3.3.5. Permits/Approvals. Before the use of a water body *(Gewässerbenutzungen)*, DoD installations shall obtain necessary permits/approvals through the *BImA* or, as appropriate, the

regional Center of Expertise for Construction Management. See criterion C1.6.4. for information on obtaining permits/approvals.

C3.3.6. *Legionella* Prevention.

C3.3.6.1. Annual monitoring of *Legionella* is required at facilities containing showers or other activities where warm drinking water is aerosolized.

C3.3.6.2. Samples shall be collected at several representative sample locations and in accordance with the generally recognized rules of technology.

C3.3.6.3. Sample collection and analysis shall only be performed by a certified laboratory.

C3.3.6.4. If a value of 100 colony-forming units (CFU)/100 mL of *Legionella species* is exceeded, the following measures shall be taken:

C3.3.6.4.1. The German local health authority *(Gesundheitsamt)* and the appropriate DoD medical authority shall be notified;

C3.3.6.4.2. A risk analysis shall be conducted, investigating reasons for the exceedance of that value, including a site visit and an examination of compliance with the generally recognized rules of technology; and

C3.3.6.4.3. Measures shall be implemented to protect consumers' health and shall be reported to the German local health authority *(Gesundheitsamt)* and the appropriate DoD medical authority.

C3.3.6.5. If results for *Legionella species* are not problematic within the annual monitoring of 3 consecutive years, the appropriate DoD medical authority can grant longer monitoring intervals of up to 3 years, provided that the facility and operation do not change and it is demonstrated that the generally accepted rules of technology are applied.

Table C3.T1. Surface Water Treatment Requirements

1. Unfiltered Systems.

   a. Systems that 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 (NTUs).

   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 Table C3.T11. through Table 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 > 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 > 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 and/or inactivation 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 NTUs.

   c. Disinfection must provide the remaining log inactivation of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied. [1]

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

[1] 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 typically removes 2.0-log *Giardia*/2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.

Table C3.T1. Surface Water Treatment Requirements (continued)

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 place of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in 2 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 NTUs (in 2 consecutive measurements 15 minutes apart) for 2 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	480

Notes:

[1] Minimum number of routine samples per month.

[2] A non-community water system using groundwater and serving ≤ 1,000 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	Notification Level [1]	Unit
Aluminum	-	0.200	mg/L
Ammonium	-	0.50 [2]	mg/L
Antimony [3]	0.006	0.0050	mg/L
Arsenic [3]	0.010	0.010	mg/L
Asbestos [3]	7 million	-	fibers/L (longer than 10 µm)
Barium	2.0	-	mg/L
Beryllium [3]	0.004	-	mg/L
Boron	-	1.0	mg/L
Cadmium [3]	0.005	0.0030	mg/L
Chromium [3]	0.1	0.050	mg/L
Cyanide [3]	0.2 (as free cyanide)	0.050 (total)	mg/L
Fluoride [4]	4.0	1.5	mg/L
Mercury [3]	0.002	0.0010	mg/L
Nickel [3]	0.1	0.020 [5]	mg/L
Nitrate [6]	44.3 (10 as N)	50 [7]	mg/L
Nitrite [6]	3.3 (1 as N)	0.50 [7,8]	mg/L
Total Nitrite and Nitrate [6]	10 (as N)	-	mg/L
Selenium [3]	0.05	0.010	mg/L
Sodium [9]	-	200	mg/L
Thallium	0.002	-	mg/L

Notes:

[1] If value is exceeded, notify the German local health authority *(Gesundheitsamt)* and the appropriate DoD medical authority.

[2] The reason for a sudden or continuous increase of a typically measured concentration needs to be analyzed.

[3] MCLs apply to CWS and NTNCWS.

[4] Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.

[5] Only one sample shall be collected from one tap, supplying water intended for human consumption, in every newly constructed building, or where building piping/taps were replaced as part of a total building renovation. The sample shall be collected in accordance with German sampling protocols.

[6] MCLs apply to CWS, NTNCWS, and TNCWS.

[7] The sum of the nitrate concentration values in mg/L divided by 50 and the nitrite concentration in mg/L divided by 3 shall not exceed 1.

[8] At the outlet of the water works, the value for nitrite shall not exceed 0.10 mg/L.

[9] No MCL established. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis.

Table C3.T4. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Aluminum	Quarterly	Quarterly	---	---
Arsenic	1 sample/3 yr	Annual sample	> MCL	---
Ammonium	Annual sample	Annual sample	---	---
Antimony	1 sample/3 yr	Annual sample	> MCL	---
Barium	1 sample/3 yr	Annual sample	> MCL	---
Beryllium	1 sample/3 yr	Annual sample	> MCL	---
Boron	Annual sample	Annual sample	---	---
Cadmium	1 sample/3 yr	Annual sample	> MCL	---
Chromium	1 sample/3 yr	Annual sample	> MCL	---
Cyanide	1 sample/3 yr	Annual sample	> MCL	---
Fluoride	1 sample/3 yr	Annual sample	> MCL	
Mercury	1 sample/3 yr	Annual sample	> MCL	---
Nickel	1 sample/3 yr	Annual sample	> MCL	---
Selenium	1 sample/3 yr	Annual sample	> MCL	---
Thallium	1 sample/3 yr	Annual sample	> MCL	---
Sodium	1 sample/3 yr	Annual sample	---	---
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 at least 1 sample at every entry point to the distribution system that 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 on 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 nitrite 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] PWSs shall be analyzed within 1 year of the effective date of country-specific FGS to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one 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		Control Limits (mg/L)		
°F	°C	Lower	Optimum	Upper
50.0 - 53.7	10.0 - 12.1	0.9	1.2	1.7
53.8 - 58.3	12.1 - 14.6	0.8	1.1	1.5
58.4 - 63.8	14.7 -17.67	0.8	1.0	1.3
63.9 - 70.6	17.7 - 21.4	0.7	0.9	1.2
70.7 - 79.2	21.5 - 26.2	0.7	0.8	1.0
79.3 - 90.5	26.3 - 32.5	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 [5]	1
< 100	5 [5]	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 that 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-size 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 four 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.

[5] For water systems that collect 5 samples per monitoring event, the comparative value to determine exceedance of the action level is computed by taking the average of the highest and second highest concentrations.

Table C3.T7. Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	MCL, mg/L	Notification Level, mg/L [1]	Detection Limit, mg/L
Pesticides/PCBs			
Alachlor	0.002	0.00010	
Aldicarb	0.003	0.00010	
Aldicarb sulfone	0.003	0.00010	
Aldicarb sulfoxide	0.004	0.00010	
Aldrin		0.000030	
Atrazine	0.003	0.00010	
Carbofuran	0.04	0.00010	
Chlordane	0.002	0.00010	
Dalapon	0.2	0.00010	
2,4-D	0.07	0.00010	
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00010	0.00002
Di (2-ethylhexyl) adipate	0.4	0.00010	
Di (2-ethylhexyl) phthalate	0.006	0.00010	
Dieldrin		0.000030	
Dinoseb	0.007	0.00010	
Diquat	0.02	0.00010	
Endrin	0.002	0.00010	0.00002
Endothall	0.1	0.00010	
Ethylene dibromide (EDB)	0.00005	0.00010	0.00001
Glyphosate	0.7	0.00010	
Heptachlor	0.0004	0.000030	
Heptachlor epoxide	0.0002	0.000030	0.00002
Hexachlorobenzene	0.001	0.00010	
Hexachlorocyclopentadiene	0.05	0.00010	
Lindane (gamma-BHC)	0.0002	0.00010	0.00002
Methoxychlor (4,4 Methoxychlor)	0.04	0.00010	
Oxamyl (Vydate)	0.2	0.00010	
PCBs (as decachlorobiphenyls)	0.0005	-	0.0001
Pentachlorophenol	0.001	0.00010	0.00004
Pesticide (individual)		0.00010 [2]	
Pesticides (total)		0.00050 [2]	
Picloram	0.5	0.00010	
Simazine	0.004	0.00010	
2,3,7,8-TCDD (Dioxin)	0.00000003	-	
Toxaphene	0.003	0.00010	
2,4,5-TP (Silvex)	0.05	0.00010	
Polycyclic Aromatic Hydrocarbons (PAHs)			
Benzo[a]pyrene	0.0002	0.000010	
Total PAHs [3]		0.0001 (total)	

Table C3.T7. Synthetic Organic Chemical MCLs (continued)

Synthetic Organic Chemical	MCL, mg/L	Notification Level, mg/L [1]	Detection Limit, mg/L
Volatile Organic Chemicals			
Benzene	0.005	0.0010	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	0.0030	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
Styrene	0.1		0.0005
Tetrachloroethylene	0.005	0.010 (sum)	0.0005
Trichloroethylene	0.005		0.0005
Toluene	1.0		0.0005
Vinyl chloride	0.002	0.00050 [4]	
Xylenes (total)	10		0.0005
Other Organics			
	MCL	**Notification Level, mg/L [1]**	
Acrylamide	0.05% dosed at 1 ppm [5]	0.00010 [4]	
Epichlorohydrin	treatment technique 0.01 % dosed at 20 ppm [5]	0.00010 [4]	

Notes:

[1] If value is exceeded, notify the German local health authority *(Gesundheitsamt)* and the appropriate DoD medical authority.

[2] Includes organic insecticides, organic herbicides, organic fungicides, organic nematocides, organic acaricides, organic algicides, organic rodenticides, and organic slimicides, as well as related products (inter alia, growth regulators) and their relevant metabolites, degradation and reaction products.

[3] Sum of the following compounds: benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene.

[4] The threshold value refers to the residual monomer concentration in the drinking water, calculation based on the maximum release according to the specifications of the corresponding polymer and the applied polymer dose.

[5] 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]
Total PAHs	1 per year for ≤ 10,000 m^3/day 3 per year for ≤ 100,000 m^3/day		> 0.0001 mg/L	No
Benzo(a)pyrene	1 per year for ≤ 10,000 m^3/day 3 per year for ≤ 100,000 m^3/day		> 0.000010 mg/L	No

Notes:

[1] Groundwater systems shall take a minimum of one sample at every entry point that is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point that is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNCW, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).

[2] Increased monitoring requires at least 2 quarterly samples per year for groundwater systems, and at least 4 quarterly samples per year for surface water systems.

[3] Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after three 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 one year during each repeat compliance period, or systems < 3,300 reduce to a minimum of 1 sample every 3 years.

NOTE: 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	TTHM & HAA5 - Quarterly [1, 2]	4 [1, 2, 3]
	500 to 9,999	TTHM & HAA5 - Quarterly [4]	1 [5, 6]
	≤ 499	TTHM & HAA5 - Yearly	1 [7, 8]
Ground Water (GW)	≥ 10,000	TTHM & HAA5 - Quarterly [9]	1 [10, 11]
	≤ 9,999	TTHM & HAA5 - Yearly [12]	1 [13, 14]
All	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]	See Notes

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 ≤ 0.040 mg/L; b) the annual average for HAA5 is ≤ 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 ≤ 4.0 mg/L before treatment. Systems may then reduce monitoring of TTHM and HAA5 to one 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 ≤ 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 of 0.080 mg/L or the HAA5 MCL of 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 one 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 ≤ 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 of 0.080 mg/L or the HAA5 MCL of 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 one 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 ≤ 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 of 0.080 mg/L or if the HAA5 concentration exceeds the MCL of 0.060 mg/L.

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

[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.

[10] System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is ≤ 0.040 mg/L; b) the annual average for HAA5 is ≤ 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 ≤ 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 of 0.080 mg/L or the HAA5 the MCL of 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 one sample per 3-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is ≤ 0.040 mg/L; b) the annual average for HAA5 is ≤ 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 ≤ 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 of 0.080 mg/L or the HAA5 the MCL of 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 three-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 of 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 of 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 of 1.0 mg/L.

[18] Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL of 1.0 mg/L.

[19] Systems using ozone for disinfection or oxidation are required to take at least one 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 of 0.010 mg/L.

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

[21] Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding 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 of 4.0 mg/L.

[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. Notwithstanding 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 of 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 of 0.8 mg/L is exceeded, three 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 three samples in the distribution system as close as possible to the first customer at intervals of ≥ 6 hours.

[26] If any daily sample from the distribution system exceeds the MRDL and if one or more of the three 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 two 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 one paired sample per plant per quarter.

Table C3.T10. Radionuclide MCLs and Monitoring Requirements

Contaminant	MCL
Gross Alpha [1]	15 pCi/L (0.56 Bq/L)
Combined Radium-226 and -228	5 pCi/L (0.16 Bq/L)
Beta Particle and Photon Radioactivity [2]	4 mrem/yr
Uranium	30 µg/L [3]

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.

[3] If concentration exceeds 10 µg/L, notify the German local health authority *(Gesundheitsamt)* and the appropriate DoD medical authority.

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, 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 four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed 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 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.

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 pH		**3.0 pH**		**4.0 pH**	
Temperature (°C)	**6-9**	**10**	**6-9**	**10**	**6-9**	**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

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CHAPTER 4 - WASTEWATER

C4.1. SCOPE

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

C4.2. DEFINITIONS

C4.2.1. 2-Hour Mixed Sample. A sample drawn continuously over a 2-hour period, or a composite of several samples drawn discretely over a period of 2 hours.

C4.2.2. 24-Hour Mixed Sample. A sample drawn continuously over a 24-hour period, or a composite of several samples drawn discretely over a period of 24 hours.

C4.2.3. Adsorbable Organic Halogens (AOXs). The sum of chlorine, bromine, and iodine, expressed in equivalent chlorine and sometimes called a "group parameter" or "sum parameter."

C4.2.4. Best Management Practices (BMPs). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into waters of Germany.

C4.2.5. 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).

C4.2.6. Chemical Oxygen Demand (COD). The measure of the amount of material that can be oxidized (i.e., combined with oxygen) in the presence of a strong chemical oxidizing agent, reported as mg/L of oxygen used.

C4.2.7. *Deutsches Institut für Normung (DIN)*. National organization in Germany similar to the American National Standards Institute (ANSI) and assembled for the purpose of formulating and promoting standard analytical methods (see Table C4.T1.). These standards describe methodologies or criteria for construction and use of certain equipment or instruments.

C4.2.8. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

C4.2.9. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to waters of Germany from any "point source."

C4.2.10. Domestic Wastewater-Treatment System (DWTS). Any DoD or German facility designed to treat wastewater before its discharge to waters of Germany and in which the majority of such wastewater is made up of domestic sewage.

C4.2.11. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into waters of Germany.

C4.2.12. *Einwohnerwert (EW)*. A population equivalent corresponding to an organic biodegradable pollution load having a BOD_5 of 60g of oxygen per day (i.e., the approximate amount of organics generated by one person in 1 day). A unit of measure used to describe the capacity (size) of wastewater-treatment facilities.

C4.2.13. Flow-Proportional Sample. A composite sample collected based on the wastewater volume (i.e., the greater the flow volume, the larger the volume and number of samples to be collected). The sampling can be conducted either by using a pass-through method for continuous measurements or by pulse regulation for non-continuous measurements.

C4.2.14. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

C4.2.15. Industrial Activities Associated With Stormwater. Activities that during wet weather events may contribute pollutants to stormwater runoff or drainage. (See Table C4.T2. Best Management Practices).

C4.2.16. Industrial Wastewater. See Process Wastewater.

C4.2.17. Industrial Wastewater-Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to waters of Germany.

C4.2.18. 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.

C4.2.19. Operator. Any person who owns, leases, operates, controls, or supervises a facility.

C4.2.20. 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.

C4.2.21. Pollutant. Includes but is not limited to 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.

C4.2.22. Process Wastewater. Any water that, during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, byproduct, or waste product.

C4.2.23. Qualified Random Sample. A composite sample of at least five random samples drawn over a maximum period of 2 hours and at intervals of ≥ 2 minutes.

C4.2.24. Quantity-Proportional Sample. Equivalent to a flow-proportional sample.

C4.2.25. Random Sample. A single sample drawn from the wastewater flow on the basis of pure chance, free from any inherent bias.

C4.2.26. Regulated Facilities. Those facilities for which criteria are established under this chapter, such as DWTS, IWTS, and industrial discharges.

C4.2.27. Septic System. Onsite sewage system designed to safely dispose of < 8 m^3/d (283 ft^3/d) domestic wastewater. A septic system primarily consists of a holding tank for wastewater treatment. The end products, except the undigested solids, are discharged into an absorption or leach field.

C4.2.28. Stormwater. Runoff and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

C4.2.29. Time-Proportional Sample. A composite sample consisting of a number of subsamples of equivalent volume drawn within identical time intervals between subsamples, and within a specified period of time.

C4.2.30. Total Suspended Solids (TSSs). A measure of particulate mass per volume obtained by separating particles from a water sample using a filter of a specified pore size.

C4.2.31. Total Toxic Organics (TTOs). The summation of all quantifiable values of > 0.01 mg/L for the toxic organics in Table C4.T3., "Components of Total Toxic Organics."

C4.2.32. Wastewater-Treatment System (WWTS). A wastewater-treatment system that is either an IWTS or a DWTS.

C4.2.33. Waters of Germany. Surface water including the territorial seas recognized under customary international law, including**:**

C4.2.33.1. All waters, which are currently used, were used in the past, or may be susceptible to use in commerce.

C4.2.33.2. Waters that are or could be used for recreation or other purposes.

C4.2.33.3. Waters from which fish or shellfish are or could be taken and sold.

C4.2.33.4. Waters that are used or could be used for industrial purposes by industries.

C4.2.33.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

C4.2.33.6. Tributaries of waters identified in this definition.

Note: Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this chapter, are not waters of Germany. This exclusion applies only to manmade bodies of water that were neither originally waters of Germany nor resulted from impoundment of waters of Germany.

C4.3. CRITERIA

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

C4.3.1.1. All direct discharges to waters of Germany shall comply with the minimum effluent criteria defined in Table C4.T4. and Table C4.T5.

C4.3.1.1.1. Rheinland-Pfalz has established additional effluent limit values for discharges into sensitive areas. These additional effluent limits are presented in Table C4.T6.

C4.3.1.2. DoD components discharging to DWTS shall comply with the conditions of any wastewater treatment facility discharge permit, if such permit is required and has been

issued by the appropriate German water authority. If the conditions included in the discharge permit allow a less protective standard than prescribed in these FGS, then the FGS shall be the compliant standard. See Table C4.T7. for reference methods for controls and resulting evaluations unless otherwise defined in the permit.

C4.3.1.3. Monitoring. Monitoring requirements apply to all regulated facilities. The monitoring frequency (including both sampling and analysis) given in Table C4.T8., "Monitoring Requirements," includes all parameters which are regulated (COD, BOD_5, N_{total}, NH_4-N, P_{total}, TSS, pH). Samples shall be collected at the point of discharge to the waters of Germany.

C4.3.1.4. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. Retain records for 3 years.

C4.3.1.4.1. The effluent, concentration, or other measurement specified for each regulated parameter.

C4.3.1.4.2. The daily volume of effluent discharge from each point source.

C4.3.1.4.3. Test procedures for the analysis of pollutants.

C4.3.1.4.4. The date, exact place, and time of sampling and/or measurements.

C4.3.1.4.5. The name of the person who performed the sampling and/or measurements.

C4.3.1.4.6. The date of analysis.

C4.3.1.5. Complaint System. A system for investigating water pollution complaints from individuals or German Federal State water authority will be established, involving the Lead Environmental Component (LEC), as appropriate.

C4.3.1.6. 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. DoD components indirectly discharging to DWTS shall comply with the conditions of any wastewater-treatment facility discharge permit, if such permit is required and has been issued by the appropriate German water authority. If the conditions included in the discharge permit allow a less protective standard than prescribed in these FGS, then the FGS shall be the compliant standard.

C4.3.2.2. Indirect discharges of DoD wastewaters are prohibited if such discharge will:

C4.3.2.2.1. Endanger the health or safety of DWTS personnel.

C4.3.2.2.2. Cause physical, chemical, or biological damage to the wastewater collection and conveyance system, or other equipment owned and operated by the DWTS.

C4.3.2.2.3. Interfere or compromise the continuous operation of the DWTS.

C4.3.2.2.4. Adversely affect the DWTS ability to meet the criteria of public directives for the environment (i.e., odors) or receiving water bodies.

C4.3.2.2.5. Contaminate wastewater sludge that makes disposal environmentally unacceptable.

C4.3.2.3. 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 in paragraph C4.3.3., unless more protective criteria are established in a wastewater-treatment facility discharge permit.

C4.3.2.3.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater-treatment facility flow is prohibited.

C4.3.2.3.2. Ignitability and Explosivity.

C4.3.2.3.2.1. The discharge of wastewater with a closed cup flashpoint of < 60°C (140°F) is prohibited.

C4.3.2.3.2.2. The discharge of waste with any of the following characteristics is prohibited:

C4.3.2.3.2.2.1. A liquid solution that contains > 24% alcohol by volume and has a flash point < 60°C (140°F).

C4.3.2.3.2.2.2. A non-liquid that under standard temperature and pressure can cause a fire through friction.

C4.3.2.3.2.2.3. An ignitable compressed gas.

C4.3.2.3.2.2.4. An oxidizer, such as peroxide.

C4.3.2.3.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

C4.3.2.3.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

C4.3.2.3.3.2. Wastes that react violently with water;

C4.3.2.3.3.3. Wastes that form explosive mixtures with water or form toxic gases or fumes when mixed with water;

C4.3.2.3.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

C4.3.2.3.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

C4.3.2.3.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material;" and

C4.3.2.3.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

C4.3.2.3.4. 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, unless the DWTS is specifically designed to handle that type of wastewater.

C4.3.2.3.5. 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.

C4.3.2.3.6. 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 include the following minimum requirements:

C4.3.2.3.6.1. Description of discharge practices, including non-routine batch discharges;

C4.3.2.3.6.2. Description of stored chemicals;

C4.3.2.3.6.3. 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;

C4.3.2.3.6.4. 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 facility site runoff, and worker training;

C4.3.2.3.6.5. Proper procedures for building containment structures or equipment;

C4.3.2.3.6.6. Necessary measures to control toxic organic pollutants and solvents; and

C4.3.2.3.6.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment facility or the environment.

C4.3.2.3.7. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

C4.3.2.3.8. 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).

C4.3.2.4. Complaint System. A system for investigating water pollution complaints from the appropriate German water authority will be established, involving the LEC, as appropriate.

C4.3.3. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect).

C4.3.3.1. Any installations that 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 substantially modified on or after 1 October 1994 will meet the limitations for new activities.

C4.3.3.1.1. 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.

C4.3.3.1.1.1. Electroplating subparts are identified as follows:

C4.3.3.1.1.1.1. 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.

C4.3.3.1.1.1.2. 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.

C4.3.3.1.1.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

C4.3.3.1.1.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

C4.3.3.1.1.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

C4.3.3.1.1.1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

C4.3.3.1.1.1.7. 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.

C4.3.3.1.1.2. Discharge standards applying to new and existing facilities in the above electroplating subparts are referenced in Table C4.T9.

C4.3.3.2. Monitoring. Monitoring (including both sampling and analysis) will be accomplished quarterly. Samples should be collected at the point of discharge before any mixing with the receiving water. Monitoring 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.

C4.3.4. Stormwater Management.

C4.3.4.1. Develop and implement stormwater pollution prevention (P2) plans (SWPPPs) for activities listed in Table C4.T2., "Best Management Practices (BMPs)." Update the SWPPP annually.

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 SWPPP principles and awareness of water protection zones (see Chapter 3, "Drinking Water") and possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

C4.3.4.3. If a facility is licensed in accordance with a German federal or state criterion, any criteria that are associated with SWPPPs in the license are applicable and shall also be considered in the development and implementation of an SWPPP and during the conduct of employee training.

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."

C4.3.5.1. Septic systems treating domestic wastewater are allowed and shall be installed, operated, and maintained in accordance with a discharge permit issued by the appropriate German water authority. Documentation on maintenance actions shall be maintained.

C4.3.5.1.1. Technical experts shall inspect treatment facilities located in Bayern every 2 years. If no deficiencies were identified during the last inspection, the next inspection shall be conducted within 4 years after the last inspection. The inspection certificates shall be provided to the appropriate German water authority, and a copy shall be maintained.

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.

C4.3.7. Unpermitted WWTS. These FGS were developed under the assumption that the DoD does not operate unpermitted wastewater-treatment systems (WWTSs) in Germany that discharge directly into waters of Germany. If an unpermitted WWTS is identified or planned, please contact the LEC for additional criteria.

C4.3.8. Stormwater and Sewer System Inspections and Controls.

C4.3.8.1. Operational Control Criteria in Baden-Württemberg.

C4.3.8.1.1. Sewer Systems for Domestic Wastewater and Stormwater. Sewer systems shall be inspected on a regular basis. Inspections shall be conducted at the following intervals:

	Located in a water protection zone	**Renovated or undamaged**	**Unrenovated**
Sanitary or combined sewers	10 years (Zone I or II)	15 years	10 years
Stormwater sewers for stormwater that requires treatment	15 years	20 years	15 years

C4.3.8.1.2. Sewer Systems for Indirect Categorical Industrial Discharges. The integrity of sewer pipes and appurtenances that cannot visually be inspected shall be tested every 5 years in front of, and every 10 years behind, the last manhole *(Endkontrollschacht)*. This does not apply to biological treatment plants and amalgam separators.

C4.3.8.1.3. Stormwater-Treatment or Retention Systems.

C4.3.8.1.3.1. The operator control of stormwater treatment or retention systems includes the visual inspection of the inflow, overflow, and outflow for deposits or blockage and an operational test of equipment, measurement devices, and flow restrictors. Visual inspection shall be conducted at least bimonthly for stormwater overflow basins and quarterly for other facilities.

C4.3.8.1.3.2. Operators shall conduct quarterly visual inspections of the area around the direct discharge points for problems such as sedimentation, erosion, odor, color, and so on.

C4.3.8.2. Operational Control Criteria in Bavaria.

C4.3.8.2.1. Sewer Systems and Associated Structures. These criteria apply to sewer systems for sanitary sewage, stormwater, or combined sewage including their associated structures (e.g., pump stations, stormwater retention basins). Connection sewers and sewer systems for the direct discharge of < 8 m^3/d of domestic wastewater are excluded.

C4.3.8.2.1.1. The condition of sewer systems including manholes and the associated structures shall be inspected/tested as follows:

Methodology	Frequency
Visual inspection of sewer pipes with a diameter/largest dimension of < 1,200 mm	Every 10 years
Visual inspection of sewer pipes with a diameter/largest dimension of ≥ 1,200 mm	Every 5 years
Visual inspection of associated structures	Every 5 years
Water-tightness testing	Every 20 years (initially at an age of 40 years)

C4.3.8.2.1.1.1. Visual inspection of sewer pipes may be substituted with water-tightness testing every 10 years from the date of last tightness test.

C4.3.8.2.1.1.2. Visual inspection and water-tightness testing of stormwater sewer pipes is required only if the stormwater requires treatment or if the sewer pipe is located in a water protection zone.

C4.3.8.2.1.2. Data on the retention characteristics of stormwater basins that are equipped with a level meter shall be collected for each wet weather event and evaluated annually. Data shall be sorted by the date of the wet weather event and include the maximum level or the maximum overflow level, filled duration, and overflow duration.

C4.3.8.2.1.3. Operators shall conduct annual visual inspections of the area around the direct discharge points of stormwater basins for problems such as sedimentation, erosion, odor, color, and so on.

C4.3.8.2.2. Discharge of Collected Stormwater Into Groundwater.

C4.3.8.2.2.1. Stormwater collected from developed and paved areas discharged without a permit via areal seepage shall meet the criteria given in Table C4.T10.

C4.3.8.2.2.2. Stormwater collected from developed and paved areas discharged without a permit via subsurface seepage shall be pretreated and meet the criteria given in Table C4.T11.

C4.3.8.3. Operational Control Criteria in Hessen.

C4.3.8.3.1. Sewer Systems.

C4.3.8.3.1.1. Sewer system inspections/tests shall be based on visual surveys and/or pressure tests at the following frequency:

Sewer System	Frequency
Sewer systems constructed or repaired prior to 1 January 1999	At least every 10 years
Sewer systems constructed or repaired after 1 January 1999	No later than 15 years
Stormwater lines, newly constructed or repaired	No later than 20 years
Stormwater lines, existing	At least every 10 years

C4.3.8.3.1.2. The condition of the sewer system and any identified damages shall be documented. The progress and the results of the wastewater system checks shall be summarized annually in an operator control report.

C4.3.8.3.1.3. Flow measurement devices for wastewater-treatment plants and throttling devices for stormwater relief facilities shall be certified by Hessen authorities.

C4.3.8.3.2. Stormwater Control Facilities.

C4.3.8.3.2.1. Stormwater control facilities (e.g., retention basins, sewer overflow structures) shall be inspected for structural conditions and proper operation at the following frequency:

C4.3.8.3.2.1.1. The structures *(Bauwerke)* including all associated parts shall be visually inspected annually.

C4.3.8.3.2.1.2. Throttling devices with adjustable parts shall be hydraulically tested every 5 years.

C4.3.8.3.2.1.3. All components of stormwater control facilities shall be visually inspected monthly and functionally tested quarterly.

C4.3.8.3.2.2. Centralized control facilities shall be equipped with measuring devices for level, number, and duration of discharge.

C4.3.8.3.2.3. Modifications of control facilities shall be immediately reported to the water authority.

C4.3.8.3.2.4. Hydraulic test records of throttling devices shall be submitted to the Hessian water authority in the operator control report.

C4.3.8.4. Operational Control Criteria in Rheinland-Pfalz.

C4.3.8.4.1. Sewer Lines. The first two inspections after commissioning of a sewer line shall be conducted at 15 year intervals. Thereafter, condition of operational sewer lines shall be visually inspected every 10 years.

C4.3.8.4.2. Combined sewage treatment facilities and pump stations. The operability and structural condition of combined sewage treatment facilities and pump stations shall be visually inspected on demand or at least monthly. Deficiencies and/or any sediment build up that may affect the function of the system shall be corrected immediately.

Table C4.T1. Approved Analytical Test Methods

Parameter	Method
General Methods	
Directives for sampling techniques	DIN EN 25667-2
Sampling from wastewater	DIN 38402-A 11
Wastewater flow	Corresponding to DIN 19559
Pretreatment, homogenizing, and splitting of heterogeneous water samples	DIN 38402-A 30
Analytical Methods	
Anions/Elements	
Chloride	DIN EN ISO 10304-2
Cyanide, easily releasable	DIN 38405-D 13-2
Cyanide, in the unfiltered sample	DIN 38405-D 13-1
Fluoride, total in the unfiltered sample	DIN 38405-D4-2
NO_3-Nitrogen	DIN EN ISO 10304-2
NO_2-Nitrogen	DIN EN 26777
Phosphorus, total in the unfiltered sample	DIN EN 1189 (6.4)
Phosphate compounds as total phosphorus, in the unfiltered sample	DIN EN ISO 11885
Sulfate	DIN EN ISO 10304-2
Sulfide, easily releasable	DIN 38405-D 27
Sulfite	DIN EN ISO 10304-3
Cations/Elements	
Aluminum, in the unfiltered sample	DIN EN ISO 11885
NH_4-Nitrogen	DIN EN ISO 11732
Antimony, in the unfiltered sample	DIN EN ISO 11885
Arsenic, in the unfiltered sample	DIN EN ISO 11969
Barium, in the unfiltered sample	DIN EN ISO 11885
Lead, in the unfiltered sample	DIN EN ISO 11885
Cadmium, in the unfiltered sample	DIN EN ISO 11885
Chrome, in the unfiltered sample	DIN EN ISO 11885
Chrome (VI)	DIN 38405-D 24
Cobalt, in the unfiltered sample	DIN EN ISO 11885
Iron, in the unfiltered sample	DIN EN ISO 11885
Copper, in the unfiltered sample	DIN EN ISO 11885
Nickel, in the unfiltered sample	DIN EN ISO 11885
Mercury, in the unfiltered sample	DIN EN 1483
Silver, in the unfiltered sample	DIN EN ISO 11885
Thallium, in the unfiltered sample	DIN 38406-E 26
Vanadium, in the unfiltered sample	DIN EN ISO 11885
Zinc, in the unfiltered sample	DIN EN ISO 11885
Tin, in the unfiltered sample	DIN EN ISO 11885
Titanium, in the unfiltered sample	DIN EN ISO 11885
Selenium, in the unfiltered sample	DIN 38405-E 23-2
Gallium, in the unfiltered sample	According to DIN EN ISO 11885
Indium, in the unfiltered sample	According to DIN EN ISO 11885
Manganese, in the unfiltered sample	DIN EN ISO 11885
Single Substances, Sum Parameters, Group Parameters	
TSS, in the unfiltered sample	DIN EN 872
AOX, in the unfiltered sample indicated as chloride	< 5 g/L: DIN EN 1485; adsorption according to section 8.2.2 > 5 g/L: DIN 38409-H 22
COD, in the unfiltered sample	DIN 38409-H 41

Table C4.T1. Approved Analytical Test Methods (continued)

Parameter	Method
COD, in the unfiltered sample without H_2O_2	DIN 38409-H 41; deduction of the H_2O_2 affected COD share
TOC (total organic carbon), in the unfiltered sample	DIN EN 1484
TNb (total bound Nitrogen), in the unfiltered sample	DIN V ENV 12260; burning temperature higher than 700°C shall be kept for complete mineralization
Non-volatile lipophilic substances (extractable), in the unfiltered sample	DEV H56
Hydrocarbons, total in the unfiltered sample	DIN EN ISO 9377-2
Direct separable lipophilic light substances, in the unfiltered sample	DIN 38409-H 19, average of two samples
Phenol index after distillation and dye extraction, in the unfiltered sample	DIN 38409-H 16-2
Chlorine, total	DIN 38408-G 4-1
Chlorine, free	DIN 38408-G 4-1
Hexachlorobenzene, in the unfiltered sample	DIN 38407-F 2
Trichloroethene, in the unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
1,1,1,-Trichloroethane, in the unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Tetrachlorethene, in the unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Trichloromethane, in unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Tetrachloromethane, in unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Dichloromethane, in unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Hydrazine	DIN 38413-P 1
Tensides, anionic	DIN EN 903
Tensides, non-ionic	DIN 38409-H 23-2
Tensides, cationic	DIN 38409-H 20
Bismuth complex index (Ibik)	DIN 38409-H 26
Aniline, in the unfiltered sample	DIN EN ISO 10301, section 2, extraction with Dichloromethane at pH 12, GC-separation at e.g., DB 17 and OV 101. N-P-Detector
Hexachlorocyclohexane, as sum of all isomers	DIN 38407-F 2
Hexachlorobutadiene (HCBD), in the unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Aldrine, Dieldrine, Endrine, Isodrine (Drines), in the unfiltered sample	DIN 38407-F 2
Volatile organically bound halogens, in the unfiltered sample indicated as chloride	DEV H 25, at room temperature blowing out for 10 minutes
1,2-Dichloroethane, in the unfiltered sample	DIN EN ISO 10301, application according to liquid/liquid-extraction procedure
Trichlorobenzene as sum of all isomers, in the unfiltered sample	DIN 38407-F 2
Endosulfane as sum of all isomers, in the unfiltered sample	DIN 38407-F 2

Table C4.T1. Approved Analytical Test Methods (continued)

Parameter	Method
Benzene and derivatives, in the unfiltered sample	DIN 38407-F-9-1; instead of $KaCO_3$ 1 to 3 g $NaSO_4$ per 5 mL sample shall be applied. In section 3.8.3 the value "8.78 µg/L" is substituted by "878 µg/L"
Sulfide and mercaptane sulfur, in the unfiltered sample	Titration with silver-nitrate-solution
Polycyclic aromatic hydrocarbons (PAH), in the unfiltered sample (Fluoranthene, Benzo (a) pyrene (3,4-Benzopyrene), Benzo (b) fluoranthene (3.4-Benzofluoranthene), Benzo (g,h,i) perylene (1,12-Benzoperylene), and Indeno (1,2,3-cd) pyrene (2,3-o-Phenylene pyrene))	DIN 38407-F 8
Chlorinedioxide and other oxidizing agents, indicated as chlorine	DIN 38408-G 5; measures against interference according to section 4 are not to be applied
Coloring	DIN EN ISO 7887, section 3
Polychlorinated dibenzo dioxins/furans (PCDD/PCDF)	DEV F33
Biological Test Procedures	
Guidelines for sampling and performing of biological test procedures	DIN EN ISO 5667-16
Fish egg toxicity (G_{Ei}), in the unfiltered sample	DIN 38415-T6
Daphnia toxicity (G_D), in the unfiltered sample	DIN 38412-L 30
Algae toxicity (G_A), in the unfiltered sample	DIN 38412-L 33; the reference "if no inhibition more than 20% could be registered for higher dilutions" in section 3.5 does not apply; annotation in section 11.1 does not apply
Bacteria illuminating inhibition (G_L) in the unfiltered sample	DIN 38412-L 34 combined with DIN 38412-L 341; a dilution has to be performed with distilled water instead of the indicated common salt solvent
Easy aerobic biological degradation ability of substances	Appendix of USEUCOM Directive 92/69/EWG for 17th adjustment to Directive 67/548/EWG
Aerobic biological degradation ability of substances	DIN EN 29888; Degradation ability is determined as DOC degradation degree over 28 days. *Belebtschlamm-Inoculum* 1 g/L dry stuff per test. Water hardness may reach 2.7 mmol/L. Outblown and adsorbed substances are not considered for the result. The result is indicated as degree of degradation. Preadapted inocula are not allowed.
Aerobic biological degradation ability in biological treatment facilities (elimination ability) of filtered sample	DIN EN 29888; Degradation ability is determined as COD or DOC degradation degree. The inoculum of the real treatment facility with 1g/L dry stuff in the testing arrangement shall be applied (section 8.3). The duration of the elimination test corresponds to the time required for achieving the elimination degree of the total wastewater amount of the real wastewater treatment facility in the test simulation. The COD concentration in the test (100 – 1000 mg/L) shall correspond to the real conditions. The water hardness of the testing water shall not exceed the hardness of the tested wastewater. Outblown substances are not considered for the result. The elimination degrees refer to the COD concentrations at the beginning of the test under subtraction of stripping shares. The result shall be indicated al degree of elimination.
BOD_5	DIN EN 1899-1
Potential for genetic material alternation	DIN 38415-T 3

Table C4.T2. Best Management Practices

Activity	**Best Management Practice**
Aircraft Ground Support Equipment Maintenance	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids. Cap hoses to prevent drips and spills.
Aircraft/runway de-icing	Perform anti-icing before the storm. Put critical aircraft in hangars/shelters.
Aircraft/vehicle fueling operations	Protect fueling areas from the rain. Provide spill response equipment at filling station.
Aircraft/vehicle maintenance & repair	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids.
Aircraft/vehicle washing	Capture washwater and send to wastewater-treatment plant. Treat washwater with oil-water separator before discharge.
Bulk fuel storage areas	Use dry camlock connectors to reduce fuel loss. Capture spills with drip pans when breaking connections. 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. Perform corrosion control activities inside.
Hazardous material storage	Store hazardous materials inside or under cover. Reduce use of hazardous materials.
Outdoor material storage areas	Cover and curb salt, coal, urea piles. Store product drums inside or under cover. Reduce quantity of material stored outside.
Outdoor painting/depainting operations	Capture sandblasting media for proper disposal. Capture paint clean up materials (thinners, rinsates).
Pesticide operations	Capture rinse water when mixing chemicals. 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. Use drip pans to capture leaking fluids.

Table C4.T3. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1,2-Dichloropropane
Methyl bromide (bromomethane)	1,3-Dichloropropylene (1,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1,2-Trichloroethane
1,1-Dichloroethene	Benzene
1,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1,2-Dichloroethane	Bromoform (tribromomethane)
1,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1,2-Diphenylhydrazine
1,3-Dichlorobenzene	N-nitrosodiphenylamine
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate
Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractable Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	

Table C4.T3. Components of Total Toxic Organics (continued)

Pesticides/PCBs	
Alpha-Endosulfan	Endrin
Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor
Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)
Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and metabolites)	PCB-1016 (Arochlor 1016)
Dieldrin	

Table C4.T4. Limit Values for COD, BOD_5, Total Nitrogen, NH_4-N, and Total Phosphorus for Direct Discharges into Normal Waters from Municipal Wastewater-Treatment Facilities

Parameter	Size of the Treatment Facility				
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**
COD	150	110	90	90	75
BOD_5	40	25	20	20	15
N_{total}	-	-	-	18	13
NH_4-N	-	-	10	10	10
P_{total}	-	-	-	2	1

Notes:

1. All values are indicated in mg/L.

2. The limit values relate to either qualified random samples or 2-hour mixed samples.

3. These values apply to a wastewater temperature ≥ 12°C in the discharge pipe of the biological reactor of the wastewater treatment facility.

4. If the samples are collected from a pond facility that is designed for a holding time ≥ 24 hours, and the sample is clearly colored by algae, COD and BOD_5 shall be determined from algae-free samples. In this case, the limit values are reduced by 15 mg/L for COD and 5 mg/L for BOD_5.

5. The classification of a discharge facility into one of the size categories is dependent on the capacity of the wastewater-treatment facility that is based on the BOD concentration of the untreated wastewater (BOD raw). In cases in which the capacity of a wastewater-treatment facility was calculated based on only the BOD value of settled wastewater, the following values are to be used for the classification:

Category 1: < 40 kg/d BOD_5 settled
Category 2: 40 to 200 kg/d BOD_5 settled
Category 3: 200 to 400 kg/d BOD_5 settled
Category 4: 400 to 4000 kg/d BOD_5 settled
Category 5: > 4000 kg/d BOD_5 settled

6. For nitrogen, less stringent limit values up to 25 mg/L may be permitted by the discharge license or if the reduction of the total nitrogen concentration is at least 70%. The reduction relates to the nitrogen load at the influent compared to the effluent. The load calculation at the inflow is based on organic and inorganic nitrogen.

Table C4.T5. Total Suspended Solids (TSSs) Threshold Values for Direct Dischargers

	30-day	**7-day**
New Sources	30	45
Existing Sources	45	65

Note:

The effluent pH values shall be maintained between 6.0 and 9.0.

Table C4.T6. Limit Values for Total Nitrogen and Total Phosphorus for Discharges into Sensitive Areas in Bayern and Rheinland-Pfalz

Parameter	Size of the Facility	Concentration	Minimum Reduction
Total Phosphorus	10,000 - 100,000 EW > 100,000 EW	2 mg/L 1 mg/L	80%
Total Nitrogen	20,000 - 100,000 EW > 100,000 EW	15 mg/L 10 mg/L	70-80%

Table C4.T7. Reference Methods for Controls and Resulting Evaluations

1. A control method shall be applied that complies with the following criteria (methods other than those referenced in no.s 2, 3, and 4 can be applied if equivalent results can be achieved).
2. At the outflow and, if necessary at the inflow, samples shall be collected from the same determined places, as flow proportional or time proportional 24-hour samples in order to determine if the discharged wastewater is in compliance.

   Internationally accepted laboratory procedures shall be applied in order to minimize any changes to the sample condition between sampling and analysis.
3. The minimum number of yearly samples shall be determined according to the size of the domestic wastewater-treatment facility. Samples shall be taken in regular intervals according to the following schedule:

   2000 - 9999 EW: 12 samples in the first year, four samples in the following years if it can be shown that the wastewater was in compliance in the first year. If one of the samples has exceeded the limit value, 12 samples shall be collected in the following year.

   10,000 - 49,000 EW: 12 samples per year

   > 50,000 EW: 24 samples per year
4. For the treated wastewater, the limit values are considered to be met if for each individual parameter, the sample results comply with the following criteria:

   4.1 For $CBOD_5$, COD, and total suspended solids (TSSs), table C4.T7a. indicates the maximum number of samples that are permitted to exceed the established limits and have the system still in compliance.

   4.2 For $CBOD_5$, COD, and total suspended solids (TSSs), the deviation of the given parameter concentration under normal operating conditions may not exceed 100%; for TSS deviations up to 150% are permitted.

   4.3 For phosphorus and total nitrogen, the yearly average may not exceed the established limit.
5. Extreme values of wastewater pollution are not considered, as long these exceptional situations are related to stormwater events.

Table C4.T7a. Maximum Number of Samples Permitted to Exceed the MCL with the System Maintaining Compliance

Total Number of Samples Collected Per Year	**Maximum Number of Samples Permitted to Exceed the MCL**
4-7	1
8-16	2
17-28	3
29-40	4
41-53	5
54-67	6
68-81	7
82-95	8
96-100	9
101-125	10
126-140	11
141-155	12
156-171	13
172-187	14
188-203	15
204-219	16
220-235	17
236-251	18
252-268	19
269-284	20
285-300	21
301-317	22
318-334	23
335-350	24
351-365	25

Table C4.T8. Monitoring Requirements

Plant Capacity (MGD)	**Monitoring Frequency**
0.001 – 0.99	Monthly
1.0 – 4.99	Weekly
> 5.0	Daily

Table C4.T9. Discharge Standards for Electroplating Facilities

Pollutant	**Criteria prior to mixing with other wastewater [1]**
Adsorbable organic halogens	1 mg/L
Arsenic	0.1 mg/L
Lead	0.5 mg/L
Cadmium	0.2 mg/L 0.3 kg/t
Free chlorine	0.5 mg/L
Chrome	0.5 mg/L
Chrome VI	0.1 mg/L
Cyanide, easily releasable	0.2 mg/L
Copper	0.5 mg/L
Nickel	0.5 mg/L
Silver	0.1 mg/L
Sulfide	1 mg/L
Tin	2 mg/L
Zinc	2 mg/L

Note:

[1] Concentration measured in wastewater by qualified random sample or 2-hour mixed sample.

Table C4.T10. Areas to be Drained, Approved Seepage Not Requiring a Permit, and Criteria for Preliminary Treatment of Stormwater for Areal Seepage in Bavaria

Areas connected to French drain (areas not listed shall be classified according to their contamination):	**Areal seepage not requiring a permit**	**On surface soil**
	Outside of karst areas or areas with fissured bedrock	**Within karst areas or areas with fissured bedrock**
Roof areas Terrace areas	Surface soil layer covered with vegetation with a minimum height of 20 cm; minimum size of declared seepage area or basin not smaller than 1/15 of connected paved area	
Copper, zinc, or lead covered areas > 50 m^2	Surface soil layer covered with vegetation with a minimum height of 30 cm; pH-value 6 - 8, humus content 1 - 3%, clay content < 10%; monitoring and, if necessary, adjustment of pH-value at intervals of 3 years; minimum size of declared seepage area or basin not smaller than 1/15 of connected paved area	
Pedestrian areas, proprietary paths, other public-limited paths Bike and footpaths outlying splashing and spraying areas of roads (distance > 3m) Vehicle parking spaces, courtyard and traffic areas with low traffic volume (up to 300 vehicles/24 hrs)	Surface soil layer covered with vegetation with a minimum height of 20 cm; minimum size of declared seepage area or basin not smaller than 1/15 of connected paved area, or water permeable pavements for treatment of stormwater approved by the German Institute for Structural Engineering *(Deutsches Institut für Bautechnik)*	
Vehicle parking spaces, district and rural roads with not more than two lanes and low traffic volume (up to 5,000 vehicles/24 hrs)	Surface soil layer covered with vegetation with a minimum height of 20 cm; minimum size of declared seepage area or basin not smaller than 1/15 of connected paved area or water permeable pavements for treatment of stormwater approved by the German Institute for Structural Engineering *(Deutsches Institut für Bautechnik)*	Surface soil layer covered with vegetation with a minimum height of 30 cm; minimum size of declared seepage area or basin not smaller than 1/10 of connected paved area[1] or water permeable pavements for treatment of stormwater approved by the German Institute for Structural Engineering *(Deutsches Institut für Bautechnik)*
Loading/unloading areas of trade and manufacturing companies [2]		

[1] For existing seepage areas or basins, a height of 20 cm and a minimum area of 1/15 of the connected area apply.
[2] Areas on which water-endangering substances are handled regularly, exempt from the exclusive handling of small containers (≤ 20 liters); district and rural roads with more than two lanes; roads that are subject to an official plan approval.

Table C4.T11. Areas to be Drained, Approved Seepage Not Requiring a Permit, and Criteria for Preliminary Treatment of Stormwater for Subsurface Seepage in Bavaria

Areas connected to French drain (areas not listed shall be classified according to their contamination):	**Subsurface seepage not requiring a permit**	**Linear or punctual seepage**
	Outside of karst areas or areas with fissured bedrock	**Within karst areas or areas with fissured bedrock**
Roof areas	after preliminary treatment through baskets for reject retention	
Terrace areas	after preliminary treatment through courtyard or street outlet with sludge basket	
Copper, zinc, or lead covered areas > 50 m^2	after preliminary treatment through approved filters	
Pedestrian areas, proprietary paths, other public-limited paths Bike and foot paths outlying splashing and spraying areas of roads (distance > 3m) Vehicle parking spaces, courtyard and traffic areas with low traffic volume (up to 300 vehicles/24 hrs)	after preliminary treatment through: street outlets for wet sludge or settling pond with constant accumulation and a water surface of minimum 1/800[1] of connected paved area or treatment facilities for storm water which are approved by the German Institute for Structural Engineering *(Deutsches Institut für Bautechnik)*	after preliminary treatment through: manhole seepage with mounted filter bag (two-stage composite filter with a water-sided coarse filter and a manhole-sided fine filter) or treatment facilities for stormwater that are approved by the German Institute for Structural Engineering *(Deutsches Institut für Bautechnik)*
Pedestrian areas, proprietary paths, other public-limited paths Bike and foot paths outlying splashing and spraying areas of roads (distance > 3m) Vehicle parking spaces, courtyard and traffic areas with low traffic volume (up to 300 vehicles/24 hrs)	after preliminary treatment through: street outlets for wet sludge or settling pond with constant accumulation and a water surface of minimum 1/800[1] of connected paved area or treatment facilities for storm water which are approved by the German Institute for Structural Engineering *(Deutsches Institut für Bautechnik)*	
Loading/unloading areas of trade and manufacturing companies [3]	subsurface seepage without a permit not allowed	

[1] Design with a rain yield factor of 30 L/(s*ha) and a surface feed of 9 m/h.
[2] Design with a rain yield factor 125 L/(s*ha) and a surface feed of 9 m/h .
[3] Areas on which water-endangering substances are handled regularly, exempt from the exclusive handling of small containers (≤ 20 liters); district and rural roads with more than two lanes; roads that are subject to an official plan approval.

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CHAPTER 5 - HAZARDOUS MATERIAL

C5.1. SCOPE

This chapter provides 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 FGS do not cover munitions, radioactive material or the transportation of hazardous material.

C5.2. DEFINITIONS

C5.2.1. Aboveground Storage Tank. See Chapter 9, "Petroleum, Oil, and Lubricants," C9.2. Definitions.

C5.2.2. Combustible Liquids. Any liquid with a flashpoint > 37,8 °C (100 °F) and < 93 °C (200 °F).

C5.2.3. Determination of Suitability. The determination of suitability is a formal acceptance by the appropriate German authority on facilities or equipment carried out before start-up of an operation. The determination of suitability is based on an external inspection report prepared by an accredited facility inspection body for the defined facility (e.g., filling station-dispensing equipment).

C5.2.4. Expert. An individual knowledgeable of the applicable health and safety regulations, and technical standards of a facility. An expert shall be external to the DoD. Depending on specific criteria, an expert requires specific training or shall be registered by an appropriate German authority.

C5.2.5. Facilities Requiring Supervision. Facilities such as boiler plants; pressure vessels; plants for the filling of compressed, liquefied, and under- pressure dissolved gases; facilities that have elevators; facilities in explosive areas; facilities containing acetylene; calcium carbide storage; and facilities for the storing, filling, and transportation of flammable liquids. Included in the definition are pressurized pipelines containing flammable, corrosive, or toxic gases, vapors, or fluids.

C5.2.6. Filling Facility. Devices used for filling containers with POL substances. These also include areas in which POL substances are filled from one container into another. There is no volume limit value that defines a filling facility.

C5.2.7. Filling Safeguards. Devices that discontinue a filling procedure by activating a shutoff device in the container (this may also apply to a tanker truck) from which the hazardous substance is filled into another container.

C5.2.8. Globally Harmonized System of Classification and Labeling of Chemicals (GHS). System developed by the United Nations addressing the classification of substances and mixtures by types of hazards and proposing harmonized hazard communication elements, including labels and safety data sheets (SDS). Table C5.T1. shows GHS Definitions.

C5.2.9. GHS Label. Standardized label in accordance with the Globally Harmonized System. It shall include the following elements:

C5.2.9.1. Name, address and telephone number of the supplier;

C5.2.9.2. Nominal quantity of the substance or mixture in the package;

C5.2.9.3. Product identifier;

C5.2.9.4. Applicable hazard pictogram;

C5.2.9.5. Applicable signal words;

C5.2.9.6. Applicable hazard statements;

C5.2.9.7. Applicable precautionary statements; and

C5.2.9.8. Applicable supplemental information.

C5.2.10. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the information required by Section C5.3.7.

C5.2.11. Hazard Category. A classification of hazard based on the flammability of liquid substances as outlined below:

Hazard	Hazard Category	Criterion
Extremely Flammable	1	Fluids with a flashpoint < 23 °C (73.4 °F) and a boiling point ≤ 35 °C (95 °F)
Highly Flammable	2	Fluids with a flashpoint < 23 °C (73.4 °F) and a boiling point > 35 °C (95 °F)
Flammable	3	Fluids with a flashpoint ≥ 23 °C (73.4 °F) and ≤ 60 °C (140 °F)

C5.2.12. 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. Munitions are excluded. Hazardous materials include chemical substances and mixtures that are listed in the European Union List of Wastes[1], from the LEC, designated as

[1] The European Union List of Wastes is available from the Official Journal of the European Union in various formats and languages at https://eur-lex.europa.eu/eli/dec/2014/955/oj. Should a chemical or material not be found on the European Union List of Wastes, please contact the LEC.

hazardous in the Hazardous Material Information Resource System, or present one or more of the hazards listed in Table C5.T1., "Classes of Hazardous Materials.".

C5.2.13. Hazardous Material Information Resource System (HMIRS). The computer- based information system developed to accumulate, maintain, and distribute important information on hazardous material used by the DoD in accordance with DoDI 6050.05, "DoD Hazard Communication (HAZCOM) Program.".

C5.2.14. 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.

C5.2.15. Hazard Pictogram. Label displaying the hazard of a hazardous material, used for single substances and mixtures. See Table C5.T1.

C5.2.16. Hazard Sign. A sign posted at workplaces where hazardous materials are stored or handled that warns against a specific risk or danger (i.e., risks or dangers associated with flammables, toxics, irritants, oxidizers, compressed gases, batteries, or explosive atmosphere). See Appendix C5.A1.

C5.2.17. Hazard Statement. Each hazard statement is designated a code, starting with the letter "H" and followed by three digits describing the nature of the hazards of a hazardous material/mixture.

C5.2.18. Hazardous Substances. Substances that are considered to be harmful to human health and the environment. Hazardous substances include both hazardous materials and hazardous wastes.

C5.2.19. Leak-Detection Sensor. Devices that automatically detect the leak of liquid water-endangering substances or the infiltration of water into a controlled area or fluid retention room. Leak-detection sensors consist of point sensors (leak sensors), line sensors (cables, hoses) and surface sensors (mats), and the associated detection equipment.

C5.2.20. Leak Protection Liner. Flexible or rigid intermediate layers that conform to the shape of a container and that are designed to create an operational monitoring space within a single-walled container for the purpose of carrying out leak control.

C5.2.21. Mandatory Sign. A sign placed at a workplace where hazardous materials are stored or handled that indicates that a certain behavior shall be followed (for example, the use of specific personal protection equipment (i.e., safety masks, goggles, or gloves) or special precautionary measures). See Appendix C5.A2.

C5.2.22. Piping. Rigid or flexible piping used to convey substances. Piping also comprises fittings, flanges, and gaskets. There are several categories of piping: piping within an installation (i.e., onsite piping) and piping extending outside an installation (i.e., offsite piping). Onsite piping is always part of a facility (e.g., a filling station, a fuel-unloading facility, or a stationary airfield refueling facility). Piping that extends offsite and connects facilities closely related, both physically and operatively, is called connecting piping.

C5.2.23. Persistent Organic Pollutants (POPs). Chemical substances that persist in the environment, bioaccumulate through the food web, and pose a risk of causing adverse effects to human health and the environment.

C5.2.24. Precautionary Statement. Each precautionary statement is designated a code, starting with the letter "P" and followed by three digits describing recommended measures to minimize or prevent adverse effects resulting from exposure to a hazardous material/mixture.

C5.2.25. Qualified Person. An individual qualified for the monitoring of working equipment based on his/her profession, work experience, and technical knowledge. The individual may be internal or external to the DoD.

C5.2.26. Safety Data Sheet (SDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties of the product, and the hazardous effects of a particular product.

C5.2.27. Safety Sign. A sign that addresses information regarding health and safety concerns. A safety sign consists of a combination of a geometric shape and colors with a hazard symbol. A safety sign maybe a hazard sign or a mandatory sign. See Appendix C5.A1. and Appendix C5.A2.

C5.2.28. Secondary Containment. Leakproof structures, rooms in buildings (fluid retention rooms), and/or prefabricated building components (collecting vats) designed to collect leaking substances from containers or piping, and leakproof drainage areas designed to channel leaking substances from containers or pipelines into collection devices (e.g., holding tanks, sumps).

C5.2.29. Signal Word. Words including "Danger" indicating more severe hazard categories and "Warning" indicating less severe hazard categories according to hazard classification of hazardous material/mixtures.

C5.2.30. Special Protection Area. A special protection area is defined as the space surrounding compressed gas cylinders storing very toxic gases (Cat. I; H300; H310; H330) where the release of gas or gas/air mixtures cannot be excluded following leakage at connections or fittings, or during the change of connections. The special protection area is based on the type of gas (see Appendix C5.A3.).

C5.2.31. Storage, Distribution, and Handling Facility. Independent, stationary or quasi-stationary units that handle any volume of water endangering substances and are used for more than a short period of time. The temporary storage of water-endangering substances in areas not normally designated for this purpose (i.e., temporary storage for transportation) is not considered a storage, distribution, and handling facility. Temporary storage for transportation shall not exceed 24 hours, exclusive of non-workdays.

C5.2.32. Transshipment Facilities. Areas and equipment used for the loading and unloading of water-endangering substances from one transport vehicle to another, either as bulk loads or as packaged products.

C5.2.33. Underground Storage Tank (UST). See Chapter 19, "Underground Storage Tanks," C19.2. Definitions.

C5.2.34. Water-Endangering Substances. Water-endangering substances are substances classified under water hazard classes (WGKs) 1 through 3 (see paragraph C5.2.36.).

C5.2.35. Water Hazard Category. Classification of facilities based on the volume or mass and WGK of the substances used at the facilities (see Table C5.T2.).

C5.2.36. Water Hazard Class (*Wassergefährdungsklasse (WGK)*). Classification of substances based on their potential for endangering water resources. (For lists of water-endangering and non-water-endangering substances, see https://webrigoletto.uba.de/rigoletto/public/welcome.do.

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 "Handling of Hazardous Materials" 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, Ch 3.4 (HM24), "Preparing Hazardous Materials for Military Air Shipment".

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.

C5.3.2.1. In addition to general aisle space criteria outlined in the Joint Service Publication on Storage and Handling of Hazardous Materials, aisle width shall be at least 3 meters (10 feet) when operating material handling equipment within storage areas, or the width of the widest material handling equipment used within a storage area plus 1 meter (3.28 feet), whichever is greater.

C5.3.2.2. Aisles within work or storage areas with an area > 1,000 square meters (m^2) (1,200 square yards (yd^2)) shall be marked unless the aisle space is otherwise easily recognizable.

C5.3.3. Transportation of hazardous material originating from US Army installations in Germany shall comply with provisions outlined in AER 55-50. Transportation of hazardous material originating from USAFE installations in Germany shall comply with USAFEI 23-104. For movements through the Defense Transportation System (DTS) follow ECM 4504.01 and DoD 4500.9 R Part II, CH 203,204 and 205. Contact a dangerous goods advisor for advice.

C5.3.4. Each installation shall maintain a master listing of all storage, distribution, and handling locations for hazardous material as well as an inventory of all hazardous materials contained therein. The master listing should include, but is not limited to, facility designs, water hazard category, type and amount of water endangering substances stored. (See Chapter 18, “Spill Prevention and Response Planning”.

C5.3.4.1. The inventory shall be accessible to all affected personnel and their representatives.

C5.3.4.2. Those that store hazardous material will identify by type and amount and report to the local fire and safety office the maximum amount of hazardous materials required at any single point of operation during a period of a year.

C5.3.4.3. The inventory shall contain at least the name of the hazardous material; the hazard classification or hazardous properties; quantity to be used during operation; and name of the work area where employees may be exposed to the hazardous material. The inventory shall reference the applicable SDS.

C5.3.5. Each SDS shall be in English or the predominant language in the workplace, and shall contain at least the following information:

C5.3.5.1. The identity used on the label. SDSs shall display the hazard identification in accordance with Table C5.T1 or US equivalent;

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 names of the ingredients that contribute to these known hazards, and the common names of the mixture itself; or

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

C5.3.5.1.3.1. The chemical and common names of all ingredients that have been determined to be health hazards, and that comprise ≥ 1 % of the composition, except that chemicals identified as carcinogens, or as persistent, bioaccumulative and toxic, or as very persistent and very bioaccumulative shall be listed if the concentrations are ≥ 0.1 %;

C5.3.5.1.3.2. The chemical and common names of all ingredients that have been determined to be health hazards, and that comprise < 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 names 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, flashpoint);

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 routes 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 SDS, where available;

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

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 SDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for cleanup 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 SDS, 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 SDS 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 SDS 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 SDSs for each hazardous material procured, stored, or used at the work center. SDSs that are not contained in the HMIRS and those SDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of SDS information not contained in the HMIRS should be maintained on site.

C5.3.7. Labeling Criteria for Hazardous Material.

C5.3.7.1. All hazardous materials on DoD installations will have a hazardous chemical warning label in accordance with DoDI 6050.05, "DoD Hazard Communication (HAZCOM) Program" (or German equivalent in accordance with Table C5.T1. DoD installations shall have SDS information readily and visibly available. These requirements apply throughout the life-cycle of these materials.

C5.3.7.2. GHS labels shall be written in English and German. Depending on the predominant language(s) of the workforce, an additional language may be required.

C5.3.7.3. Unless handled by local national employees, individual containers of hazardous materials labeled in accordance with US Consumer Product Safety Commission regulations do not require supplemental or revised labeling. Different outer packaging labeling may be required for compliance with transport regulations. If handled by local national employees, CLP (EC 1272/2008) conformed labeling is required.

C5.3.8. DoD installations will evaluate minimization options for all hazardous materials in use and 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. The evaluation process shall address substitution of hazardous materials with non-hazardous or less hazardous alternatives and process modifications to reduce the volume of hazardous materials.

C5.3.9. All excess hazardous material will be processed through the Defense Logistics Agency (DLA) Disposition Services in accordance with the procedures in DoDM 4160.21. The DLA Disposition Services will only donate, transfer, or sell hazardous material to environmentally responsible parties. This criterion is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local Hazardous Material Tracking Activity (HTA) or exchange program.

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

C5.3.10.1. Verbal instruction shall be provided to employees before assignments that may involve working with hazardous materials, and annually thereafter. The verbal instruction shall be workplace-specific, based on work- and substance-related operating instructions *(Betriebsanweisung)* (see Chapter 18, "Spill Prevention and Response Planning") and include but not be limited to the following topics:

C5.3.10.1.1. Safety measures and procedures for activities that involve hazardous substances;

C5.3.10.1.2. Measures to be taken in the event of operating malfunctions;

C5.3.10.1.3. Decontamination procedures

C5.3.10.1.4. Emergency response plan and procedures;

C5.3.10.1.5. Spill containment;

C5.3.10.1.6. Waste disposal;

C5.3.10.1.7. SDS location and use;

C5.3.10.1.8. Location and availability of hazardous materials inventory; and

C5.3.10.1.9. Labeling criteria.

C5.3.10.2. The date and content of the verbal instruction shall be recorded and confirmed by employees through their signature. Training records shall be maintained until they are replaced by the next annual instruction records.

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

C5.3.12. Banned or Restricted Hazardous Materials.

C5.3.12.1. The import, manufacturing, storage, and use of persistent organic pollutants (POPs) listed in Table C5.T3. is prohibited. Exceptions are made for:

C5.3.12.1.1. Use in laboratories as reference standards; and

C5.3.12.1.2. In the case of compounds, preparations or products not deliberately contaminated with trace amounts of POPs.

C5.3.12.2. Table C5.T4. lists the most frequently used hazardous substances banned or otherwise restricted from introduction to the German Market[1].

C5.3.12.3. Carcinogens and Mutagens. Installations shall notify the locally responsible *BImA* or, as appropriate, the Center of Expertise for Construction Management through the installation commander when carcinogens or mutagens are used. Notification is required at least 14 days in advance of the first use of carcinogens or mutagens as well as before the start of new activities involving carcinogens or mutagens. The notification shall include the

[1] For a comprehensive, current list of restricted chemicals, please see Restrictions List at https://echa.europa.eu/substances-restricted-under-reach

following: name and volume of the substance, description of usage; protective measures, results of considerations concerning potential substitution of the substance and minimization of exposure, number of employees exposed, and level of potential exposure. Options for less hazardous substitutes for all applications shall be evaluated and documented in writing. In the event that substitution is not possible, enclosed facilities shall be used as much as possible, and concentrations in the ambient air shall be minimized. Storage of carcinogens or mutagens shall follow the storage criteria for toxic materials.

C5.3.12.4. Fertilizers. Storage areas for fertilizers shall comply with the criteria for water-endangering substances.

C5.3.12.5. Refer to Chapter 2, "Air Emissions," Chapter 11, "Pesticides," Chapter 14, "Polychlorinated Biphenyls," Chapter 15, "Asbestos," and Chapter 17, "Lead-based Paint" for additional criteria regarding ODSs, pesticides, polychlorinated biphenyls/terphenyls (PCB/Ts), asbestos, and lead-based paint.

C5.3.13. Outer packaging of hazardous materials shall be labeled as "Outer Packaging" and shall comply with the criteria for packaging for the hazardous materials contained therein.

C5.3.14. Facilities That Store, Distribute, and Handle Hazardous Substances.

C5.3.14.1. General Operational Criteria.

C5.3.14.1.1. General Criteria. A permit or a determination of suitability may be required for the construction or significant change of use of facilities that store, distribute, and handle water-endangering substances. Necessary permits for the construction or retrofitting of a facility will be obtained through the Center of Expertise for Construction Management; necessary permits for a significant change of use will be obtained through *BImA*. This does not apply to daily-use quantities in use at the work area and substances stored in minor quantities in laboratories and during short term storage prior to transport, if packages fulfill the requirements for transport on public roads. The criterion for secondary containment is dependent on the volume and the water hazard class of the substances stored, distributed, or handled (see Table C5.T2.).

C5.3.14.1.2. Facilities where hazardous substances are stored or handled and where local national employees are working must conduct a risk assessment including the evaluation of hazardous properties (as outlined in the SDS) of stored materials and mixtures in accordance with applicable German occupational safety regulations. The necessary permits, inspections and protective measures shall be determined according to the hazards identified.

C5.3.14.1.3. The use of flammable liquid dispensing devices shall allow for the expedient and safe access and egress to and from the facility.

C5.3.14.1.4. The ground surface in the area of filling facilities shall be sufficiently stable and impermeable.

C5.3.14.1.5. Minimum quantities of hazardous substances may be stored in work areas while in use. Flammable substances classified as extremely flammable, highly flammable, or flammable may be stored in work areas only if they are placed in appropriate safety cabinets after use (e.g., conformant to EN 14470).

C5.3.14.1.6. Toxic materials as defined in Table C5.T1. shall be stored and secured so that only qualified persons can access these materials.

C5.3.14.1.7. Labeling Criteria.

C5.3.14.1.7.1. Hazard signs and mandatory signs in English and German shall be displayed in workplaces where hazardous materials are handled and/or stored. Depending on the predominant language of the workforce, an additional language may be required. See Appendix C5.A1. and Appendix C5.A2.

C5.3.14.1.7.2. Compressed gas cylinders containing very toxic gases shall be stored and handled in special protection areas. Special protection areas shall be labeled according to the hazard associated with the respective type of gas (i.e., danger of poisoning). All associated piping shall be clearly labeled to indicate the type of gas it contains. Connection points and extraction points shall also be clearly labeled.

C5.3.14.1.7.3. Smoking and the use of open flames or open light in areas with fire and explosion hazards is prohibited. The prohibitions shall be clearly posted in English and German.

C5.3.14.1.7.4. Areas with fire or explosion hazards shall not be accessed by unauthorized personnel. A sign reading “Authorized Personnel Only!” shall be clearly posted at all areas with fire or explosion hazard.

C5.3.14.2. Operators of facilities that store, distribute, and/or handle water- endangering substances shall prepare and follow operating instructions *(Betriebsanweisung)* including monitoring, maintenance, and alarm plans. This does not apply to facilities of water hazard category A. For heating oil facilities, the officially published operating procedure “Instructions for the Use and Safe Handling of Water-Endangering Substances” shall be permanently affixed in conspicuous places in the vicinity of facilities.

C5.3.14.3. Inspections.

C5.3.14.3.1. Facilities That Store, Distribute, and Handle Water-Endangering Substances.

C5.3.14.3.1.1. The integrity of facilities for the storage, distribution, or handling of water-endangering substances and the functioning of their safety devices shall be monitored.

C5.3.14.3.1.2. An inspection performed by an external accredited expert is required according to Table C5.T2.1.

C5.3.14.3.1.3. Aboveground storage tanks containing water-endangering substances shall meet the criteria for inspections outlined in paragraph C5.3.14.3. et al. The logbook shall be maintained at a location identified by the operator of the tank and be accessible for inspection.

C5.3.14.4. Retention Basins for Firefighting Water.

C5.3.14.4.1. Water-endangering substance storage areas shall be provided with a retention basin for firefighting water if:

C5.3.14.4.1.1. Water shall be the primary firefighting agent,

C5.3.14.4.1.2. The storage area is not exclusively constructed of nonflammable construction material, and

C5.3.14.4.1.3. The following storage volumes are exceeded:

C5.3.14.4.1.3.1. 100 metric tons (110 tons) of water hazard class 1 (WGK 1) substances;

C5.3.14.4.1.3.2. 10 metric tons (11 tons) of water hazard class 2 (WGK 2) substances; or

C5.3.14.4.1.3.3. 1 metric ton (1.1 tons) of water hazard class 3 (WGK 3) substances.

C5.3.14.5. Storage of Solid Substances.

C5.3.14.5.1. Aboveground storage tanks, drum storage, and filling and transshipment facilities that store solid, water-endangering substances do not require a determination of suitability, if:

C5.3.15.14.5.1.1. The storage area has a certified liquid-tight floor and the solid substances are stored outdoors in containers that remain closed and protected from weather and potential damages; or

C5.3.15.14.5.1.2. The facilities are located within a building with a floor that is stable against these substances.

C5.3.15. Piping.

C5.3.15.1. Permits. All piping associated with a facility used for the storage, distribution or handling of hazardous substances, and that does not extend beyond the site boundary, is subject to the same permitting and notification criteria required for the facility.

C5.3.15.2. Operational Criteria.

C5.3.15.2.1. Underground piping is permissible only if it meets the following technical criteria (see also Chapter 19, "Underground Storage Tanks"):

C5.3.15.2.1.1. Detachable joints and valves are located in leakproof inspection chambers that are monitored;

C5.3.15.2.1.2. Pipes are double-wall constructed and equipped with an automatic leak-detection system;

C5.3.15.2.1.3. The system is designed with suction pipes; and the pipes are fitted with a leakproof protective sheathing or installed in a channel where leaked substances can be detected.

C5.3.15.3. Inspections. All piping associated with a facility storing, distributing, or handling hazardous substances that does not extend beyond the site boundary, is subject to the same inspection criteria as the associated facilities.

C5.3.16. Compressed Gas Cylinders.

C5.3.16.1. General Criteria.

C5.3.16.1.1. Compressed gas shall not be stored in:

C5.3.16.1.1.1. Stairways and halls of buildings;

C5.3.16.1.1.2. Narrow yards and passages;

C5.3.16.1.1.3. Stairs in outdoor facilities or near emergency escape routes;

C5.3.16.1.1.4. Garages, residential rooms, and rooms open to the public;

C5.3.16.1.1.5. The immediate vicinity of highly flammable substances;

C5.3.16.1.1.6. Areas without sufficient ventilation (i.e., without at least an opening near the floor and near the ceiling of a room with a width of at least 100 cm^2 (15.5 in^2)); and

C5.3.16.1.1.7. Rooms located below the surface level of the surrounding area (except as outlined in C5.3.16.1.2).

C5.3.16.1.2. Up to 50 compressed gas cylinders may be stored below the surface level of the surrounding area in the following cases only:

C5.3.16.1.2.1. In areas with forced ventilation if the hourly air exchange rate exceeds twice the volume of the storage room equipped with automatic warning device if a defined threshold is exceeded;

C5.3.16.1.2.2. In areas with natural ventilation if the ventilation openings have an area of at least 10 % of the room area, the efficiency of the ventilation is ensured, and the floor of the area is not located at > 1.5 m (4.92 ft) below the surface level of the surrounding area;

C5.3.16.1.2.3. If stored within safety cabinets according to EN 14470-2 standard; and

C5.3.16.1.2.4. In work areas, but only in amounts required for the continuation of work.

C5.3.16.1.3. Dispensing and maintenance of compressed gas cylinders are not permitted in storage areas.

C5.3.16.1.4. Welding facilities and compressed gas cylinders shall not be exposed to heat (i.e., open flames and radiators). A minimum distance of 1.0 m (3.28 ft) shall be maintained from open flames. The distance to radiators shall be at least 0.5 m (1.64 ft).

C5.3.16.1.5. Compressed gas cylinders shall be adequately secured to prevent mechanical damage.

C5.3.16.2. Liquid Fuel.

C5.3.16.2.1. Compressed gas cylinders for liquid fuel shall be secured to prevent mechanical damage and protected from heat. Storage of compressed gas cylinders for liquid fuel in stairways, halls, narrow passageways, and in their immediate vicinity is permitted only on a temporary basis and only if required for the continuation of work.

C5.3.16.2.2. Liquid fuel cylinders connected to facilities shall be stored at a sufficient distance from basement openings, pits, uncovered manholes, shafts, and other flammable materials. In partially segregated areas with an area of < 2 square meters (m^2) (21.5 ft^2), the storage of liquefied gas cylinders is not permitted if leaking gas cannot adequately be vented to the outside.

C5.3.17. Chlorine Facilities.

C5.3.17.1. General Criteria.

C5.3.17.1.1. Rooms used for the operation of chlorine facilities and for storing chemicals shall be lockable, secured against unauthorized access, and not be designated for permanent occupancy. The rooms shall be designed to allow for the easy removal of chemicals. Chlorine facilities for water treatment and storage of associated chemicals may be located in outside areas if they are secured against unauthorized access and operation.

C5.3.17.1.2. If sodium hypochlorite, sodium chlorite, solutions of these substances, or

hydrochloric acid are stored indoors, the temperature in such rooms shall not fall below 0 °C (32 °F).

C5.3.17.1.3. Rooms for the operation of chlorine facilities or storage areas for Associated chemicals shall have ventilation. In the case of electrolysis units, the ventilation opening shall be located close to the ceiling.

C5.3.17.1.4. All chlorine facilities and components thereof shall be resistant to operational, chemical, mechanical, and thermal strains to be expected during their lifetime.

C5.3.17.1.5. Containers used for the storage of chemicals associated with chlorination shall be equipped with caps and covers secured against accidental opening. Caps and covers shall be able to prevent the contamination of the contents with other substances and the accidental release of the contents during transport and handling. Containers shall be kept closed.

C5.3.17.1.6. Chlorine gas cylinders shall be secured to prevent mechanical damage.

C5.3.17.2. Chlorine Facilities Operating With Chlorine Gas and Associated Storage Areas.

C5.3.17.2.1. Rooms used as chlorine gas facilities shall contain only equipment associated with the facility's operation and the associated chlorine gas cylinders. The rooms shall not be accessible from other rooms and shall be physically separated from other rooms by fireproof and gasproof walls. The rooms shall be directly accessible from an outdoor area. Doors shall open outwards and be equipped with panic bars.

C5.3.17.2.2. Rooms used as chlorine gas facilities shall be equipped with water sprinkler systems. Activation of the sprinkler system shall be possible from outside the room. The room shall have drains with sufficient capacity for the amount of water sprayed via the sprinkler system. Drains shall be equipped with gas traps and be visually inspected at least weekly.

C5.3.17.2.3. The floors of rooms used as chlorine gas facilities shall be level. The exit area may not be below the outside floor level and may not be higher than a loading ramp. For chlorine facilities used for the treatment of drinking water, underground storage rooms are permitted if they are equipped with chlorine gas detection systems.

C5.3.17.2.4. Hazardous releases of chlorine gas from chlorine gas facilities shall be prevented (i.e., by limiting the size for any openings to the outside to 20 cm by 20 cm (0.66 ft by 0.66 ft) or by installing appropriate alarm systems). Accidental releases in emergencies shall not reach other rooms, manholes, pits, canals, or ventilation holes located below the facility level.

C5.3.17.2.5. Facilities equipped with suction pipes for chlorine gas are exempt from the above criteria (C5.3.17.2.1. to C5.3.17.2.4.).

C5.3.17.2.6. The temperature within the chlorine facility shall not exceed 50 °C (122 °F).

C5.3.17.2.7. The chlorine gas dispensing system for potable water treatment shall be automatically interrupted if the raw water supply or the water flow is interrupted.

C5.3.17.2.8. Chlorine facilities shall have shutoff valves for connection pipes during the exchange of chlorine gas containers.

C5.3.17.3. Chlorine Facilities Operating on Chlorine Dioxide and Chlorine Electrolysis Facilities.

C5.3.17.3.1. Chlorine dioxide facilities shall be operated to prevent the supply of pure sodium chlorite or acid from coming in contact with the raw water.

C5.3.17.3.2. Chlorine electrolysis facilities shall be designed to prevent the release of hydrogen into rooms.

C5.3.17.3.3. Chlorine gas dispensing systems for potable water treatment shall be automatically interrupted if the raw water supply or the water flow is interrupted.

C5.3.17.4. Handling of Sodium Hypochlorite and Sodium Chlorite.

C5.3.17.4.1. Sodium hypochlorite shall not come into contact with acids or chemicals that react similar to acids.

C5.3.17.4.2. Containers of sodium hypochlorite and sodium chlorite shall be stored together only with containers of acids or chemicals that react similar to acids if either sodium hypochlorite or acidic substances are stored in unbreakable containers.

C5.3.17.4.3. Sodium chlorite shall not come into contact with fats, oils, oxidizers, acids, and strong salts if not otherwise required by the process technology.

C5.3.17.4.4. Sodium chlorite shall not be stored near fats and highly flammable substances.

C5.3.17.4.5. Smoking is prohibited in areas where sodium chlorite or its solutions are handled.

C5.3.17.5. Inspections.

C5.3.17.5.1. Chlorine facilities shall be commissioned or recommissioned only after inspection by a qualified person.

C5.3.17.5.2. The types and results of inspections shall be recorded in an inspection logbook.

Table C5.T1. Classes of Hazardous Materials

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Explosive	Unstable	H200		Danger	Unstable Explosive
	Expl. 1.1	H201			Explosive: Mass explosion hazard
	Expl. 1.2	H202		Danger	Explosive: Severe projection hazard
	Expl. 1.3	H203		Danger	Explosive: Fire, blast, or projection hazard
	Expl. 1.4	H204		Warning	Explosive: Fire or projection hazard
	Expl. 1.5	H205	None	Danger	May mass explode
	Expl. 1.6	None	None	None	None
Flammable Gas	Flam. Gas 1	H220		Danger	Extremely Flammable Gas
	Flam. Gas 2	H221	None	Warning	Flammable Gas
	Flam. Gas 1, Chem. Unst. Gas A	H220, H230	None	None	May react explosively even in the absence of air
	Flam. Gas 1, Chem. Unst. Gas B	H220, H231	None	None	May react explosively even in the absence of air at elevated pressure and/or temperature
Aerosols	Aerosol 1	H222		Danger	Extremely flammable aerosol; Pressurized container: May burst if heated

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Aerosols	Aerosol 2	H223		Warning	Flammable aerosol; Pressurized container: May burst if heated
	Aerosol 3	None	None	Warning	Pressurized container: May burst if heated
Oxidizing Gas	Ox. Gas 1	H270		Danger	May cause or intensify fire; Oxidizer
Flammable Liquid	Flam. Liq. 1	H224		Danger	Extremely flammable liquid and vapor
	Flam. Liq. 2	H225		Danger	Highly flammable liquid and vapor
	Flam. Liq. 3	H226		Warning	Flammable liquid and vapor
Flammable Solid	Flam. Sol. 1	H228		Danger	Flammable Solid
	Flam. Sol. 2	H228		Warning	Flammable Solid
Self-reactive Substance or Mixture	Self-react. A	H240		Danger	Heating may cause explosion
	Self-react. B	H241		Danger	Heating may cause a fire or explosion

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Self-reactive Substance or Mixture	Self-react. CD	H242		Danger	Heating may cause a fire
	Self-react. EF	H242		Warning	Heating may cause a fire
	Self-react. G	None	None	None	None
Pyrophoric Liquid	Pyr. Liq. 1	H250		Danger	Catches fire spontaneously if exposed to air
Pyrophoric Solid	Pyr. Sol. 1	H250		Danger	Catches fire spontaneously if exposed to air
Self-heating Substance or Mixture	Self-heat. 1	H251		Danger	Self-heating; May catch fire
	Self-heat. 2	H252		Warning	Self-heating in large quantities; May catch fire
Substance or Mixture, which in Contact with Water, Emits Flammable Gas	Water-react. 1	H260		Danger	In contact with water, releases flammable gases which may ignite spontaneously
	Water-react. 2	H261		Danger	In contact with water, releases flammable gases
	Water-react. 3	H261		Warning	In contact with water, releases flammable gases
Oxidizing Liquid	Ox. Liq. 1	H271		Danger	May cause fire or explosion; Strong oxidizer

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Oxidizing Liquid	Ox. Liq. 2	H272		Danger	May intensify fire; Oxidizer
	Ox. Liq. 3	H272		Warning	May intensify fire; Oxidizer
Oxidizing Solid	Ox. Sol. 1	H271		Danger	May cause fire or explosion; Strong oxidizer
	Ox. Sol. 2	H272		Danger	May intensify fire; Oxidizer
	Ox. Sol. 3	H272		Warning	May intensify fire; Oxidizer
Organic Peroxide	Org. Perox. A	H240		Danger	Heating may cause explosion
	Org. Perox. B	H241		Danger	Heating may cause a fire or explosion
	Org. Perox. CD	H242		Danger	Heating may cause a fire
	Org. Perox. EF	H242		Warning	Heating may cause a fire

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
	Org. Perox. G	None	None	None	None
Substance or Mixture Corrosive to Metals	Corrosive to metals	H290		Warning	May be corrosive to metals
Acute Toxicity	Acute Tox. 1	H300		Danger	Fatal if swallowed
	Acute Tox. 2	H300		Danger	Fatal if swallowed
	Acute Tox. 3	H301		Danger	Toxic if swallowed
	Acute Tox. 4	H302		Warning	Harmful if swallowed
	Acute Tox. 5	H303	None	None	May be harmful is swallowed
Skin Corrosion/ Irritation	Skin Corr. 1A, 1B, 1C	H314		Danger	Causes sever skin burns and eye damage
	Skin Irrit. 2	H315		Warning	Causes skin irritation
Serious Eye Damage/Eye Irritation	Eye Dam. 1	H318		Danger	Causes serious eye damage

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Serious Eye Damage/Eye Irritation	Eye Irrit. 2	H319		Warning	Causes serious eye irritation
Respiratory/Skin Sensitization	Resp. Sens. 1, 1A, 1B	H334		Danger	May cause allergy or asthma symptoms or breathing difficulties if inhaled
	Skin. Sens. 1, 1A, 1B	H317		Warning	May cause allergic skin reaction
Germ Cell Mutagenicity	Muta. 1A, 1B	H340		Danger	May cause genetic defects
	Muta. 2	H341		Warning	Suspected of causing genetic defects
Carcinogenicity	Carc. 1A, 1B	H350		Danger	May cause cancer
	Carc. 2	H351		Warning	Suspected of causing cancer
Reproductive Toxicity	Repr. 1A, 1B	H360		Danger	May damage fertility or the unborn child
	Repr. 2	H361		Warning	Suspected of damaging fertility or the unborn child
	Lact	H362	None	None	May cause harm to breast-fed children

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Specific Target Organ Toxicity — Single Exposure	STOT SE 1	H370		Danger	Causes damage to organs
	STOT SE 2	H371		Warning	May cause damage to organs
	STOT SE 3	H335		Warning	May cause respiratory irritation; or May cause drowsiness or dizziness
Specific Target Organ Toxicity — Repeated Exposure	STOT RE 1	H372		Danger	Causes damage to organs
	STOT RE 2	H373		Warning	May cause damage to organs
Aspiration Hazard	Asp. Tox. 1	H304		Danger	May be fatal if swallowed or enters airways
Hazardous to the Aquatic Environment	Aquatic Acute 1	H400		Warning	Very toxic to aquatic life
	Aquatic Chronic 1	H410		Warning	Very toxic to aquatic life with long lasting effects
	Aquatic Chronic 2	H411		None	Toxic to aquatic life with long lasting effects
	Aquatic Chronic 3	H412	None	None	Harmful to aquatic life with long lasting effects

Table C5.T1. Classes of Hazardous Materials (continued)

Hazard Class	Hazard Category	Hazard Category Code	Pictogram	Signal Word(s)	Hazard Statement
Hazardous to the Aquatic Environment	Aquatic Chronic 4	H413	None	None	May cause long lasting effects to aquatic life
Hazardous for the Ozone Layer	Ozone 1	H420		Warning	Harms public health and the environment by destroying ozone in the upper atmosphere
Gases Under Pressure	Compressed Gas	H280		Warning	Contains gas under pressure; May explode if heated
	Liquefied Gas	H280		Warning	Contains gas under pressure; May explode if heated
	Refrigerated Liquefied Gas	H281		Warning	Contains refrigerated gas; May cause cryogenic burns or injury
	Dissolved Gas	H280		Warning	Contains gas under pressure; May explode if heated

Table C5.T2. Water Hazard Categories of Facilities (A to D)

The following table defines the water hazard category of facilities (i.e., category A to category D) based on the water hazard class of the hazardous material stored, and the volume of hazardous material in cubic meters (m^3) or mass in metric tons.

	Water Hazard Class		
Volume in m³ or mass in metric tons	**1**	**2**	**3**
up to 0.22 m^3 (or 0.2 t)	Category A	Category A	Category A
Between 0.22 m^3 (or 0.2 t) and 1 m^3	Category A	Category A	Category B
between 1.0 and 10	Category A	Category B	Category C
between 10 and 100	Category A	Category C	Category D
between 100 and 1,000	Category B	Category D	Category D
above 1,000	Category C	Category D	Category D

Notes:
1 m^3 = 35.3 ft^3 = 264 gallons
1 metric ton = 2,204 pounds

Table C5.T2.1. Inspections of Facilities Handling Water Endangering Materials

Single inspection time and inspection intervals

	Before initial use of the facility and after significant modification	**Inspection intervals**	**After decommissioning**
Underground installations for liquid and gaseous materials	Hazard Category A, B, C, D	Hazard Category A, B, C, D Every 5 years	Hazard Category A, B, C, D
Aboveground installations for liquid and gaseous materials and heating oil tanks	Hazard Category B, C, D	Hazard Category C & D Every 5 years	Hazard Category C & D
Installations for solid materials	Installations > 1,000 t	Installations > 1,000 t Every 5 years	Installations > 1,000 t
Installations for transshipping	Installations > 100 t per day	Installations > 100 t per day Every 5 years	Installations > 100 t per day

Table C5.T3. Persistent Organic Pollutants Prohibited

POP	**CAS Number**	**Exemptions**
Aldrin	309-00-2	-
Chlordane	57-74-9	-
Chlordecone	143-50-0	-
Dieldrin	60-57-1	-
Endrin	72-20-8	-
Heptachlor	76-44-8	-
Hexabromobiphenyl	36355-01-8	-
Hexachlorobenzene	118-74-1	-
Hexachlorocyclohexanes, including lindane	58-89-9 319-84-6 319-85-7 608-73-1	-
Mirex	2385-85-5	-
Toxaphene	8001-35-2	-
Pentachlorobenzene	608-93-5	-
DDT (1,1,1-trichloro-2,2-bis(4-	50-29-3	-
Tetrabromodiphenyl ether $C_{12}H_6Br_4O$ Pentabromodiphenyl ether $C_{12}H_5Br_5O$ Hexabromodiphenyl ether $C_{12}H_4Br_6O$ Heptabromodiphenyl ether $C_{12}H_3Br_7O$		1. The use of substances, preparations, articles or as constituents of the flame-retarded parts of articles with unintentional trace amounts of tetrabromodiphenyl , pentabromodiphenyl , hexabromodiphenyl or heptabromodiphenyl ether, shall be allowed for concentrations ≤ 10 mg/kg (0.001 % by weight). 2. By way of derogation, the production, placing on the market and use of the following shall be allowed: 2.1. Articles and preparations containing concentrations below 0.1 % by weight when produced partially or fully from recycled materials or materials from waste prepared for re-use; and 2.2. Electrical and electronic equipment 3. The use of articles already in use before 25 August 2010 containing tetrabromodiphenyl, pentabromodiphenyl, hexabromodiphenyl or heptabromodiphenyl ether as a constituent of such articles shall be allowed.

Table C5.T3. Persistent Organic Pollutants Prohibited (continued)

POP	CAS Number	Exemptions
Perfluorooctane sulfonic acid and its derivatives (PFOS) $C_8F_{17}SO_2X$		1. The use of substances or preparations with unintentional trace amounts of PFOS shall be allowed for concentrations ≤ 10 mg/kg (0.001 % by weight). 2. The use of semi-finished products or articles, or parts thereof with unintentional trace amounts of PFOS shall be allowed for concentrations < 0.1 % by weight calculated with reference to the mass of structurally or micro-structurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is < 1 μg/m2 of the coated material. 3. The use of articles already in use before 25 August 2010 containing PFOS as a constituent of such articles shall be allowed.
Endosulfan	115-29-7 959-98-8 33213-65-9	Placing on the market and use of articles already in use before or on 10 July 2012 containing endosulfan as a constituent of such articles shall be allowed.
Hexachlorobutadiene	87-68-3	Placing on the market and use of articles already in use before or on 10 July 2012 containing hexachlorobutadiene as a constituent of such articles shall be allowed.
Polychlorinated naphthalenes[1]		Placing on the market and use of articles already in use before or on 10 July 2012 containing polychlorinated naphthalenes as a constituent of such articles shall be allowed.
Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs)	85535-84-8	1. By way of derogation, the production, placing on the market and use of substances or preparations containing SCCPs in concentrations < 1 % by weight shall be allowed. 2. By way of derogation, the production, placing on the market, and use of the following applications shall be allowed: 2.1. Fire retardants in rubber used in conveyor belts in the mining industry; and 2.2. Fire retardants in dam sealants. 3. Placing on the market and use of articles already in use before or on 10 July 2012 containing SCCPs as a constituent of articles shall be allowed.

Note:

[1] Polychlorinated naphthalenes are chemical compounds based on the naphthalene ring system, where one or more hydrogen atoms have been replaced by chlorine atom

Table C5.T3. Persistent Organic Pollutants Prohibited (continued)

POP	CAS Number	Exemptions
"Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds"means the following: (i) perfluorooctanoic acid, including any of its branched isomers; (ii) its salts; (iii) PFOA-related compounds which, for the purposes of the Convention, are any substances that degrade to PFOA, including any substances (including salts and polymers) having a linear or branched perfluoroheptyl group with the moiety (C7F15)C as one of the structural elements.	335-67-1 and others	1. Concentrations of PFOA or any of its salts equal to or below 0.025 mg/kg (0.0000025 % by weight) where they are present in substances, mixtures or articles. 2. Concentrations of any individual PFOA-related compound or a combination of PFOA-related compounds equal to or below 1 mg/kg (0.0001 % by weight) where they are present in substances, mixtures or articles. 3. The use of PFOA, its salts and PFOA-related compounds shall be allowed in fire-fighting foam for liquid fuel vapour suppression and liquid fuel fire (Class B fires) already installed in systems, including both mobile and fixed systems, until 4 July 2025, subject to the following conditions: 3.1. fire-fighting foam that contains or may contain PFOA, its salts and/or PFOA-related compounds shall not be used for training; 3.2. fire-fighting foam that contains or may contain PFOA, its salts and/or PFOA-related compounds shall not be used for testing unless all releases are contained; 3.3. as from 1 January 2023, uses of fire-fighting foam that contains or may contain PFOA, its salts and/or PFOA-related compounds shall only be allowed in sites where all releases can be contained; 3.4. fire-fighting foam stockpiles that contain or may contain PFOA, its salts and/or PFOA-related compounds shall be managed in a safe, efficient and environmentally sound manner, taking all steps to ensure that stockpiles are managed using safeguards that will protect human health and the environment. When no longer required for one of the specific uses permitted above, all installed and stockpiled fire-fighting foam that contains or may contain PFOA, its salts and/or PFOA-related compounds shall be disposed of as hazardous waste.

Table C5.T4. Hazardous Substances not to be Introduced to the German Market

Substance	Prohibition	Exemption
Asbestos including: actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite	Substances with fiber structure, preparations containing > 0.1 % of these substances, and products containing these substances or preparation are prohibited to be placed on the market.	1. Chrysotile containing spare parts for maintenance, if other suitable asbestos-free parts are not offered on the market. 2. Naturally occurring mineral resources, as well as preparations and products made thereof containing < 0.1 % asbestos.
Formaldehyde	Placing on the market is prohibited for: 1. Coated and uncoated wooden products and furniture emitting > 0.1 mL/m³ (ppm) formaldehyde in the air. 2. Detergents, cleaning and care products containing > 0.2 % formaldehyde.	1. Boards for coating not exceeding 0.1 ppm formaldehyde in the air 2. Industrial cleaners
Dioxins and furans	Substances, preparations and products containing these substances in various combinations and concentrations are prohibited to be placed on the market.	Exemptions for selected substances, preparations and products under various circumstances (e.g., wastewater, recyclable wastes, plant protection products requiring authorization).
Hazardous liquid substances or preparations	Substances in decorative objects and toys, fuel for decorative lamps, colors and fragrances and substances presenting an aspiration hazard and are labeled with R65/H304 are prohibited to be placed on the market.	Placing on the market of these substances in containers > 15 liters (4 gallons): colors and fragrances for the production of lamp oils.
Benzene	Benzene and preparations containing ≥ 0.1 % benzene are prohibited to be placed on the market.	1. Motor fuels 2. Industrial processes in closed cycles 3. Crude oil and fuel components for the production of motor fuels 4. Substances and preparation destined for export 5. Teaching and training purposes
Aromatic amine including: 2- Naphthylamine, 4-aminobiphenyl, benzidine, 4-nitrobiphenyl, and their salts	Substances and preparations containing ≥ 0.1% of these substances are prohibited to be placed on the market.	None

Table C5.T4. Hazardous Substances not to be Introduced to the German Market (continued)

Substance	Prohibition	Exemption
Mercury compounds	Mercury compounds and preparations containing these substances are prohibited to be placed on the market if used in/as: 1. Antifouling paints 2. Wood preservation 3. Impregnation of heavy-duty industrial textiles and yarn intended for their manufacture 4. Treatment of industrial, commercial and municipal water	None
Arsenic compounds	Substances and preparations containing arsenic compounds used for water treatment, wood preservation and prevention of fouling by microorganisms are prohibited to be placed on the market.	Copper-chrome-arsenic compounds authorized as biocidal products for wood impregnation and various commercial and industrial purposes.
Organostannic compounds	Organostannic compounds and preparations containing such substances are prohibited to be placed on the market if used in/as: 1. biocidal active agent in paints to prevent the fouling by micro-organisms, plants and animals (antifouling paints) 2. treatment of industrial, commercial, and municipal water	None
Di-µ-oxo-di-n-butylstannio-hydroxyborane (DBB)	Substances and preparations containing ≥ 0.1 % of this substance are prohibited to be placed on the market.	None
Polychlorinated biphenyls (PCB)	See Chapter 14, “Polychlorinated Biphenyls”	See Chapter 14, “Polychlorinated Biphenyls”
Vinyl chloride (chloroethene)	Products containing vinyl chloride as aerosol propellant are prohibited to be placed on the market.	None
Pentachlorophenol (PCP), its salts and compounds	Substances and preparations containing > 0.01 % of these substances and products treated with a preparation containing these substances (> 5 mg/kg (ppm)) are prohibited to be placed on the market.	Wooden parts of buildings, furniture, and textiles treated with these substances before 23 December 1989.

Table C5.T4. Hazardous Substances not to be Introduced to the German Market (continued)

Substance	Prohibition	Exemption
Aliphatic chlorinated hydrocarbons including tetrachloromethane, 1,1,2,2-tetrachloroethane, 1,1,1,2-tetrachloroethane, pentachloroethane, trichloromethane, 1,1,2-trichloroethane, 1,1-dichloroethylene, 1,1,1-trichloroethane and chloroform	Substances, preparations and products in various combinations and concentrations of these substances are prohibited to be placed on the market.	Industrial use in closed systems
Tar oils including creosote, creosote oil, distillates (coal tar), naphthalene oils, creosote oil, cenaphthene fraction, higher distillates (coal tar), anthracene oil, tar acids, coal crude, creosote, wood, low temperature tar oil, alkaline.	Wood preservation products containing these substances and products treated with wood preservation products containing these substances are prohibited to be placed on the market.	1. Industrial use for treatment of wooden parts in closed systems, if wood preservation products contain < 50 mg/kg benzo(a)pyren and 3% water soluble phenol, and if packaging size is at least 20 liters (5 gallons). 2. Treated products (new and used) for commercial and industrial use only (e.g. railway sleepers, power poles, fences etc.).
Cadmium and cadmium compounds	Substances and preparations are prohibited to be placed on the market for use of: • dying plastics, if they contain > 0.01 % of these substances • paints and lacquers containing > 0.01 % of these substances • stabilizers in a wide range of PVC products treatment of metallic surfaces for a wide range of applications	1. Coloring or stabilizing required for safety reasons 2. Certain applications requiring high safety standards, including aviation, mining, off-shore, and nuclear energy 3. Safety components for road and agricultural vehicles, rail bound vehicles, and vessels 4. Electrical contacts in machinery 5. Preparations with a high zinc content if the Cd concentration is held as low as possible and does not exceed 0.1 %

Table C5.T4. Hazardous Substances not to be Introduced to the German Market (continued)

Substance	Prohibition	Exemption
Carcinogenic, mutagenic and reproductive toxic substances	Substances and preparations with concentrations of these substances at or above published concentrations are prohibited to be passed on to private end users.	1. Fuel 2. Petroleum products for use in incinerators 3. Fuels sold in closed systems 4. Artists paints
DBBT	Substances and preparations with concentrations of these substances at or above published concentrations are prohibited to be placed on the market.	None
Nickel and its compounds	1. Articles intended to come into direct and prolonged contact with the skin if the rate of nickel release from the parts of these articles coming into direct and prolonged contact with the skin is greater than 0.5 µg/cm²/week are prohibited to be placed on the market. 2. Articles that have a non-nickel coating unless such coating is sufficient to ensure that the rate of nickel release from those parts of such articles coming into direct and prolonged contact with the skin will not exceed 0.5 µg/cm²/week for a period of at least two years of normal use of the article shall not be placed on the market.	None
Flammable, highly flammable or extremely flammable substances	Aerosols for entertaining and decoration purposes containing these substances are prohibited to be passed on to private end users.	None
Hexachloroethane	Use in manufacturing or processing of non-ferrous metals is prohibited.	None
Biopersistent fibers	Substances, preparations and products containing > 0.1 % of these substances are prohibited to be placed on the market for the use in thermal and sound insulation and ventilation systems.	Fibers which have been confirmed to be non-cancerogenic.
Short-chained chlorinated paraffins	Substances and preparations containing > 1% of these substances for use in metalworking and treatment of leather are prohibited to be placed on the market.	None

Table C5.T4. Hazardous Substances not to be Introduced to the German Market (continued)

Substance	Prohibition	Exemption
Flame retardants including pentabromo-diphenylether and octa-bromodiphenylether (PBDE/OBDE)	Substances, preparations and products (or flame retardant parts thereof) containing > 0.1 % of these substances are prohibited to be used and placed on the market.	None
Azocolorants	Substances and preparations containing > 0.1 % of the substance for dying of leather and textile products are prohibited to be placed on the market.	None
Alkylphenols	Substances and preparations containing ≥ 0.1 % of these substances for the use for: 1. industrial cleaning 2. home cleaning 3. textile and leather processing 4. metal treatment and processing 5. paper and pulp manufacturing 6. part of cosmetics 7. adjuvant in pesticides and biocide products are prohibited to be placed on the market.	Application in closed systems and in other cleaning facilities, if the cleaning liquid will be recycled or incinerated.
Tris (2,3 dibromopropyl) phosphate	Textile articles, such as garments, undergarments and linen, intended to come into contact with the skin.	None
2-(2-methoxyethoxy) ethanol (DEGME)	Substances and preparations are prohibited to be placed on the market, for supply to the general public, as a constituent of paints, paint strippers, cleaning agents, self-shining emulsions or floor sealants in concentrations ≥ 0.1 % by weight.	None
Tris(aziridinyl) phosphinoxide	Textile articles, such as garments, undergarments and linen, intended to come into contact with the skin.	None
Polybromobiphenyl; Polybrominated biphenyls (PBB)	Textile articles, such as garments, undergarments and linen, intended to come into contact with the skin.	None
4-Nitrobiphenyl	Substances and preparations are prohibited to be placed on the market, or used, as substances or in mixtures in concentrations > 0.1 % by weight.	None

Table C5.T4. Hazardous Substances not to be Introduced to the German Market (continued)

Substance	Prohibition	Exemption
Polychlorinated Terphenyls (PCTs)	Substances and preparations are prohibited to be placed on the market or used as substances, in mixtures, including waste oils, or in equipment, in concentrations > 50 mg/kg (0.005 % by weight).	None
2-(2-butoxyethoxy)ethanol (DEGBE)	1. Substances and preparations are prohibited to be placed on the market for the first time after 27 June 2010, for supply to the general public, as a constituent of spray paints or spray cleaners in aerosol dispensers in concentrations ≥ 3 % by weight. 2. Spray paints and spray cleaners in aerosol dispensers containing DEGBE shall not be placed on the market for supply to the general public after 27 December 2010.	None
Acrylamide	Substances and preparations are prohibited to be placed on the market or used as a substance or constituent of mixtures in a concentration, ≥ 0.1 % by weight for grouting applications.	None
Lead and its compounds	Substances and preparations are prohibited to be placed on the market or used in any individual part of jewelry articles if the concentration of lead (expressed as metal) in such a part is ≥ 0.05 % by weight.	None
1,4-dichlorobenzene	Shall not be placed on the market or used, as a substance or as a constituent of mixtures in a concentration ≥ 1 % by weight, where the substance or the mixture is placed on the market for use or used as an air freshener or deodorizer in toilets, homes, offices or other indoor public areas.	None
Bisphenol A	Shall not be placed on the market in thermal paper in a concentration ≥ 0.02 % by weight after 2 January 2020	None
Methanol	Shall not be placed on the market to the general public after 9 May 2018 in windscreen washing or defrosting fluids, in a concentration ≥ 0.6 % by weight.	None

Table C5.T4. Hazardous Substances not to be Introduced to the German Market (continued)

Substance	Prohibition	Exemption
(3,3,4,4,5,5,6,6,7, 7,8,8,8 tridecafluorooctyl) silanetriol and any of its mono-, di- or tri-O-(alkyl) derivatives (TDFAs)	Shall not be placed on the market for supply to the general public after 2 January 2021 individually or in any combination, in a concentration ≥ 2 ppb by weight of the mixtures containing organic solvents, in aerosol dispensers, pump sprays, trigger sprays, marketed for proofing or impregnation spray applications.	None
4-Aminobiphenyl xenylamine and its salts	Shall not be placed on the market, or used, as substances or in mixtures in concentrations > 0.1 % by weight	None
Chromium VI compounds	Cement and cement containing preparations are prohibited to be placed on the market, if it contains, when hydrated > 2 mg/kg soluble chromium VI of the total dry weight of the content.	Use in controlled closed and totally automated processes in which cement and cement containing preparations are handled solely by machines and in which there is no possibility of contact with the skin.
Polycyclic aromatic hydrocarbons (PAH)	Substances and preparations for use for softening oils for tire production, if the content of benzo(a)pyrene exceeds 1 mg/kg or the total PAH content is >10 mg/kg	Remolded tires, if the applied softening oils within the contact surface do not exceed the limit values provided in column 2
Toluene	Adhesives and spraying dyes containing > 0.1 % toluene are prohibited to be provided to private end-consumers	None
1,2,4- Trichlorobenzene	Substances and preparations containing > 0.1 % 1,2,4- trichlorobenzene are prohibited to be placed on the market	Application as an intermediate product, as a solvent in closed chemical applications for chlorinating reactions, or for manufacturing 1,3,5-trinitro-2,4,6- triaminobenzene
Lead carbonate, lead sulfate and lead compounds	Placing on the market of these substances and preparations containing these substances for the use as paint is prohibited.	Paints used for restoration and maintenance of works of art and historical buildings, if no substitutes are available.

Appendix C5.A1. Hazard Signs

Warnung vor feuergefährlichen Stoffen
Warning; Flammable material

Warnung vor explosionsgefährlichen Stoffen
Warning; Explosive material

Warnung vor giftigen Stoffen
Warning; Toxic material

Warnung vor ätzenden Stoffen
Warning; Corrosive substance

Warnung vor brandfördernden Stoffen
Warning; Oxidizing substance

Warnung vor Biogefährdung
Warning; Biological hazard

Warnung vor Gasflaschen
Warning; Pressurized cylinder

Warnung vor Gefahren durch das Aufladen von Batterien
Warning; Battery charging

Warnung vor explosionsfähiger Atmosphäre
Warning; Explosive atmosphere

Appendix C5.A2. Mandatory Signs

Augenschutz benutzen
Wear eye protection

Kopfschutz benutzen
Wear head protection

Fußschutz benutzen
Wear safety footwear

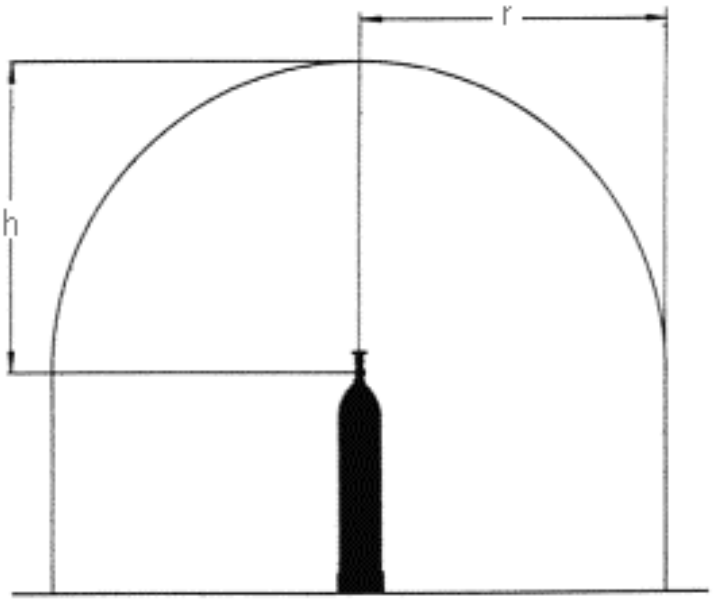
Atemschutz benutzen
Wear respiratory protection

Gehörschutz benutzen
Wear ear protection

Handschutz benutzen
Wear protective gloves

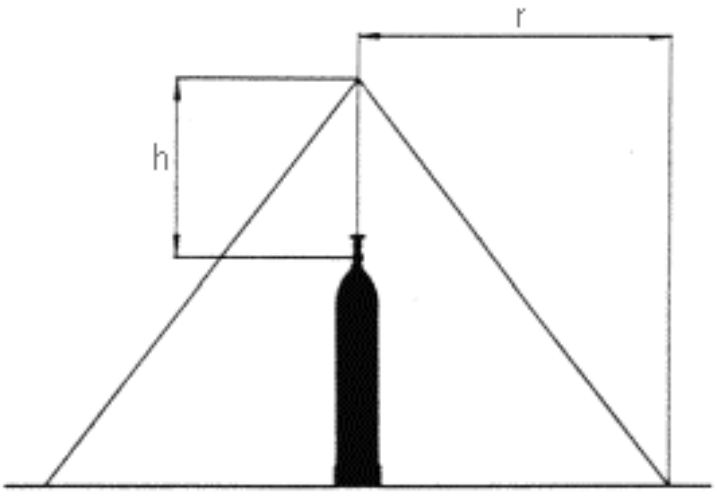
Appendix C5.A3. Special Protection Areas

Figure C5.A3.1. Special protection area for compressed gas containers containing gas lighter than ambient air (for minimum dimensions of the special protection area, refer to Tables C5.A3.T1. and C5.A3.T2. in this appendix).



h = height
r = radius

Figure C5.A3.2. Special protection area for compressed gas containers containing gas heavier than ambient air (for minimum dimensions of the special protection area, refer to Tables C5.A3.T1. and C5.A3.T2. in this appendix).



h = height
r = radius

Figure C5.A3.3. Special protection area for a group of compressed gas containers stored together. The rounded and angular shape of the space indicated relates to compressed gases heavier than ambient air *(Gase, schwerer als Luft)* or lighter than ambient air *(Gase, leichter als Luft)* as described in Figures 1 and 2 above (for dimensions refer to Tables C5.A3.T1. and C5.A3.T2. in this appendix).

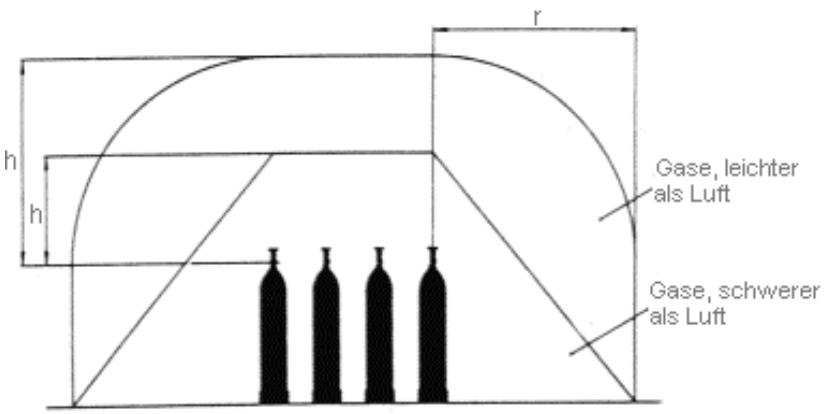


Figure C5.A3.4. Top view of a special protection area for a group of compressed gas containers. The figure illustrates two special protection areas of different sizes referring to outside storage of compressed gas containers *(im Freien)* and inside storage of compressed gas containers within rooms *(in Räumen)*.

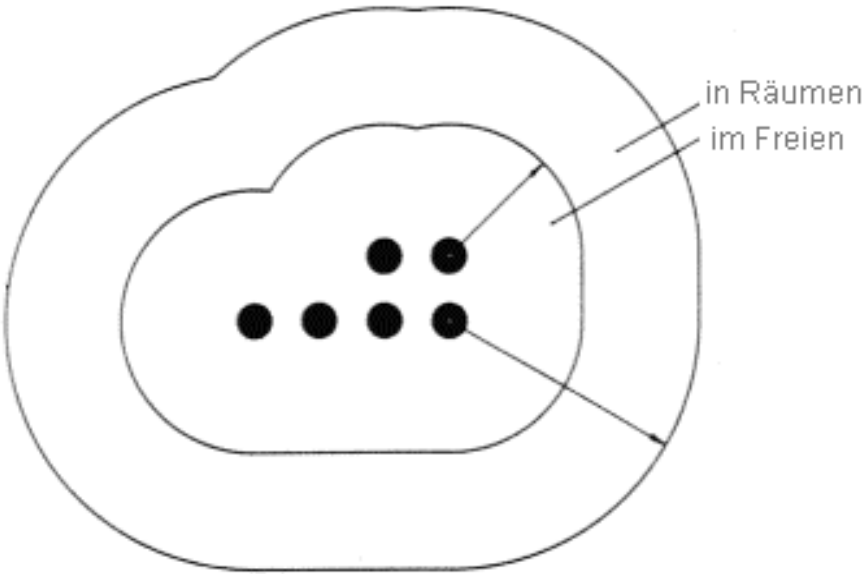


Table C5.A3.T1. Dimensions of Special Protection Areas for Inside Storage of Compressed Gas Containers Containing Very Toxic (Cat. 1 H 300; H310; H330) Gases

Compressed Gas/Container Type	**Height (h) (meters)**	**Radius (r) (meters)**
Compressed gas lighter than ambient air/Bottles	2	2
Compressed gas lighter than ambient air/Drums	2	2
Compressed gas heavier than ambient air/Bottles	1	2
Compressed gas heavier than ambient air/Drums	1	3

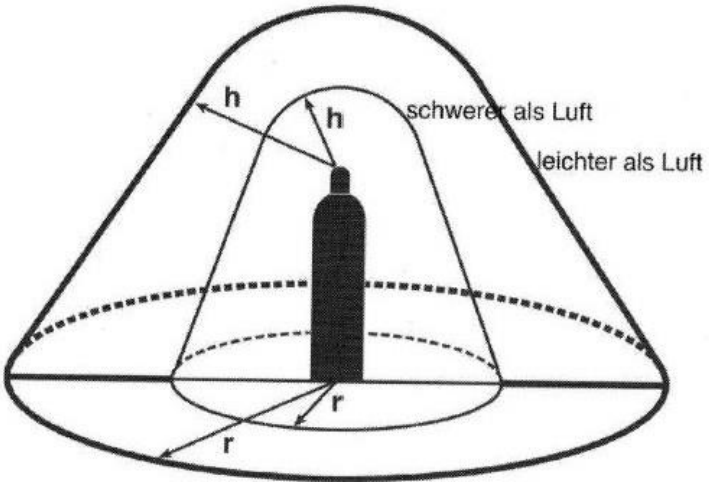
Note:
1 meter = 3.28 feet

Table C5.A3.T2. Dimensions of Special Protection Areas for Outside Storage of Compressed Gas Containers Containing Very Toxic (Cat. 1 H 300; H310; H330) Gases

Compressed Gas	**Height (h) (meters)**	**adius (r) (meters)**
Compressed gas lighter than ambient air	1	1
Compressed gas heavier than ambient air	0.5	1

Note:
1 meter = 3.28 feet

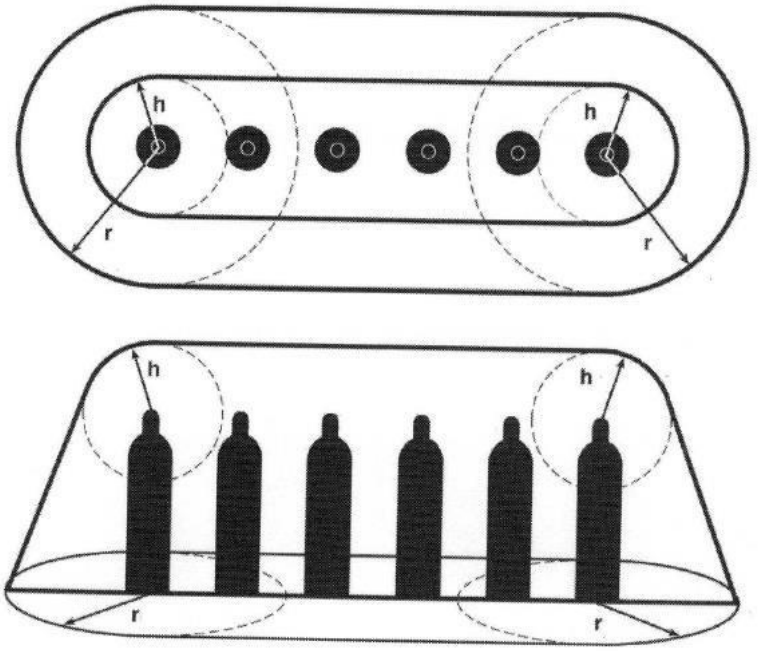
Figure C5.A3.5. Protection Area for 1 bottle/drum



h = height
r = radius

schwerer als Luft = heavier than ambient air
leichter als Luft = lighter than ambient air

Figure C5.A3.6. Protection Area for more than 1 bottle / drum



h = height
r = radius

CHAPTER 6 - HAZARDOUS WASTE

C6.1. SCOPE

This chapter provides criteria for a comprehensive management program to ensure that hazardous waste (HW) is identified, stored, transported, treated, disposed, and recycled in an environmentally sound manner.

C6.2. DEFINITIONS

C6.2.1. Acceptance Slip. Slip certifying the transfer of HW from the waste generator to the waste collector using the collective disposal manifest or the transfer of small quantities of HW (< 2,000 kg or 4,409 pounds) from the waste generator to the waste disposal facility.

C6.2.2. Accompanying Documentation. Slips accompanying HW from the waste generator to the waste disposal facility and copies remaining with the different parties involved, i.e., copies for the register of the waste generator, the appropriate German authority, the register of the waste carrier, and the register of the waste disposal facility.

C6.2.3. Acute Hazardous Waste. Those HW listed in Table C6.T1.

C6.2.4. Collective Disposal Manifest. Documentation to prove the permissibility of the collective disposal of HW prior to disposal for: HW of the same waste code, HW with the same disposal path, HW contents conforming with the requirements of the disposal manifest, and an amount of HW not exceeding 20 metric tons (20,000 kilograms or 44,092 pounds) per year per waste code.

C6.2.5. Combustible Liquid. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C6.2.6. Container. A general term used to describe different types of receptacles, including tanks, drums, cans, and canisters.

C6.2.7. Disposal. The treatment, recycling, reuse, or permanent disposal (e.g., landfilling) of waste. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any HW 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.

C6.2.8. Disposal Manifest. Documentation to prove the permissibility of disposal of HW prior to disposal.

C6.2.9. DoD Activity Address Code (DoDAAC). A distinctive six-position alphanumeric code assigned to identify specific units, activities, or organizations.

C6.2.10. DoD Hazardous Waste Generator. The DoD considers a generator to be the installation, or generating activity on an installation, that produces a HW.

C6.2.11. 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.

C6.2.12. Expert. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C6.2.13. Generating Activity. The actual organization, unit, or shop within a DoD installation that produces the waste. The generating activity is typically the activity responsible for properly managing the waste and preparing internal HW documentation.

C6.2.14. Hazardous Material. See definition in Chapter 5, "Hazardous Material," C5.2. Definitions.

C6.2.15. Hazardous Substances. See definition in Chapter 5, "Hazardous Material," C5.2. Definitions.

C6.2.16. Hazardous Waste (HW). A waste that may be solid, semi-solid, liquid, or contained gas, that is either:

C6.2.16.1. Listed as a 6-digit waste code marked with an asterisk (*) in the European Union List of Wastes[1], but without a specific or general reference to "hazardous substances;" or

C6.2.16.2. Listed as a 6-digit waste code and marked with an asterisk in the European Union List of Wastes with a specific or general reference to "hazardous substances" and presents one or more hazardous properties listed in Table C6.T3.

C6.2.17. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where HW are accumulated until removed to a hazardous waste storage area (HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate ≤ 208 liters (55 gallons) of HW, or 1 liter (1 quart) of acute HW, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

C6.2.18. Hazardous Waste Fuel. HW burned for energy recovery. Fuel produced from HW by processing, blending, or other treatment is also HW fuel.

C6.2.19. Hazardous Waste Generation. Any act or process that produces HW as defined in these FGS.

C6.2.20. 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.

[1] The European Union List of Wastes is available from the Official Journal of the European Union in various formats and languages at https://eur-lex.europa.eu/eli/dec/2014/955/oj.

C6.2.21. 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 HW.

C6.2.22. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected before shipment for treatment or disposal. An HWSA may store > 208 liters (55 gallons) of a HW stream, and > 1 liter (1 quart) of an acute HW stream. The criteria for storage, distribution, and handling facilities as described in Chapter 5, "Hazardous Material," are also applicable to HWSAs.

C6.2.23. 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.

C6.2.24. Identification Number. A unique number assigned to each generating activity and generator of HW and used to assist in tracking the waste from point of generation to ultimate disposal.

C6.2.25. 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.

C6.2.26. Persistent Organic Pollutants (POPs). See definition in Chapter 5, "Hazardous Material," C5.2. Definitions. POPs subject to waste management provision are listed in Table C6.T2.

C6.2.27. Tender. To offer HW to a central State agency for the purposes of determining a permanent disposal facility for the waste. A generator may propose to the central State agency to permanently dispose of waste at a facility of its choice, and assuming the agency agrees to the manner of disposal and the disposal facility, the generator may permanently dispose of waste at the desired facility. A contracted organization or other entity may tender waste on behalf of the generator.

C6.2.28. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any HW 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.

C6.2.29. Used Oil. All used fluids or semi-fluid substances that consist partly or entirely of mineral oil or synthetic oil, including oil-containing residues from containers, emulsions and water-oil mixtures. Used oil may also include impurities as a result of use, or additives added before use (e.g., solvents, preservatives). Note: used oil is considered a HW when packaged and tendered for disposal. Used oil mixed with HW will be managed as HW.

C6.2.30. 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.

C6.3. CRITERIA

C6.3.1. DoD Hazardous Waste Generators and Generating Activities.

C6.3.1.1. Hazardous Waste Determination and Characterization. Generating activities 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 conducted in accordance with established German guidelines, before disposal. For the disposal of HW by means of a collective disposal manifest, the waste identification provided to the waste collector or the disposal company may be based on the knowledge of the generating activity. The generating activity must identify the HW using the appropriate European Union List of Wastes code and ensure all applicable responsibilities under German dangerous goods transportation laws are fulfilled.

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

C6.3.1.3. Identification Number.

C6.3.1.3.1. Generating Activities. Each generating activity will use the DoD Activity Address Code (DoDAAC) as their identification number for all DoD internal recordkeeping, reports, and transportation documentation for HW.

C6.3.1.3.2. Generators. Each generator shall use the official Generator Identification Number assigned by the appropriate German authority for disposal manifests for HW.

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 German public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable German 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 German regulations, international standards will be used.

C6.3.1.4.1.2. When transporting HW via military vehicle on German public

roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, as required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), German dangerous good transportation regulations.

C6.3.1.4.2. Manifesting.

C6.3.1.4.2.1. Generators that generate > 2,000 kg (2 metric tons or 4,409 pounds) per year of HW.

C6.3.1.4.2.1.1. The generator shall prove the appropriate disposal of HW by using the disposal manifest or the collective disposal manifest prior to disposal of HW for each waste type, comprising a completed cover sheet for records of proper waste management, declaration of the waste generator that includes a declaration analysis of the waste, declaration of acceptance from the waste disposal facility, and, if required, confirmation from the appropriate German authority responsible for certifying the disposal facility.

C6.3.1.4.2.1.2. The disposal of HW shall be proven by using accompanying documentation and acceptance slips, as required.

C6.3.1.4.2.1.3. The electronic disposal documentation shall be used by all parties involved in the disposal of HW. Applicable documents shall be signed with qualified electronic signatures, acceptance slips may be signed manually by the generator. Personnel trained according to C6.3.10. may provide qualified electronic signatures.

C6.3.1.4.2.1.4. The generator shall maintain an electronic register containing applicable accompanying documentation, acceptance slips and completed disposal manifests by waste code and in chronological order. All documentation will be filed within 10 days after receipt of applicable waste documentation from the waste-disposal facility or waste collector.

C6.3.1.4.2.2. Generators that generate ≤ 2,000 kg (2 metric tons or 4,409 pounds) per year of HW.

C6.3.1.4.2.2.1. The generator shall document waste disposal only by maintaining acceptance slips for each waste type.

C6.3.1.4.2.2.2. The generator shall maintain a register containing acceptance slips by waste code ~~and~~ in chronological order. All acceptance slips will be filed within 10 days of receipt.

C6.3.1.4.2.3. All applicable waste manifest documentation including accompanying documentation and acceptance slips shall be retained for a minimum of 3 years after the date of entry in the register. If electronic registers are used, they shall be maintained permanently.

C6.3.1.4.2.4. Manifests shall include the following:

C6.3.1.4.2.4.1. The name and address of the HW generator.

C6.3.1.4.2.4.2. The generator identification number assigned by the appropriate German authority to the DoD installation.

C6.3.1.4.2.4.3. Transporter's name, address and carrier number.

C6.3.1.4.2.4.4. Destination name,-address and disposal number.

C6.3.1.4.2.4.5. The six-digit European Union List of Wastes code and name of the HW to be disposed shall be included in the accompanying documentation or acceptance slips.

C6.3.1.4.2.4.6. The disposal company accepting the HW shall record the total quantity of HW in metric tons.

C6.3.1.4.2.4.7. Date of shipment.

C6.3.1.4.2.4.8. Date of receipt by the destination facility.

C6.3.1.4.3. Generators will maintain an audit trail of HW from the point of generation to disposal (i.e., a DoD audit trail internal to the installation in addition to required German manifest). Generators using Defense Logistics Agency (DLA) Disposition Services will obtain a signed copy of the manifest from the initial DLA Disposition Services recipient of the waste. A generating activity, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different DoDAAC 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 comply with the manifesting criteria of these FGS.

C6.3.2. Hazardous Waste Accumulation Point (HWAP).

C6.3.2.1. An HWAP is defined in criterion C6.2.17. 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 hazard signs appropriate for the waste being accumulated at that site (see Chapter 5, “Hazardous Material”).

C6.3.2.2. An HWAP will comply with the storage limits in criterion C6.2.17. When these limits have been reached, the generating activity will make arrangements within 5 working days to move the HW to an HWSA or ship it offsite for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD Form 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 (e.g., used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-quart) volume accumulation limit, but must be transported offsite to a final destination facility within 1 year.

C6.3.2.3. All criteria of C6.3.4., “Use and Management of Containers,” apply to

HWAPs except for criterion C6.3.4.1.5., "Weekly Inspections."

C6.3.2.4. The following provisions of criterion 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. As a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in C6.3.10.

C6.3.2.6. Daily Removal of HW to a HWAP or HWSA. HW generated at multiple areas serviced by a single HWAP, e.g., within shops or motor pools, shall be transferred on a daily basis to the designated HWAP or HWSA.

C6.3.3. Hazardous Waste Storage Area. HWSAs shall meet the criteria for facilities that store, distribute, or handle hazardous substances of Chapter 5, "Hazardous Material" (e.g., location, design, and operation, training of personnel, storage compatibility, and inspection criteria).

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. HW should not be stored longer than 1 year in an HWSA. Operating permits may specify storage times of < 1 year.

C6.3.3.3. Waste Analysis and Verification.

C6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installations 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- and offsite HW. 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. Before 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 generating activity if there is reason to believe that the process generating the waste has changed;

C6.3.3.3.4. 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

C6.3.3.3.4.1. Reject shipments that do not match the accompanying waste descriptions unless the generating activity 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 an 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 German. Depending on the predominant language of the workforce, an additional language may be required. The legend must be legible from a distance of at least 7.62 meters (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 (PPE) 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 criterion C6.3.4.1.5. Minimum frequencies for inspecting tank systems are found in criterion C6.3.7.1.2. For equipment not covered by those criteria, 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 3 years from the date of inspection. As 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 criteria in C6.3.10.

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, 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 German. Depending on

the predominant language of the workforce, an additional language may be required. 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. See also Chapter 5, "Hazardous Material," for facilities that store hazardous substances that require an inspection by an expert before closure.

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 an estimate of the expected date for closure.

C6.3.4. Use and Management of Containers. The following criteria and the criteria for the use and management of hazardous material in Chapter 5, "Hazardous Material," apply to the use and management of containers of HW (e.g., condition of containers, inspections, containment).

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 and 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 at all times.

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

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 stormwater.

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. 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 criterion 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 before 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. HW must not be placed in an unwashed container that previously held an incompatible waste or material. All packaging, including containers used for shipment of HW, shall be free from contamination, regardless whether the contaminant is hazardous or non-hazardous.

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. Internal turn-in documents (e.g., DD Form 1348-1A or manifests) must be maintained for 3 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 the generating activity;

C6.3.5.2.2. Description and hazard class of the HW, including the European Union List of Wastes code;

C6.3.5.2.3. Number and types of containers;

C6.3.5.2.4. Quantity of HW;

C6.3.5.2.5. Date stored;

C6.3.5.2.6. Storage location; and

C6.3.5.2.7. Disposition data, including 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 3 years.

C6.3.5.5. Manifests. Manifests of incoming and outgoing HW will be retained for at least 3 years.

C6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until 3 years after closure of the HWSA.

C6.3.5.7. The installation will maintain records identified in 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 on which the plan relies to provide emergency services. Contingency plans should be available in both English and German.

C6.3.7. Tank Systems. The following criteria apply to all storage tanks containing HW. Tank systems for storing or accumulating HW shall follow HWSA or HWAP criteria as appropriate. In Germany, no distinction is made between tank systems storing HW and tank systems storing hazardous material. As a result, the criteria for tank systems storing hazardous material provided in Chapter 5, "Hazardous Material," are also applicable. See Chapter 19, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POL and hazardous substances.

C6.3.7.1. General Operating Requirements.

C6.3.7.1.1. HW 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.

C6.3.7.1.2. The installation must inspect and log at least once each operating day:

C6.3.7.1.2.1. The aboveground portions of the tank system, if any, to detect corrosion or releases of waste;

C6.3.7.1.2.2. 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

C6.3.7.1.2.3. 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).

C6.3.7.1.3. 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.

C6.3.7.2. 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 in accordance with Chapter 5, "Hazardous Material." In addition, installations must satisfy the following requirements:

C6.3.7.2.1. 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.

C6.3.7.2.2. Containment of Visible Releases to the Environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

C6.3.7.2.2.1. Prevent further migration of the leak or spill to soil or surface water;

C6.3.7.2.2.2. Remove and properly dispose of any contaminated soil or surface water;

C6.3.7.2.2.3. Remove free product to the maximum extent possible; and

C6.3.7.2.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

C6.3.7.2.3. Make required notifications and reports in accordance with Chapter 18, "Spill Prevention and Response Planning."

C6.3.7.3. Closure.

C6.3.7.3.1. At closure of a tank system, the storage tank shall be emptied and cleaned by a licensed organization before being inspected by a certified expert. The installation must dispose of HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable, and structures and equipment.

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

C6.3.8.1. Priority Given to Processing Used Oil. Processing of used oil shall take priority over burning used oil for energy recovery or otherwise disposing of used oil.

C6.3.8.2. Used Oil Burned for Energy Recovery. Used oil fuel may be burned in facilities that have a permit issued by the appropriate German authorities.

C6.3.8.3. 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.

C6.3.8.4. Used Oil Analysis for PCBs and Halogens. Before processing, used oil shall be sampled and analyzed for PCBs and halogens. This sampling and analysis is generally conducted by the contractor responsible for collecting and transporting used oil to the processing facility. Sampling should be conducted in accordance with German regulations. Used oil containing PCBs $\leq$ 20 ppm (mg/kg) may be reconditioned for use as recycled oil. Waste oil with a PCB concentration $\geq$ 20 ppm must be disposed of as waste requiring special supervision.

C6.3.8.5. Prohibition of Mixing Used Oil. Used oils that can be reprocessed shall not be mixed with other wastes or used oils that cannot be reprocessed.

C6.3.8.6. Used Oil Declaration. When used oil is collected by a waste contractor for reprocessing, the installation shall provide the contractor a written statement that states the oil is

not contaminated with additives, such as PCB-containing synthetic oils or their substitutes, or other substances that would prohibit reprocessing.

C6.3.8.7. Used Oil Return System. DoD Installations shall integrate the reuse, recycling, and disposal of used oil into their waste-management practices.

C6.3.8.8. Used Batteries.

C6.3.8.8.1. Treatment and storage of used batteries in treatment facilities shall only be conducted at sites with impervious surfaces and appropriate weatherproofed cover or in appropriate containers. This also applies if used batteries are stored only temporarily.

C6.3.8.8.2. Lead-acid batteries, nickel-cadmium batteries and batteries containing mercury or lithium will be managed as HW, regardless of whether they are to be recycled or disposed of permanently.

C6.3.9. Persistent Organic Pollutants.

C6.3.9.1. Generators and owners of waste shall avoid mixing waste with POPs listed in Table C6.T2.

C6.3.9.2. Waste containing substances listed in Table C6.T2. below concentrations provided in Table C6.T2. shall be disposed of as HW. If concentrations exceed the limits presented in Table C6.T2. the HW shall be disposed of or recovered, without undue delay using the following disposal and recovery operations:

C6.3.9.2.1. Physico-chemical treatment;

C6.3.9.2.2. Incineration on land; and

C6.3.9.2.3. Use principally as a fuel or other means to generate energy, excluding waste containing PCBs.

C6.3.9.3. Disposal or recovery operations that may lead to recovery, recycling, reclamation or re-use of the substances listed in Table C6.T2. shall be prohibited.

C6.3.10. Hazardous Waste Training.

C6.3.10.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program before assuming those duties. Personnel assigned to such duty after the effective date of these FGS must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05, “DoD Hazard Communication (HAZCOM) Program.”

C6.3.10.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

C6.3.10.3. Training Contents and Requirements. The training program must:

C6.3.10.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

C6.3.10.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or have experience.

C6.3.10.3.3. 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.

C6.3.10.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

C6.3.10.3.4.1. Emergency procedures (response to fire/explosion/spills, use of communications/alarm systems, body and equipment clean up);

C6.3.10.3.4.2. Drum/container handling/storage, safe use of HW equipment, proper sampling procedures;

C6.3.10.3.4.3. Employee protection, including PPE, safety and health hazards, hazard communication, and worker exposure; and

C6.3.10.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

C6.3.10.3.5. Documentation of Training. Installations must document all HW training for each individual assigned duty 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 3 years after termination of duty of these personnel.

C6.3.11. Hazardous Waste Disposal.

C6.3.11.1. All DoD HW should normally be disposed of through the DLA Disposition Services. A decision not to use the DLA Disposition Services for HW disposal may be made in accordance with DoDD 4001.1, “Installation Management” 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 the DLA Disposition Services.

C6.3.11.2. To the maximum extent possible, HW generated in Germany shall be treated, recycled, or permanently disposed of in Germany. An export of HW is permitted only if no appropriate German treatment or disposal facility exists. If exported, disposal in an EU member country has priority over disposal in another country. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either US law or German law are not disposed of in Germany unless the disposal is conducted in accordance with FGS and the following:

C6.3.11.2.1. If HW is exported, appropriate notification procedures shall be followed. The authorities of the country or state of origin shall be notified for waste transportation measures. When HW cannot be disposed of in accordance with FGS within Germany or the EU, it will either be retrograded to the US or, if permissible under international agreements, transferred to another country outside the US 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 US for disposal must be approved by, at a minimum, the Assistant Secretary of Defense for Energy, Installations, and Environment [ASD (E, I&E)].

C6.3.11.2.2. The determination of whether particular DoD-generated HW may be disposed of in Germany will be made by the Lead Environmental Component (LEC), in coordination with the unified combatant commander, the Director of Defense Logistics Agency, other relevant DoD components, and the Chief of the US diplomatic mission.

C6.3.11.3. Disposal Procedures.

C6.3.11.3.1. The determination of whether HW may be disposed of in Germany must include consideration of whether the means of treatment and/or containment technologies used in the German program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the German program includes:

C6.3.11.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

C6.3.11.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

C6.3.11.3.1.3. Appropriate standards and limitations on the methods that may be used to treat and dispose of HW.

C6.3.11.3.1.4. 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.

C6.3.11.3.2. The LEC must also be satisfied, either through reliance on the German regulatory system and/or provisions in the disposal contracts, that:

C6.3.11.3.2.1. Persons and facilities in the waste management process have

demonstrated the appropriate level of training and reliability; and

C6.3.11.3.2.2. Effective inspections, monitoring, and recordkeeping shall take place.

C6.3.11.4. German facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the appropriate German authorities as being in compliance with their regulatory requirements. This evaluation and approval may consist of having a valid German permit, licenses, or other form of official approval for the HW that will be handled.

C6.3.11.5. 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.

C6.3.11.6. Land Disposal Requirements. Hazardous wastes will be land-disposed only in landfill facilities permitted by the appropriate German authorities.

C6.3.11.6.1. The operation of a HW landfill requires a plan approval or a license from the appropriate German authority.

C6.3.11.7. Incinerator Standards. This criterion applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

C6.3.11.7.1. Incinerators used to dispose of HW must be licensed or permitted by the appropriate German authority. This license or permit must comply with the criteria listed in C6.3.11.7.2.

C6.3.11.7.2. A license or permit 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.

C6.3.11.8. 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 these FGS 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 will continue to be managed as HW under the criteria of these FGS, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of German disposal alternatives. These technologies should not be implemented without consultation with the appropriate German authorities and the LEC.

C6.3.11.8.1. Organics.

C6.3.11.8.1.1. Incineration in accordance with criterion C6.3.11.7.1.

C6.3.11.8.1.2. 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. The operation of a recycling facility or an incineration facility that uses HW as a fuel source requires a permit from the appropriate German authority.

C6.3.11.8.1.3. 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. The operation of a facility for the biodegradation of HW requires a permit from the appropriate German authority.

C6.3.11.8.1.4. 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. The operation of a recovery facility for the treatment of HW requires a permit from the appropriate German authority.

C6.3.11.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions. The operation of a chemical degradation facility for the treatment of HW requires a permit from the appropriate German authority.

C6.3.11.8.2. Heavy Metals.

C6.3.11.8.2.1. 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. The operation of a facility for the treatment of HW via stabilization or fixation requires a permit from the appropriate German authority.

C6.3.11.8.2.2. 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. The operation of a recovery facility for the treatment of HW requires a permit from the appropriate German authority.

C6.3.11.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits hazardous properties. The operation of a facility for the treatment of HW requires a permit from the appropriate German authority.

C6.3.11.8.4. Corrosives. Corrosive wastes 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. The operation of a facility for the treatment of HW requires a permit from the appropriate German authority.

C6.3.11.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with criteria C6.3.11.8.2.1. or C6.3.11.8.2.2. to stabilize, fix, or recover heavy metals, as appropriate, and in accordance with criterion C6.3.11.8.4. to neutralize any corrosives before disposal.

C6.3.11.9. 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 accordance with criteria C6.3.11.7. and C6.3.11.8.

C6.3.12. Tendering of Hazardous Waste.

C6.3.12.1. Baden-Württemberg.

C6.3.12.1.1. Generators shall tender all HW to be permanently disposed to the central state agency, the Sonderabfallagentur Baden-Württemberg GmbH (SAA) prior to transporting HW to the disposal facility or handing it over to a third party.

C6.3.12.1.2. The generator is exempt from the obligation to tender the waste to the SAA in the following cases:

C6.3.12.1.2.1. If the total quantity of HW does not exceed 2,000 kg (2 metric tons or 4,409 pounds) per year; however, in that case the applicable disposal facility is obliged to tender the HW to the SAA.

C6.3.12.1.2.2. If HW is disposed in a certified in-house waste-disposal facility operated by the generator and that has been in operation since 1 January 1996.

C6.3.12.1.2.3. If the waste collector received an allocation from the SAA for a specific HW for collective disposal.

C6.3.12.1.3. HW tendered to the SAA shall be disposed in a SAA-approved facility.

C6.3.12.2. Bayern.

C6.3.12.2.1. Generators shall tender all HW to be permanently disposed to the GSB Sonderabfall-Entsorgung Bayern GmbH.

C6.3.12.3. Rheinland-Pfalz.

C6.3.12.3.1. Generators shall tender all HW to be permanently disposed to the central state agency, the Sonderabfall-Management-Gesellschaft Rheinland-Pfalz mbH (SAM), in writing or electronically using required forms.

C6.3.12.3.2. The generator is exempt from the obligation to tender the waste to the SAM in the following cases:

C6.3.12.3.2.1. If the total quantity of HW does not exceed 2,000 kg (2 metric tons or 4,409 pounds) per year and the disposal facility is certified for this kind of HW.

C6.3.12.3.2.2. If HW is picked up under collective disposal by a contractor and the contractor tenders the HW to the SAM.

C6.3.12.3.2.3. If the disposal of used oil by recycling or energy recovery is documented.

C6.3.13. Permitted Transportation and Disposal Companies.

C6.3.13.1. HW for permanent disposal shall be transported by a company that has obtained a transportation permit.

C6.3.13.2. An approved disposal company does not require a transportation permit for the transport of HW for permanent disposal. Criteria applicable to approved disposal companies are addressed in Chapter 7, "Solid Waste."

C6.3.14. Waste Management Officer.

C6.3.14.1. A waste management officer shall be appointed at all times and prior to the beginning of the following activities: HW storage and disposal facilities, HW landfills, incinerators, hospitals and clinics, and plants for chemical or physical treatment of HW with a throughput of > 0.5 metric tons (500 kg or 1,102 pounds) per hour.

C6.3.14.2. The tasks of the waste management officer are described in Chapter 7, "Solid Waste."

C6.3.15. Provision of Statistical Information. DoD installations that operate HW facilities requiring a permit shall provide statistical data on the facility on an annual basis (beginning with calendar year 2006). This data includes waste types, waste composition, amount, origins, destinations, waste disposal procedures, and the intended use of the waste treatment products as well as the number, types, and localities of the waste facilities. DoD installations that operate HW facilities requiring a permit shall also provide data regarding the capacity of the waste facilities as well as the amount and disposition of any energy generated by the waste treatment process (if applicable) to the locally responsible *BImA* or, as appropriate, the Center of Expertise for Construction Management on a biennial basis. Typically, individual State agencies for statistics distribute standard forms to collect the requested information.

Table C6.T1. Acute Hazardous Wastes

Waste/Substance/Material	**Chemical Abstract Service (CAS)**
Acetaldehyde, chloro-	107-20-0
Acetamide, N-(aminothioxomethyl)-	591-08-2
Acetamide, 2-fluoro-	640-19-7
Acetic acid, fluoro-, sodium salt	62-74-8
Acetone cyanohydrin	75-86-5
1-Acetyl-2-thiourea	591-08-2
Acrolein	107-02-8
Aldicarb	116-06-3
Aldrin	309-00-2
Allyl alcohol	107-18-6
Aluminum phosphide (R,T)	20859-73-8
5-(Aminomethyl)-3-isoxazolol	2763-96-4
4-Aminopyridine	504-24-5
Ammonium picrate (R)	131-74-8
Ammonium vanadate	7803-55-6
Argentate(1-), bis(cyano-C)-, potassium	506-61-6
Arsenic acid H_3AsO_4	1327-52-2
Arsenic oxide As_2O_3	1327-53-3
Arsenic oxide As_2O_5	1303-28-2
Arsenic pentoxide	1303-28-2
Arsenic trioxide	1327-53-3
Arsenous oxide	1327-53-3
Arsine, diethyl-	692-42-2
Arsorous dichloride, phenyl-	696-28-6
Aziridine	151-56-4
Azindine, 2-methyl-	75-55-8
Barium cyanide	542-62-1
Benzenamine, 4-chloro-	106-47-8
Benzenamine, 4-nitro-	100-01-6
Benzene, chloromethyl-	100-44-7
1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- (R)	51-43-4
Benzeneethanamine, alpha, alpha-dimethyl-	122-09-8
Benzenethiol	108-98-5
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-,	81-81-2
Benzyl chloride	100-44-7
Beryllium	7440-41-7
Bromoacetone	598-31-2

Table C6.T1. Acute Hazardous Wastes (continued)

Waste/Substance/Material	Chemical Abstract Service (CAS)
Brucine	357-57-3
2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamno)carbonyl] oxime	39196-18-4
Calcium cyanide Ca(CN)2	592-01-8
Camphene, octachloro-	8001-35-2
Carbon disulfide	75-15-0
Carbonic dichloride	75-44-5
Choroacetaldehyde	107-20-0
p-Chloroaniline	106-47-8
Chloromethyl ether	542-88-1
1-(o-Chlorophenyl)thiourea	5344-82-1
3-Chloropropionitrile	542-76-7
Copper cyanide	544-92-3
Cyanides (soluble salts and complexes) not otherwise specified	57-12-5
Cyanogen	460-19-5
Cyanogen chloride	506-77-4
2-Cyclohexanone	131-89-5
Dichloromethyl ether	542-88-1
Dichlorophenylarsine	696-28-6
Dieldrin	60-57-1
Diethylarsine	692-42-2
Diethyl-p-nitrophenyl phosphate	311-45-5
O,O-Diethyl O-pyrazinyl phosphorothioate	297-97-2
Diisopropyfluorophosphate	55-91-4
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-	309-00-2
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-	465-73-6
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,	60-57-1
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,	72-20-8
Dimethoate	60-51-5
alpha, alpha-Dimethylphenethylamine	122-09-8
4,6-Dinitro-o-cresol and salts	534-52-1

Table C6.T1. Acute Hazardous Wastes (continued)

Waste/Substance/Material	Chemical Abstract Service (CAS)
2,4-Dinitrophenol	51-28-5
Dinoseb	88-85-7
Diphosphoramide, octamethyl-	152-16-9
Diphosphoric acid, tetraethyl ester	107-49-3
Disulfoton	298-04-4
Dithiobiuret	541-53-7
Endosulfan	115-29-7
Endothall	145-73-3
Endrin	72-20-8
Endrin & metabolites	72-20-8
Epinephrine	51-43-4
Ethanedinitrile	460-19-5
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752-77-5
Ethyl cyanide	107-12-0
Ethyleneimine	151-56-4
Famphur	52-85-7
Fluorine	7782-41-4
Fluoroacetamide	640-19-7
Fluoroacetic acid, sodium salt	62-78-6
Fulminic acid, mercury(2^-) salt (R,T)	628-86-4
Heptachlor	76-44-8
Hexaethyl tetraphosphate	757-58-4
Hydrazine, methyl-	60-34-4
Hydrazinecarbothioamide	79-19-6
Hydrocyanic acid	74-90-8
Hydrogen cyanide	74-90-8
Hydrogen phosphide	7803-51-2
Isodrin	465-73-6
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763-96-4
Mercury (acetate-O)phenyl-	62-38-4
Mercury fulminate	628-86-4
Methanamine, N-methyl-N-nitroso-	62-75-9
Methane, isocyanato-	624-83-9
Methane, oxybis(chloro-	542-88-1
Methanesulfenyl chloride, trichloro-	594-42-3
Methane, tetranitro- (R)	509-14-8

Table C6.T1. Acute Hazardous Wastes (continued)

Waste/Substance/Material	Chemical Abstract Service (CAS)
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115-29-7
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a- tetrahydro-	76-44-8
Methiocarb	2032-65-7
Methomyl	16752-77-5
Methyl aziridine	75-55-8
Methyl hydrazine	60-34-4
Methyl isocyanate	624-83-9
2-Methyllactonitrile	75-86-5
Methyl parathion	298-00-0
Muscimol	2763-96-4
alpha-Naphthylthiourea	86-88-4
Nickel carbonyl	13463-39-3
Nickel carbonyl Ni(CO)4, (T-4)-	13463-39-3
Nickel cyanide	557-19-7
Nicotine & salts	54-11-5
Nitric oxide	10102-43-9
p-Nitroaniline	100-01-6
Nitrogen dioxide	10102-44-0
Nitrogen oxide	10102-43-9
Nitroglycerine	55-63-0
N-Nitrosodimethylamine	62-75-9
N-Nitrosomethylvinylamine	4549-40-0
Octamethylpyrophosphoramide	152-16-9
Osmium tetroxide	20816-12-0
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145-73-3
Oxamyl	23135-22-0
Parathion	56-38-2
Phenol, 2-cyclohexyl-4,6-dinitro-	131-89-5
Phenol, 2,4-dinitro-	51-28-5
Phenol, 2-methyl-4,6-dinitro-and salts	534-52-1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88-85-7
Phenol, 2,4,6-trinitro-, ammonium salt	131-74-8
Phenylmercury acetate	62-38-4
Phenylthiourea	103-85-5
Phorate	298-02-2
Phosgene	75-44-5

Table C6.T1. Acute Hazardous Wastes (continued)

Waste/Substance/Material	Chemical Abstract Service (CAS)
Phosphoric acid, diethyl 4-nitrophenyl ester	311-45-5
Phosphorodithioic acid, O,O-diethyl S-[2	298-04-4
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl	298-02-2
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2- oxoethyl] ester	60-51-5
Phosphorofluondic acid, bis(1-methylethyl) ester	55-91-4
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56-38-2
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52-85-7
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298-00-0
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297-97-2
Physostigmine	57-47-6
Plumbane, tetraethyl-	78-00-2
Potassium cyanide	151-50-8
Potassium silver cyanide	506-61-6
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116-06-3
Propanenitrile	107-12-0
Propanenitrile, 3-chloro-	542-76-7
Propanenitrile, 2-hydroxy-2-methyl-	75-86-5
1,2,3-Propanetnol, trinitrate- (R)	55-63-0
2-Propanone, 1-bromo-	598-31-2
Propargyl alcohol	107-19-7
2-Propenal	107-02-8
2-Propen-1-o1	107-18-6
1,2-Propylenimine	75-55-8
2-Propyn-1-o1	107-19-7
4-Pyridinamine	504-24-5
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)	54-11-5
Selenious acid, dithallium (1+) salt	12039-52-0
Selenourea	630-10-4
Silver cyanide	506-64-9
Sodium azide	26628-22-8
Sodium cyanide	143-33-9
Strychnidin-10-one	57-24-9
Strychnidin-10-one, 2,3-dimethoxy-	357-57-3
Strychnine, & salts	572-49-4
Sulfuric acid, dithallium (1+) salt	7446-18-6

Table C6.T1. Acute Hazardous Wastes (continued)

Waste/Substance/Material	**Chemical Abstract Service (CAS)**
Tetraethyl lead	78-00-2
Tetraethyl pyrophosphate	107-49-3
Tetraethyldithiopyrophosphate	3689-24-5
Tetranitromethane (R)	509-14-8
Tetraphosphoric acid, hexaethyl ester	757-58-4
Thallic oxide	1314-32-5
Thallium oxide	1314-32-5
Thallium selenite	12039-52-0
Thallium sulfate	7446-18-6
Thallous sulfate (Thallium (I) sulfate)	7446-18-6
Thiodiphosphoric acid, tetraethyl ester	3689-24-5
Thiofanox	39196-18-4
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541-53-7
Thiophenol	108-98-5
Thiosemicarbazide	79-19-6
Thiourea, (2-chlorophenyl)-	5344-82-1
Thiourea, 1-naphthalenyl-	86-88-4
Thiourea, phenyl-	103-85-5
Toxaphene	8001-35-2
Trichloromethanesulfenyl chloride	594-42-3
Vanadic acid, ammonium salt	7803-55-6
Vanadic oxide V_2O_5	1314-62-1
Vanadic pentoxide	1314-62-1
Vinylamine, N-methyl-N-nitroso-	4549-40-0
Warfarin, & salts, when present at concentrations greater than 0.3 %	81-81-2
Zinc cyanide	557-21-1
Zinc phosphide	1314-84-7
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10 %	1314-84-7

Table C6.T1. Acute Hazardous Wastes (continued)

Acute Hazardous Wastes from Non-specific Sources
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 list does not include wastes from the production of Hexachlorophene from highly purified 2,4,5- trichlorophenol).
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.
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.
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 list does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5- trichlorophenol).
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.
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This list does not include formulations containing Hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component).

Table C6.T2. Persistent Organic Pollutants subject to Waste Management Provisions

Substance	**Chemical Abstract Service (CAS) No.**	**Concentration Limit**
Aldrin	309-00-2	50 mg/kg
Chlordane	57-74-9	50 mg/kg
Dieldrin	60-57-1	50 mg/kg
Endrin	72-20-8	50 mg/kg
Heptachlor	76-44-8	50 mg/kg
Hexachlorobenzene	118-74-1	50 mg/kg
Mirex	2385-85-5	50 mg/kg
Toxaphene	8001-35-2	50 mg/kg
Polychlorinated Biphenyls (PCBs)	1336-36-3 and others	50 mg/kg
DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane)	50-29-3	50 mg/kg
Chlordecone	143-50-0	50 mg/kg
Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)		15 µg/kg
Hexachlorocyclohexanes including Lindane	58-89-9 319-84-6 349-85-7 608-73-1	50 mg/kg
Hexabromobiphenyl	36355-01-8	50 mg/kg
Pentachlorobenzene	608-93-5	50 mg/kg
Perflourooctane sulfonic acid and its derivates (PFOS) $C_8F_{17}SO_2X$ (X = OH, Metal salt (O-M+), halide, amide, and other derivatives including polymers)	1763-23-1 2795-39-3 29457-72-5 29081-56-9 70225-14-8 56773-42-3 251099-16-8 4151-50-2 31506-32-8 1691-99-2 24448-09-7 307-35-7 and others	50 mg/kg

Table C6.T2. Persistent Organic Pollutants subject to Waste Management Provisions (continued)

Substance	**Chemical Abstract Service (CAS) No.**	**Concentration Limit**
Tetrabromodiphenyl ether	40088-47-9 and others	Sum of the concentrations of tetrabromodiphenyl ether, pentabromodiphenyl ether, hexabromodiphenyl
Pentabromodiphenyl ether	32534-81-9 and others	
Hexabromodiphenyl ether	36483-60-0 and others	
Heptabromodiphenyl ether	68928-80-3	
Decabromodiphenyl ether	1163-19-5	
Endosulfan	115-29-7 959-98-8 33213-65-9	50 mg/kg
Hexachlorobutadiene	87-68-3	100 mg/kg
Polychlorinated naphthalenes [1]		10 mg/kg
Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs)	85535-84-8	10,000 mg/kg
Hexabromocyclododecane	25637-99-4 3194-55-6 134237-50-6 134237-51-7 134237-52-8	1,000 mg/kg

Note:
[1] Polychlorinated naphthalenes means chemical compounds based on the naphthalene ring system, where one or more hydrogen atoms have been replaced by chlorine atoms.

Table C6.T3. Hazardous Properties of Waste

Hazardous Properties of Wastes	**Description**	**H-Sentence**
HP1	Explosive	H200, H201, H202, H203, H204, H240, H241
HP2	Oxidizing	H270, H271, H272
HP3	Flammable	H220, H221, H222, H223, H224, H225, H226, H228, H242, H250, H251, H252, H260, H261
HP4	Irritating (skin and eye damaging)	H314, H315, H318, H319, H314
HP5	Specific target organ toxicity	H370, H371, H335, H372, H373, H304
HP6	Acute toxicity	H300, H301, H302, H310, H311, H312, H330, H331, H332
HP7	Carcinogenic	H350, H351
HP8	Corrosive	H314
HP9	Infectious	N/A
HP10	Toxic to reproduction	H360, H361
HP11	Mutagenic	H340, H341
HP12	Release of an acutely toxic gas	EUH029, EUH031, EUH032
HP13	Sensitizing	H317, H334
HP14	Ecotoxicity	H420, H400, H410, H411, H412, H413
HP15	Waste that may develop any of the above hazard-relevant properties not immediately present in the original waste	H205, EUH001, EUH019, EUH044

CHAPTER 7 – SOLID WASTE

C7.1. SCOPE

This chapter provides 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, commercial, and industrial 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 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," Chapter 11, "Pesticides," Chapter 14, "Polychlorinated Biphenyls," and Chapter 15, "Asbestos." Procedures for obtaining permits or other authorizations are addressed in Chapter 1, "Overview" of these FGS.

C7.2. DEFINITIONS

C7.2.1. Animal Carcasses. The body of an animal after slaughter and dressing.

C7.2.2. Animal By-Products. Entire bodies or parts of animals, products of animal origin or other products obtained from animals, which are not intended for human consumption, including oocytes, embryos and semen.

C7.2.3. Approved Disposal Company *(Entsorgungsfachbetrieb)*. An approved waste disposal company is a company that collects, transports, stores, treats, recovers, disposes, trades of waste or acts as a broker, either commercially or within the framework of commercial enterprises or public institutions, and, with respect to one or more of the activities described above, is certified by a technical monitoring organization.

C7.2.4. Biodegradable Waste. Organic, degradable substances (native or derivative) associated with municipal waste. Depending on the local disposal system, it may be required for private households to separate biodegradable waste from typically generated household waste.

C7.2.5. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

C7.2.6. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

C7.2.7. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, public entities, forestry, fishing and fish farming, hunting, horticulture and agriculture, construction and demolition, and other non-manufacturing activities, excluding residential and industrial wastes.

C7.2.8. 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. Certain construction and demolition waste fractions are considered commercial solid waste.

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. Electrical and Electronic Equipment. Equipment with a voltage rating not exceeding 1,000 volts (V) direct current (DC) or 1,500 V alternating current (AC), except such equipment specifically designed and determined for military use. Electrical and electronic equipment is categorized as follows: (1) Large household appliances; (2) Small household appliances; (3) Information technology (IT) and telecommunications equipment; (4) Consumer equipment and photovoltaic panels; (5) Lighting equipment; (6) Electrical and electronic tools; (7) Toys, leisure, and sports equipment; (8) Medical devices; (9) Monitoring and control instruments; (10) Automatic dispensers. On 16 August 2018, the definition will be: Equipment with a voltage rating not exceeding 1,000 volts (V) direct current (DC) or 1,500 V alternating current (AC), except such equipment specifically designed and determined for military use. Electrical and electronic equipment is categorized as follows: (1) Temperature exchange equipment; (2) Screens, monitors, and equipment containing screens having a surface $> 100\ cm^2$; (3) Lamps; (4) Equipment with any external dimension > 50 cm (large equipment); (5) Equipment with any external dimension ≤ 50 cm (small equipment); (6) Small information technology (IT) and telecommunication equipment (no external dimension > 50 cm).

C7.2.12. Electronic Waste. Waste that is considered bulky waste or household waste powered by electricity and/or batteries and contains electronic components (i.e., wires, circuit boards, switches, conductors).

C7.2.13. 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.

C7.2.14. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

C7.2.15. Generation. The act or process of producing solid waste.

C7.2.16. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste," C6.2., Definitions.

C7.2.17. Household Waste. Waste generated from residential areas (e.g., government family housing, leased housing, and barracks).

C7.2.18. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

C7.2.19. 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.

C7.2.20. Landfill, Class 0 *(Deponieklasse 0)*. An aboveground landfill licensed for wastes that comply with the criteria for Landfill, Class 0 as listed in Table C7.T1. (inert solid wastes).

C7.2.21. Landfill, Class I *(Deponieklasse I)*. An aboveground landfill licensed for wastes that comply with the criteria for Landfill, Class I as listed in Table C7.T1. Class I landfills are used for disposal of solid wastes that have a very low organic content (up to 1% of total organic carbon by weight) and that have a low potential for release of contaminants as determined by a leaching test.

C7.2.22. Landfill, Class II *(Deponieklasse II)*. An aboveground landfill licensed for wastes, including mechanically or biologically treated wastes, with a higher organic content (up to 3% of total organic carbon by weight) and a higher chemical reactivity than the solid wastes that may be disposed of in a Class I landfill. Therefore, the criteria for the siting and construction of a Class II landfill are more stringent than those required for a Class I landfill.

C7.2.23. Landfill, Class III *(Deponieklasse III)*. An aboveground landfill licensed for wastes with a higher organic content (up to 6% of total organic carbon by weight) and a higher chemical reactivity than the solid wastes that may be disposed of in a Landfill, Class II. The criteria for the siting and construction of a Landfill, Class III are more stringent than those required for a Landfill, Class II.

C7.2.24. Landfill, Class IV *(Deponieklasse IV)*. An underground landfill in which waste is completely encased in stone, e.g., in a mine with an area for waste disposal separate from the mineral excavation, or in a cave or cavern.

C7.2.25. 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.

C7.2.26. Municipal Solid Waste (MSW). Household waste, household-like waste, bulky waste, yard waste, non-contaminated sewage sludge, non-contaminated construction debris, and non-contaminated rubbish from road cleaning. Municipal solid waste does not include HW.

C7.2.27. 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. An MSWLF unit includes landfills of Class 0, Class I, and Class II, but does not include landfills of Class III and Class IV.

C7.2.28. Open Burning. Burning of solid wastes in the open, such as in an open dump.

C7.2.29. 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.

C7.2.30. Packaging Waste. Any material manufactured for the purpose of accepting, protecting, handling, delivering, or presenting goods, ranging from raw materials to processed product and passed on to the distributor or end user. Packaging material is usually collected and

recycled or disposed of by an appropriate waste consortium, such as *"Duales System Deutschland (DSD)*."

C7.2.31. Recovery. Recovery includes any operation that uses waste to replace other materials which would otherwise have been used to fulfil a particular function, or to fulfil this particular function by pre-treatment of this waste.

C7.2.32. Recycling. Recycling includes any recovery operation that turns waste into products, materials or substances whether for the original purpose or for other purposes; it includes the processing of organic material, but does not include energy recovery and the reprocessing into materials that are intended for use as fuels or for backfilling.

C7.2.33. Residential Solid Waste. The wastes generated by normal household activities, including but not limited to food wastes, rubbish, ashes, and bulky wastes. See also household waste.

C7.2.34. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

C7.2.35. Sanitary Landfill. A land disposal site using 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.

C7.2.36. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

C7.2.37. Scrap Vehicles. Vehicles intended for permanent disposal (i.e., end-of-life vehicles).

C7.2.38. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 91-8, Army TM 5-634, "Solid Waste Management", or their successor documents.

C7.2.39. 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.

C7.2.40. 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. All property that the owner disposes or recovers, wishes to dispose or recover, or shall dispose or recover. Recovery processes are listed in Table C7.T3. and disposal processes in Table C7.T4.

C7.2.41. Solid Waste Generator. The producer or owner of solid waste, including individuals, private and public agencies and institutions, and industrial and commercial facilities. The solid waste generator is the entity responsible for ensuring that waste is recovered

or disposed of in a legal and environmentally compatible manner. This responsibility cannot be transferred to other individuals, companies, or agents.

C7.2.42. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

C7.2.43. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

C7.2.44. United States European Command (USEUCOM) Waste List (EWL). Refer to Chapter 6, "Hazardous Waste," C6.2. Definitions.

C7.2.45. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

C7.2.46. Waste Management Officer. Internal or external personnel appointed by the site operator (installation commander). The officer advises the site operator and staff in matters of waste prevention and waste management. The officer's tasks and duties are determined by law.

C7.2.47. Waste Meat. Raw meat scraps and by-products (including poultry and seafood) resulting from food preparation.

C7.2.48. 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. Evaluation of Waste Facilities. DoD solid wastes will be treated, stored, and disposed of in certified waste disposal facilities *(zugelassene Abfallbeseitigungsanlagen)* 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.

C7.3.1.1. Organizations and facilities handling solid wastes may voluntarily participate in a certification process to achieve the title "approved disposal company" *(Entsorgungsfachbetrieb)* (paragraph C7.3.18.1.).

C7.3.2. General Provisions and Cooperation with Host-Nation Officials. Installations will cooperate with the appropriate German authorities, to the extent possible, in the solid waste-management planning process. It is the responsibility of the solid waste generator to ensure the legal and environmentally compatible recovery or disposal of solid waste occurs, even when other individuals, companies, or agents are involved in the management of solid waste.

C7.3.3. Reduction of Waste Disposal. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy shall include the following order of preference: waste prevention, preparation of reuse, recycling, other recovery (in particular energy recovery, composting and backfilling), and disposal in a landfill. If the generation of solid waste cannot be avoided, generators shall separately collect, store, and transfer solid wastes according to type (i.e., waste fractions) in order to ensure the highest possible recovery in a safe and efficient manner. This applies to commercial solid wastes generated as separate waste fractions, including paper and cardboard, glass, plastics, metals, and biodegradable kitchen, canteen, and yard wastes. If segregation and separate collection, storage, and transfer of paper and cardboard, glass, plastics, and metals are not technically or

economically feasible at the point of generation, commercial solid wastes may be collected and stored as waste mixtures. In general, commercial solid wastes and mixtures thereof may contain only the following waste fractions: paper and cardboard; glass; clothing; textiles; wood, except for wood that contains hazardous substances; plastics; metals; rubber; cork; ceramics; wastes from woodworking and the production of boards and furniture (bark and cork; and sawdust, shaving, cuttings, and spoiled timber/particle board/veneer, except for those containing hazardous substances); packaging wastes, except for those containing residues of hazardous substances, or that are contaminated with hazardous substances; and wastes from construction and demolition, except for waste containing or contaminated with hazardous substances (wood; glass; plastics; copper, bronze, brass, aluminum, lead, zinc, iron and steel, tin, each with respective alloy, as well as mixed metals; cable except for those containing oil, coal tar, or other hazardous substances; concrete; and tiles, bricks, and ceramics). Commercial solid waste mixtures shall be pre-treated in a sorting facility before disposal using processes that are suitable to guarantee the highest possible degree of sorting and leads to a result comparable to separate collection. Commercial solid waste mixtures to be disposed in waste incinerators do not require pre-treatment in a sorting facility if the mixtures do not contain the following waste fractions: glass; metals; mineral wastes; and biodegradable kitchen, canteen, and yard wastes.

C7.3.3.1. Storage and Disposal of Scrap Vehicles (End-of-Life Vehicles).

C7.3.3.1.1. Scrap vehicles shall be returned to the manufacturer or distributor, to a collection system organized by the auto industry, or to a recycling company or a receiving point established by a recycling company (including approved DoD recycling centers). European manufacturers are required to take back their vehicle brands free of charge from the end-user. This applies to four-wheeled vehicles designed to carry passengers and comprising no more than eight seats in addition to the driver's seat, four-wheeled vehicles designed to carry goods with a permissible maximum weight of < 3.5 metric tons, vehicles for special purposes with > 3.5 metric tons (i.e., mobile homes), and three-wheeled vehicles except for three-wheeled motorcycles. All other scrap vehicles, including military vehicles, shall be disposed of in a manner that does not present a risk to public health or the environment.

C7.3.3.1.2. The operation of a recycling center for scrap vehicles requires a permit *(Genehmigung)* from, or a notification *(Anzeige)* to, the appropriate German authorities. Scrap vehicle receiving shops, recycling centers, and facilities for further recycling of vehicle bodies shall be certified annually by an expert *(Sachverständiger)*. If the scrap vehicle receiving center is also a vehicle repair shop, then the annual certificate shall be issued by the appropriate automotive guild *(Kraftfahrzeug-Innung)*. A permit *(Betriebserlaubnis)* is required for the operation of a holding yard or a facility for treatment of more than four scrap vehicles, including privately operated vehicles and military vehicles that require registration and a license plate *(amtliches Kennzeichen)*.

C7.3.3.1.3. Scrap vehicle recycling centers shall maintain records on incoming and outgoing volumes, disposal documentation (i.e., disposal manifest "*Entsorgungsnachweis*," accompanying documentation "*Begleitscheine*," acceptance slips "*Übernahmescheine*"), recycling certificates, and volumes of all removed substances, materials, and components. The operators of such facilities shall immediately certify the transfer of the scrap vehicle by providing a disposal manifest to the former vehicle owner.

C7.3.3.2. Biodegradable Waste. Composting of biodegradable solid waste is required. Solid waste generators may compost onsite when an adequate system and space are available.

Alternatively, solid waste generators may transfer biodegradable wastes and other recyclables to a third party for composting. Biodegradable kitchen, canteen, and yard wastes shall be stored, collected, and transported separate from other solid wastes.

C7.3.3.3. Electrical and Electronic Equipment. DoD Installations shall integrate the reuse, recycling, and disposal of electrical and electronic equipment into their waste-management practices. DoD installations shall segregate the collection of electrical and electronic equipment as 1) equipment specifically designed and determined for military use, and 2) other equipment (non-military (private) use or dual use), and provide collection containers for each. Electrical and electronic equipment for private use or similar to private use (e.g., personal computers in administrative offices) purchased with a registration number label guarantees that the manufacturer has provided for transport and disposal, reuse, or recycling. The Selling or reselling of electrical and electronic equipment with no registration number label to EU private consumers is prohibited.

C7.3.3.4. Commercial Solid Waste. Commercial solid wastes may be disposed of with other municipal solid wastes if the type, reactivity, or concentration of pollutants is comparable with municipal solid waste (i.e., commercial solid waste that is household-like). Commercial solid waste that is household-like includes all waste fractions according to the EWL, chapter 20[1] (see: https://www.us.army.mil/suite/files/20917769).

C7.3.4. Storage of Wastes or Materials to be Recovered. All solid wastes or materials that have been separated for the purpose of recovery, e.g. 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. Bulky wastes shall be stored in a manner that provides for reuse and recovery. 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 (ODS) as defined in Chapter 2, "Air Emissions," or hazardous constituents as defined in Chapter 6, "Hazardous Waste." ODS contained in bulky waste may only be removed onsite before shipment for offsite disposal by DoD or subcontractor personnel who are properly qualified *(Sachkundiger)*. Readily detachable or removable hazardous substances will be segregated and disposed of in accordance with Chapter 2, "Air Emissions," Chapter 6, "Hazardous Waste," Chapter 14, "Polychlorinated Biphenyls," and Chapter 15, "Asbestos" of these FGS.

C7.3.6. Solid Waste Storage Areas. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of these FGS, there will be provisions for storage in accordance with these criteria that will accommodate the volume of solid waste anticipated and the number of waste streams to be separated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

C7.3.7. Storage Containers. 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

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000D0532:20020101:EN:PDF

manner that would impair serviceability. Storage containers should have functional lids and shall be kept closed except at times of filling and emptying.

C7.3.8. Storage Container Areas. 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. Recycling programs will be instituted on DoD installations that provide facilities for separate collection (e.g., source segregation) of packaging wastes, electronic waste, paper and cardboard, glass, metal, scrap vehicles, biodegradable and other wastes, if economically feasible.

C7.3.10. Initiation of New or Expansion of Existing MSWLF Units. 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. Design and Operation of New or Expanded MSWLF Units. New landfills and modifications to existing landfills shall require a permit from the appropriate German authorities, and operated in accordance with the terms and conditions of that permit. A planning assessment procedure *(Planfeststellungverfahren)* or a permitting procedure *(Genehmigungs-verfahren)* shall be required. 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;

C7.3.11.1.1. The siting of a Class 0, Class I, or Class II MSWLF is not permitted in the following areas:

C7.3.11.1.1.1. Within karst areas (i.e., areas of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns) and areas with a high proportion of fissures and fractures in the geologic subsurface (local exceptions may be made for Class I sites);

C7.3.11.1.1.2. Within areas for the extraction of drinking water and mineral spring water (including planned or potentially designated);

C7.3.11.1.1.3. Within existing or planned flood plain areas;

C7.3.11.1.1.4. Within a quarry where a discharge of free-flowing leachate to a drainage system to an area outside of the landfill area is not possible;

C7.3.11.1.1.5. Within existing and/or planned wooded areas, nature protection zones, and areas classified as recognized protected biotopes;

C7.3.11.1.1.6. Within 300 meters (984 feet) of any neighboring residential area; or

C7.3.11.1.1.7. Within earthquake areas, active fault zones, and areas imminent of landslide or surface lowering after former mining activities.

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;

C7.3.11.4. Inspection program to include inspections:

C7.3.11.4.1. During the construction phase or before start of landfill operation;

C7.3.11.4.2. After start of landfill operation or after changing of operation;

C7.3.11.4.3. Regularly; and

C7.3.11.4.4. During or after decommissioning of landfill operation.

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. Monitoring system to include:

C7.3.11.6.1. A groundwater monitoring system during the active life of the facility and the post-closure care period;

C7.3.11.6.2. Monitoring system for the settling of the liner system;

C7.3.11.6.3. Monitoring system for the settling of the landfill body and the state of backfilling;

C7.3.11.6.4. Monitoring program for determining the quality of leachate and surface water;

C7.3.11.6.5. Monitoring system for meteorological data including precipitation, temperature, wind (direction, velocity), and evaporation;

C7.3.11.6.6. Monitoring program for landfill gas and landfill gas emissions; and

C7.3.11.6.7. Specified monitoring frequencies shall be maintained (see Table C7.T2.). The chemical substances to be analyzed shall be determined individually during the plan approval process.

C7.3.12. Installations Operating or Closing MSWLF Units. Installations operating MSWLF units will comply with all terms and conditions incorporated into MSWLF permits issued by an appropriate German authority, including:

C7.3.12.1. Use authorized 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 and recovery of MSW as an alternative to landfilling or treatment prior to landfilling. Composting of biodegradable waste is required. Composting may be conducted onsite when an adequate system and space are available.

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. Before burning, approval shall be obtained from the appropriate German authority.

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). Waste recovery shall be considered before disposal in a landfill.

C7.3.12.6.1. Recovery of composted material (for example, as final cover for landfills) shall be a priority.

C7.3.12.6.2. Recyclable construction debris shall be collected separately, treated, and reused as construction material whenever technically and economically feasible.

C7.3.12.6.3. If a DoD installation expects to recycle wastes for use as landfill construction materials/products, coordination with the Lead Environmental Component (LEC) is required to ensure that the specific allocation and analytical criteria, which may be established by the appropriate German authority, are met.

C7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation. The MSWLF operator shall employ a sufficient number of qualified personnel. Training of personnel shall be conducted initially and then every 2 years. The MSWLF operator is responsible for training personnel. The training shall include the following topics: German waste management standards and related environmental regulations; construction, operation, closure, and post-closure procedures for landfill sites; environmental effects, hazards, and annoyances that may result from the operation of the disposal sites, and measures to avoid or eliminate these effects, hazards, and annoyances; type and composition of wastes that may be encountered; regulations applicable to hazardous materials; regulations regarding operational liability; and safety and protection of workers. Washing facilities shall be provided at the site including disinfecting, cleaning, and skin care agents and the opportunity to dry damp working clothes between shifts. The operational and organizational criteria *(Betriebsordnung)* shall be developed by the landfill operator before the start of operations, and shall include the applicable rules for safety and good order. It shall be submitted to the appropriate German authority on request and is to be displayed in the entrance area. If applicable, criteria for the handling of certain types of waste shall also be included. Sufficient firefighting equipment shall be available at the various landfill operation areas.

C7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

C7.3.12.9. Gas from operating and closed landfill sections shall be collected and recovered. The quantity and quality of generated gas, and the impact of degassing, shall be regularly controlled.

C7.3.12.9.1. Construction of onsite structures at the landfill site body shall be avoided. The design of the onsite structures shall prevent landfill gas from entering the buildings. Appropriate measures include degassing equipment in the area of onsite buildings, sealing of a large area around the buildings, construction on pillars to allow for sufficient ventilation, installation of a gas collection/removal system beneath the floor of the building, and the absence of a basement.

C7.3.12.9.2. Potential migration of landfill gas toward onsite structures shall be measured.

C7.3.12.9.3. If migration of landfill gas into the structures cannot be prevented, the ambient air shall be controlled and ventilation measures installed. The ambient air shall be surveyed with gas alarm devices that give a pre-alarm if the methane concentration exceeds 0.5% by volume, and automatically turns on ventilation systems. The gas alarm devices shall be able to switch off non-explosion-proof electrical devices, if the methane concentration exceeds 1.0% by volume (which corresponds to 20% of the lower explosive limit (LEL)).

C7.3.12.9.4. If there are indications that the hydrogen sulfide concentration may exceed 0.1% by volume, appropriate gas alarm devices shall be installed for this gas.

C7.3.12.10. Operate in an aesthetically acceptable manner, including landscaping the landfill to fit into its surroundings.

C7.3.12.11. Operate in a manner to protect the environment (including aquifers) and the public from potential hazards.

C7.3.12.12. Control public access to landfill facilities.

C7.3.12.13. Prohibit the disposal of all liquid wastes.

C7.3.12.14. Maintain records on the preceding criteria. An operational log book (*Betriebstagebuch*), annual summary reports and waste registers, shall be kept on file at least until the end of the post-closure period is approved by the appropriate German authority. These documents shall be made available to the competent authorities ~~up~~on request.

C7.3.12.15. During closure and post-closure operations, installations will comply with all terms and conditions incorporated into the MSWLF permit issued by the appropriate German authority. The appropriate German authority shall be notified of the closure of a MSWLF unit.

C7.3.12.15.1. During landfill closure operations, wastes may be recycled during landfill construction measures. This type of recycling is allowed for the following landfill construction measures:

C7.3.12.15.1.1. Profiling of the landfill body;

C7.3.12.15.1.2. Completion or improvement of the geological barrier;

C7.3.12.15.1.3. During necessary landfill construction measures with the landfill body; and

C7.3.12.15.1.4. Construction of the surface sealing system.

C7.3.12.15.2. Prepare a written closure plan that includes, as a minimum, a description of all monitoring and maintenance activities required by the permit 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, 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.

C7.3.12.15.2.1. On closure of the landfill, all information required to be submitted to the appropriate German authority shall be in accordance with the criteria established in Chapter 1, "Overview."

C7.3.12.15.2.2. During the post-closure period, long-term security measures shall be established and maintained.

C7.3.13. Open Burning. 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.

C7.3.13.1. The open burning of yard waste is allowed in the German Federal States of Hessen, Baden-Württemberg, Rheinland-Pfalz and Bayern, with a permit from the local German authority.

C7.3.14. Composting Facilities Using Sludge from Domestic Wastewater-Treatment Plants. A composting facility that is located on a DoD installation and that processes sludge from a domestic wastewater-treatment plant (see Chapter 4, "Wastewater") will comply with the following criteria:

C7.3.14.1. Permit Requirements.

C7.3.14.1.1. If > 75 metric tons per day are processed, a permit from the appropriate German authority is required;

C7.3.14.1.2. If 10 to 75 metric tons per day are processed, a simplified permit from the appropriate German authority is required; and

C7.3.14.1.3. If < 10 metric tons per day are processed, no permit is required but the composting facility shall comply with German operation requirements for such facilities.

C7.3.14.2. Operators of wastewater-treatment plants shall maintain a registry including information on sludge characteristics, the quantity of sludge generated onsite and quantity of sludge delivered to agricultural facilities (in metric tons, dry weight), the type of sludge treatment, and the recipient/application area. The registry shall annually be submitted to the German authorities by 31 March for the previous calendar year. The site operator shall keep delivery notes 30 years from the date of submission and make them available to the appropriate authorities upon request.

C7.3.14.3. Operators of biological waste treatment plants have to record input materials by type, origin, quantity, and the source of waste generation. Each batch of treated biological waste shall be provided with a consecutive batch number including at least the year and month of treatment as well as a consecutive number for the specific year of treatment. The record shall include delivery notes and commercial notes obtained in the acquisition of input material or other appropriate documents and a copy of the completed forms. Records shall be kept onsite for 10 years and submitted to the appropriate authorities upon request.

C7.3.14.4. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

C7.3.14.5. 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.

C7.3.14.6. 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.

C7.3.14.7. The temperature and retention time for the material being composted must be monitored and recorded. Records regarding the temperature curves, turning times of composting processes (aerobic), and the loading intervals for anaerobic treatment plants shall be kept for 3 years.

C7.3.14.8. Periodic analysis of the compost, i.e., on every 2,000 metric tons of fresh weight 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.

C7.3.14.9. Compost must be produced by a process that further reduces pathogens in accordance with German standards.

C7.3.15. Distribution and End-Use of Compost from DoD Composting Facilities.

C7.3.15.1. Biological waste shall be subject to a biological stabilizing and sanitation treatment. DoD installations operating a composting facility shall treat such waste in accordance with German standards before application to agricultural or horticultural land.

C7.3.15.2. Composting materials and sewage sludge may be applied to agricultural or horticultural land if the limit values for soil at the application areas listed in Table C7.T6. and Table C7.T7. are not exceeded.

C7.3.15.3. The application of biological waste and organic mixtures in forested areas is permitted only after approval by the appropriate German authority in accordance with the forestry authority.

C7.3.15.4. The application of sewage sludge is prohibited on fruit or vegetable growing land, permanent green land, forested land, in Class I and II water protection zones, and in natural protection areas.

C7.3.15.5. Composting material and sewage sludge may only be stored on or near agricultural and horticultural land to the extent necessary for the application.

C7.3.15.6. All nuisance of odors to neighboring residents emanating from a DoD installation as a result of decomposing plant wastes (e.g., grass, leaves, moss) shall be avoided in Bayern, Baden-Württemberg and Hessen.

C7.3.16. Recordkeeping.

C7.3.16.1. Documentation is not required for the disposal of private household waste. Generally, household wastes that are comprised of separately collected recyclable materials (e.g., glass, paper) shall be disposed of through the public entity responsible for disposal *(öffentlich-rechtlicher Entsorgungsträger)*. Commercial waste, which includes household-type waste *(hausmüllähnlicher Gewerbeabfall)*, and industrial waste may be disposed of by the public entity responsible for disposal or by other disposal companies.

C7.3.16.2. Documentation criteria apply to waste generators or owners (*Abfallerzeuger*), to the parties collecting or transporting wastes, and to the parties recovering

(*Verwerter*) or disposing of wastes (*Beseitiger*) of which the competent authority has requested documentation on an individual basis. For details refer to Chapter 6, "Hazardous Waste."

C7.3.16.3. All wastes generated shall be assigned the applicable six-digit EWL code (see https://www.us.army.mil/suite/files/20917769). When assigning the waste ~~in~~to the relevant types, the two-digit, branch-specific or process-specific code shall come before any two-digit code denoting origin or type of waste.

C7.3.16.4. Site operators of waste treatment facilities and disposal companies shall maintain a register to record amount, type and origin of waste, and type of recovery or disposal. This register or specific information from the register shall be made available to the appropriate German authorities on request.

C7.3.16.5. The transfer of waste electrical and electronic equipment to collection centers or treatment facilities is exempt from disposal documentation criteria.

C7.3.17. Shipment of Waste.

C7.3.17.1. Labeling of Transportation Vehicles for Non-Hazardous Wastes. Vehicles transporting solid wastes on public roads shall be labeled with two rectangular reflective white warning signs, with a baseline of 40 cm (16 inches), and be at least 30 cm (12 inches) high. The warning signs shall be marked with a black "A" (20 cm (8 inches) high, 3 cm (1.2 inches) wide). The warning signs shall be clearly visible on the front and rear of the vehicle, perpendicular to the axle, and no more than 1.50 m (5 ft) above the road. For trains, the second sign shall be situated on the rear of the trailer. The driver of the vehicle shall be responsible for ensuring that the signs are in place.

C7.3.17.2. A notification to the appropriate German authority is required for the transportation of solid waste for disposal and recovery before start of work. This applies to the public entity responsible for waste disposal (*öffentlich-rechtliche Entsorgungsträger*), privately owned companies (including their subcontractors), and any other transporter of solid waste. However, the onsite transportation of DoD-generated solid waste in DoD vehicles does not require a notification. All transportation of hazardous solid waste requires a permit by the German authority and shall be managed in accordance with Chapter 6, "Hazardous Waste."

C7.3.17.3. Border-Crossing Shipment of Waste.

C7.3.17.3.1. Solid waste generated in Germany shall be disposed of in Germany. If disposal outside of Germany is required, disposal in an EU member country shall have priority over disposal in a non-EU country. If waste is imported among the German Federal States for disposal, the appropriate German authorities of the State where the wastes are to be recycled or disposed shall be responsible for waste transportation measures. If wastes are exported outside of Germany, then the appropriate German authorities of the State of origin shall be responsible for waste transportation measures.

C7.3.17.3.2. If solid waste is shipped to Germany, a notification of the appropriate authority of any country of transit and of the appropriate German authority is required in advance concerning the shipment and its destination.

C7.3.18. Waste Management Criteria.

C7.3.18.1. Approved Disposal Company. A disposal company approved by the appropriate German authority shall have an inspection certificate *(Überwachungszertifikat)* and

inspection seal *(Überwachungszeichen)* issued by the technical inspection organization and displaying the word "*Entsorgungsfachbetrieb*." An approved disposal company can achieve certification for one or more operations, including but not limited to transport, storage, treatment, recovery, and disposal.

C7.3.18.2. Waste Management Officer.

C7.3.18.2.1. Appointment. DoD installations that operate stationary waste disposal facilities for the storage, treatment or disposal of waste (e.g., composting facilities) or operating take-back systems for waste electrical and electronic equipment shall appoint an in-house waste management officer. The officer advises the site operator and staff in matters of waste prevention and waste management.

C7.3.18.2.2. Tasks and Duties. The waste management officer shall monitor all waste related activities onsite by conducting regular site inspections and by communicating detected shortcomings and corrective measures. The officer shall train and inform staff regarding the implemented waste reduction measures and potential hazards and adverse effects emanating from waste generated onsite. Furthermore, he/she shall develop, implement and improve environmentally friendly procedures.

C7.3.18.2.3. Reporting. The waste management officer shall prepare a written annual report on the measures taken or planned and submit it to the site operator.

C7.3.19. Reporting Criteria. Site operators of facilities requiring an operating permit, such as landfills, composting facilities, treatment facilities, waste incinerators, recycling centers, and scrap yards, are subject to disclosure obligations. Therefore, site operators shall submit, with respect to the preceding year, the following information to the German Federal Authority for Real Estate Matters *(Bundesanstalt für Immobilienaufgaben, BImA)*, or, as appropriate, the Center of Expertise for Construction Management *(Kompetenzzentrum für Baumanagement)* ~~up~~on request: the type, amount, properties, origin, and whereabouts of the treated, stored or deposited waste; the number, types, and locations of the facilities; the capacity of the facilities and the anticipated operational life of landfills as of 31 December of the preceding year; and the mechanisms established for the protection of groundwater and the treatment of waste, treatment of incineration residues, and the treatment of leachate; the type of landfill degassing and flue gas cleaning devices; and information on energy production and usage.

C7.3.19.1. Operators of facilities that treat or recycle construction and demolition waste shall submit every 2 years to the BImA, or as appropriate, the Center of Expertise for Construction Management information on the type and quantity of processed waste; the type and quantity of generated products and wastes; and the number, type, location, and capacity of facilities.

C7.3.20. Disposal of Waste Meat, Animal Carcasses and Animal By-Products.

C7.3.20.1. Waste meat, animal carcasses, remains, parts and by-products of Category 1, 2 and food waste of Category 3 (see Table C7.T5.) shall immediately be collected, transported, identified, and disposed of in facilities specifically designed for this type of waste. This criterion does not apply to food waste generated in private households which may be disposed of through the common household waste collection system.

C7.3.20.2. Waste meat and other food waste generated at commercial establishments and restaurants (e.g., commissaries, military dining halls) shall be disposed of as commercial

municipal waste either through an appropriate certified disposal company or directly to a company that recycles carcasses. In both cases, such food waste shall be handled, stored, collected, treated, and transported separately from other waste fractions.

C7.3.20.3. Food waste generated from means of transport (e.g., vehicles, aircraft, ships) operating internationally (including food wastes from means of transport that do not operate internationally but that take food on board from duty-free ports), food waste destined for animal consumption, and food waste destined for use in a biogas plant or for composting shall be collected, stored, and transported separately from other wastes, and shall be transported immediately after being provided by the waste generator/owner in leakproof, labelled containers. Vehicles and reusable containers, and all reusable items of equipment or appliances that come into contact with food waste, shall be cleaned, washed, and disinfected after each use.

C7.3.20.4. Carcasses of domestic animals (i.e., pets) may be buried in suitable areas where allowed by the appropriate German authority.

C7.3.20.5. If disposal of Category 1 and Category 2 material is required, the owner of such waste shall immediately inform the appropriate German authority (i.e., *Beseitigungs-pflichtiger*) unless it is delivered immediately to the proper disposal facility or its collection point. The transportation shall occur in closed, liquid-tight vehicles or sealed receptacles. Containers or locations have to be cleaned and disinfected immediately by the waste owner after the collection by the competent authority responsible for proper waste disposal.

C7.3.21. Solid Waste Incinerators. The construction, operation, and closure of solid waste incinerators shall require a permit *(genehmigungsbedürftige Anlagen)* and approval by the appropriate German authority.

Table C7.T1. Allocation Criteria for Class 0, I, II, and III Landfills

1	2	3	4	5	6	7	8	9 [1]
No.	**Parameter**	**Unit**	**Geo-logical Barrier**	**Class 0**	**Class I**	**Class II**	**Class III**	**Recultivation Layer**
1	**Organic content of the dry residue of the original substance [2]**							
1.01	Determined as ignition loss	Mass%	≤ 3	≤ 3	≤ 3 [3, 4, 5]	≤ 5 [3, 4, 5]	≤ 10 [4, 5]	-
1.02	Determined as TOC	Mass%	≤ 1	≤ 1	≤ 1 [3, 4, 5]	≤ 3 [3, 4, 5]	≤ 6 [4, 5]	-
2	**Criteria on original substance**							
2.01	Sum BTEX (benzene, toluene, ethylbenzene, o-, m-, p-xylene, styrene, cumene)	mg/kg dry weight	≤ 1	≤ 6	-	-	-	-
2.02	PCBs (sum of the 7 PCB congeners, PCB-28, -52, -101, -118, -138, -153, -180)	mg/kg dry weight	≤ 0.02	≤ 1	-	-	-	≤ 0.1
2.03	Mineral oil hydrocarbons (C10 to C40)	mg/kg dry weight	≤ 100	≤ 500	-	-	-	-
2.04	Total PAH (16 parameters as identified by the Environmental Protection Agency (EPA))	mg/kg dry weight	≤ 1	≤ 30	-	-	-	≤ 5 [6]
2.05	Benzo(a)pyrene	mg/kg dry weight	-	-	-	-	-	≤ 0.6
2.06	Acid neutralization capacity	mmol/kg	-	-	Shall be calculated for hazardous waste [7]	Shall be calculated for hazardous waste [7]	Shall be calculated	-
2.07	Extractable liphophilic substances in original substance	Mass%	-	≤ 0.1	≤ 0.4 [5]	≤ 0.8 [5]	≤ 4 [5]	-
2.08	Lead	mg/kg dry weight	-	-	-	-	-	≤ 140
2.09	Cadmium	mg/kg dry weight	-	-	-	-	-	≤ 1.0
2.10	Chromium	mg/kg dry weight	-	-	-	-	-	≤ 120
2.11	Copper	mg/kg dry weight	-	-	-	-	-	≤ 80

Table C7.T1. Allocation Criteria for Class 0, I, II, and III Landfills (continued)

1	2	3	4	5	6	7	8	9 [1]
No.	**Parameter**	**Unit**	**Geo-logical Barrier**	**Class 0**	**Class I**	**Class II**	**Class III**	**Recultivation Layer**
2.12	Nickel	mg/kg dry weight	-	-	-	-	-	≤ 100
2.13	Mercury	mg/kg dry weight	-	-	-	-	-	≤ 1.0
2.14	Zinc	mg/kg dry weight	-	-	-	-	-	≤ 300
3	**Leachate Criteria**							
3.01	pH-Value [8]		6.5 - 9	5.5 - 13	5.5 - 13	5.5 - 13	4 - 13	6.5 - 9
3.02	Disolved organic carbon (DOC) [9]	mg/L	-	≤ 50	≤ 50 [3, 10]	≤ 80 [3, 10, 11]	≤ 100	-
3.03	Phenol	mg/L	≤ 0.05	≤ 0.1	≤ 0.2	≤ 50	≤ 100	-
3.04	Arsenic	mg/L	≤ 0.01	≤ 0.05	≤ 0.2	≤ 0.2	≤ 2.5	≤ 0.01
3.05	Lead	mg/L	≤0.02	≤ 0.05	≤ 0.2	≤ 1	≤ 5	≤ 0.04
3.06	Cadmium	mg/L	≤ 0.002	≤ 0.004	≤ 0.05	≤ 0.1	≤ 0.5	≤ 0.002
3.07	Copper	mg/L	≤ 0.05	≤ 0.2	≤ 1	≤ 5	≤ 10	≤ 0.05
3.08	Nickel	mg/L	≤ 0.04	≤ 0.04	≤ 0.2	≤ 1	≤ 4	≤ 0.05
3.09	Mercury	mg/L	≤ 0.0002	≤ 0.001	≤ 0.005	≤ 0.02	≤ 0.2	≤ 0.0002
3.10	Zinc	mg/L	≤ 0.1	≤ 0.4	≤ 2	≤ 5	≤ 20	≤ 0.1
3.11	Chloride [12]	mg/L	≤ 10	≤ 80	≤ 1,500 [13]	≤ 1,500 [13]	≤ 2,500	≤ 10 [14]
3.12	Sulfate [12]	mg/L	≤ 50	≤ 100 [15]	≤ 2,000 [13]	≤ 2,000 [13]	≤ 5,000	≤ 50 [14]
3.13	Cyanid, easily releasable	mg/L	≤ 0.01	≤ 0.,01	≤ 0.1	≤ 0.5	≤ 1	-
3.14	Fluoride	mg/L	-	≤ 1	≤ 5	≤ 15	≤ 50	-
3.15	Barium	mg/L	-	≤ 2	≤ 5 [13]	≤ 10 [13]	≤ 30	-
3.16	Chromium, total	mg/L	-	≤ 0.05	≤ 0.3	≤ 1	≤ 7	≤ 0.03
3.17	Molybdenum	mg/L	-	≤ 0.05	≤ 0.3 [13]	≤ 1 [13]	≤ 3	-
3.18a	Antimony [16]	mg/L	-	≤ 0.006	≤ 0.03 [13]	≤ 0.07 [13]	≤ 0.5	-
3.18b	Antimony Co-Value [16]	mg/L	-	≤ 0.1	≤ 0.12 [13]	≤ 0.15 [13]	≤ 1.0	-
3.19	Selenium	mg/L	-	≤ 0.01	≤ 0.03 [13]	≤ 0.05 [13]	≤ 0.7	-
3.20	Total dissolved solids [12]	mg/L	≤ 400	≤ 400	≤ 3,000	≤ 6,000	≤ 10,000	-
3.21	Electrical conductivity	µS/cm	-	-	-	-	-	≤ 500

Table C7.T1. Allocation Criteria for Class 0, I, II, and III Landfills (continued)

[1] The use of soil material which originates from areas with naturally elevated contaminant levels in soils (or elevated contaminant levels in soil due to large human settlement) is permitted if this soil material does not exceed the background levels of the area, given that the function of the recultivation layer is not affected.

[2] 1.01 may be applied instead of 1.02.

[3] Exceeding the application criterion is permitted by the appropriate German authority for excavated soil (waste code 17 05 04 and 20 02 02) and for dredged material (waste code 17 05 06), if

a. the exceedance only goes back to natural components of the excavated material or dredged material,
b. other impurities do not exceed 5 percent by volume,
c. the DOC-value does not exceed 80 mg/L if disposed of together with waste containing gypsum,
d. exclusively non-hazardous waste is disposed of at landfills, landfill sections or separate sections of a landfill section,
e. public interest is not impaired.

[4] The allocation criterion does not apply to ashes from lignite firing, to waste or landfill replacement construction material from high temperature processes, such as waste from processing slags, unprocessed slag, dusts and sludge from scrubbing of exhaust gases from sinter plants, blast furnaces, shaft furnaces, and steel mills of the iron and steel industry. If such waste mentioned above is disposed of together with waste containing gypsum, the TOC-value does not exceed 5 percent by weight. Exceeding this TOC-value is permitted if the DOC-value does not exceed 80 mg/L.

[5] Does not apply to road rubble with an asphaltic basis.

[6] With PAH levels > 3 mg/kg, a column experiment shall be conducted to prove that the column leachate, at a ratio of 2:1 of liquid to solid, do not exceed 0.2 µg/L.

[7] Does not apply to asbestos-containing waste or waste containing other hazardous mineral fibers.

[8] Divergent pH-values do not necessarily constitute an exclusion criterion. In cases of higher or lower values, testing shall determine the reason for the divergence. However, if hazardous waste is disposed of at Class I and II landfills, the pH-value shall at least be 6.0.

[9] The allocation criterion for DOC shall also be considered to be in compliance if the waste or landfill replacement construction material complies with the allocation criterion not for its own pH-value, but for a pH-value between 7.5 and 8.0.

[10] Does only apply to waste and landfill replacement construction material based on gypsum if they are disposed of or used together with hazardous waste.

[11] The DOC in the leachate may be exceeded up to 100 mg/L, if no waste containing gypsum, and since 16 July 2005, exclusively non-hazardous waste or landfill replacement construction material is disposed of or used at landfills or landfill sections.

[12] 3.20 may be applied instead of 3.11 and 3.12, except in cases according to column 9 (recultivation layer).

[13] The allocation criterion does not apply, if, since 16 July 2005, exclusively non-hazardous waste or landfill replacement construction material is disposed of or used at landfills or landfill sections.

[14] Analysis not required for soil material without mineral impurities.

[15] Values in excess of the sulfate concentration, to no more than 600 mg/L, are permitted if the Co-Value of the percolation test does not exceed 1,500 mg/L at L/S = 0.1 L/kg.

[16] Values in excess of the antimony concentration according to 3.18a are permitted, if the Co-Value of the percolation test does not exceed the value according to 3.18b at L/S = 0.1 L/kg.

Table C7.T2. Monitoring Frequency

The site operator of Class 0, I, II, and III landfills has to conduct controls and measures according to No. 1-5 of this table, the site operator of a Class IV landfill has to conduct controls and measures according to No. 3 and 6 if these measures and controls are regulated. The persons responsible for inspections and measurements shall have the necessary technical expertise and qualification. Deviations from the scope and frequency of inspections may be determined at landfills or landfill sections only with the approval of the appropriate German authority.

No.	Measure/Control	Frequency of Measurements	
		Operation and Closure Phase	**Post-Closure Phase**
1	**Meteorological Data**		
1.1	Quantity of precipitation	Daily, stated as daily total	Daily, stated as monthly total
1.2	Temperature (min., max., 2 pm CET, 3 pm CEST)	Daily	Monthly average value
1.3	Wind direction and wind speed	Daily	Not necessary
1.4	Evaporation	Daily	Daily, stated as monthly total
2	**Emission Data**		
2.1	Quantity of leachate	Daily, stated as daily total	Every 6 months
2.2	Composition of leachate [1]	Quarterly	Every 6 months
2.3	Quantity and composition of surface water [1]	Quarterly	Every 6 months
2.4	Quantity and compositon of caught landfill gas (CH_4, CO_2, O_2, N_2, selected trace gases)	Landfill gas quantity – daily, stated as daily total; composition, once a month; selected tracer gases, once in 6 months	Landfill gas quantity weekly, stated as bi-annual total; composition once in 6 months
2.5	Efficiency monitoring of degassing [2]	Weekly resp. every 6 months	Every 6 months
2.6	Odor emissions	If necessary	If necessary
3	**Groundwater Data**		
3.1	Groundwater level	Every 6 months [3]	Every 6 months [3]
3.2	Groundwater quality/control of action level [4]	Quarterly	Every 6 months
4	**Data on Landfill Body**		
4.1	Settling conditions of the landfill body [5, 6]	Yearly	Yearly
4.2	Construction and composition of the landfill body [7]	Yearly	
5	**Sealing Systems**		
5.1	Deformation of the bottom liner system [6, 8]	Yearly	Yearly
5.2	Inspection of drainage lines and associated manholes by camera	Yearly	Yearly

Table C7.T2. Monitoring Frequency (continued)

No.	Measure/Control	Frequency of Measurements	
		Operation and Closure Phase	**Post-Closure Phase**
5.3	Temperatures in the landfill bottom liner system [9]	Site specific frequency	Site specific frequency
5.4	Efficiency and deformation of the surface sealing system [5, 6]	Yearly [2]	Yearly
5.5	Sealing control system	Quarterly	Quarterly
6	**Underground Storage** Altitude of the top of the filling column	Not applicable	Yearly [10]

[1] The parameters to be measured are set in the landfill approval. With the exception of the frequency of inspections, please consult your LEC for further monitoring requirements.

[2] Organoleptic controls have to be carried out on a weekly basis at remaining open landfill cells by the landfill operator. The landfill operator has to monitor the effectiveness of any degassing or the residual gas oxidation at temporarily or permanently covered or sealed landfill cells or landfills on a bi-annual basis via flame ionization detector, laser absorption spectrometry or by other equivalent methods on the landfill surface and at gas monitoring wells in the area around the landfill.

[3] Groundwater levels shall be measured at each round of groundwater sampling. The frequency shall be increased if groundwater levels fluctuate strongly.

[4] A reference measurement has to be carried out before the start of the deposition phase comprising at least the parameters of the expected leachate. After this first measurement, the parameters to be measured are based on the composition of the leachate and the groundwater quality. Please consult your LEC for further monitoring requirements.

[5] Settlement measurements have to be carried out at representative sections of the landfill.

[6] The results shall be comparable and representable as a time series of contour lines even if measurement methods are changed. If landfill settlement deviates significantly from the predictions, the causes have to be clarified and forecasts have to be corrected.

[7] Data for the status plan of the concerned landfill: surface covered with waste quantity and composition of waste, types of deposit, time and duration of depositing, calculation of remaining available capacity of the landfill.

[8] Trigonometric surveys of the drainage pipes of the drainage system or of pipes specially placed for this purpose.

[9] Continuous temperature profiles measured at the crown of the seepage pipe, up to 5 m coverage every 6 months, thereafter only by occurrence of incidents which may result in landfill fires or landfill aeration.

[10] A quinquennial inspection is considered sufficient after 20 years without incidents and findings.

Table C7.T3. Recovery Operations [1]

R1	Used principally as a fuel or other means to generate energy
R2	Solvent reclamation/regeneration
R3	Recycling/reclamation of organic substances that are not used as solvents (including composting and other biological transformation processes)
R4	Recycling/reclamation of metals and metal compounds
R5	Recycling/reclamation of other inorganic materials
R6	Regeneration of acids or bases
R7	Recovery of components used for pollution abatement
R8	Recovery of components from catalysts
R9	Oil re-refining or other reuses of oil
R10	Land treatment resulting in benefit to agriculture or ecological improvement
R11	Use of wastes obtained from any of the operations numbered R1 to R10
R12	Exchange of wastes for submission to any of the operations numbered R1 to R11
R13	Storage of wastes pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection and on the site where it is produced)

Note:

[1] List of recovery operations as they occur in practice. Waste shall be recycled without endangering human health and without the use of processes or methods likely to harm the environment.

Table C7.T4. Disposal Operations [1]

D1	Deposit into or onto land (e.g., landfill, etc.)
D2	Land treatment (e.g., biodegradation of liquid or sludgy discards in soils, etc.)
D3	Deep injection (e.g., injection of pumpable discards into wells, salt domes, or naturally occurring repositories, etc.)
D4	Surface impoundment (e.g., placement of liquid or sludgy discards into pits, ponds, or lagoons, etc.)
D5	Specially engineered landfill (e.g., placement into lined discrete cells, which are capped and isolated from one another and the environment, etc.)
D6	Release into a water body, except seas/oceans
D7	Release into seas/oceans, including seabed insertion
D8	Biological treatment not specified elsewhere in this table that results in final compounds or mixtures that are discarded by means of any of the operations numbered D1 to D12
D9	Physical and/or chemical treatment not specified elsewhere in this table that results in final compounds or mixtures that are discarded by means of any of the operations numbered D1 to D12 (e.g., evaporation, drying, calcination, etc.)
D10	Incineration on land
D11	Incineration at sea
D12	Permanent storage (e.g., emplacement of containers in a mine, etc.)
D13	Blending or mixing before application of any of the operations numbered D1 to D12
D14	Reconditioning before application of any of the operations numbered D1 to D13
D15	Storage pending any of the operations numbered D1 to D14 (excluding temporary storage pending collection at the site of origin)

Note:

[1] This table is intended to list disposal operations such as they occur in practice. Waste shall be disposed of without endangering human health and without the use of processes or methods likely to harm the environment.

Table C7.T5. Categorization of Waste Meat, Animal Parts and By-products

Category 1	**Category 2**	**Category 3**
(a) entire bodies and all body parts, including hides and skins, of the following animals: (i) animals suspected of being infected by a transmissible spongiform encephalopathy (TSE) or in which the presence of a TSE has been officially confirmed; (ii) animals killed in the context of TSE eradication measures; (iii) animals other than farmed and wild animals, including in particular pet animals, zoo animals and circus animals; (iv) animals used for experiments (v) wild animals, when suspected of being infected with diseases communicable to humans or animals;	(a) manure, non-mineralized guano and digestive tract content;	(a) carcasses and parts of animals slaughtered or, in the case of game, bodies or parts of animals killed, and which are fit for human consumption, but are not intended for human consumption for commercial reasons;
(b) the following material: (i) specified risk material; (ii) entire bodies or parts of dead animals containing specified risk material at the time of disposal;	(b) animal by-products collected during the treatment of waste water required by implementing rules for conditions and technical requirements for the handling, treatment, transformation, processing and storage of animal by-products or derived products and conditions for treatment of waste water: (i) from establishments or plants processing Category 2 material; or (ii) from slaughterhouses other than those covered in Category 1 (e);	(b) carcasses and the following parts originating either from animals that have been slaughtered in a slaughterhouse and were considered fit for slaughter for human consumption following an ante-mortem inspection or bodies and the following parts of animals from game killed for human consumption: (i) carcasses or bodies and parts of animals which are rejected as unfit for human consumption, but which did not show any signs of disease communicable to humans or animals; (ii) heads of poultry; (iii) hides and skins, including trimmings and splitting thereof, horns and feet, including the phalanges and the carpus and metacarpus bones, tarsus and metatarsus bones, of: - animals, other than ruminants requiring TSE testing, and - ruminants which have been tested with a negative result for bovine spongiform encephalopathy (BSE) and scrapie; (iv) pig bristles; (v) feathers;

Table C7.T5. Categorization of Waste Meat, Animal Parts and By-products (continued)

Category 1	**Category 2**	**Category 3**
		(c) animal by-products from poultry and lagomorphs slaughtered on the farm, and which did not show any signs of disease communicable to humans or animals;
	(d) products of animal origin which have been declared unfit for human consumption due to the presence of foreign bodies in those products;	(d) blood of animals which did not show any signs of disease communicable through blood to humans or animals obtained from the following animals that have been slaughtered in a slaughterhouse after having been considered fit for slaughter for human consumption following an ante-mortem inspection: (i) animals other than ruminants requiring TSE testing; and (ii) ruminants which have been tested with a negative result for BSE and scrapie;
(e) animal by-products collected during the treatment of waste water required by implementing rules for conditions and technical requirements for the handling, treatment, transformation, processing and storage of animal by-products or derived products and conditions for treatment of waste water: (i) from establishments or plants processing Category 1 material; or (ii) from other establishments or plants where specified risk material is being removed;		(e) animal by-products arising from the production of products intended for human consumption, including degreased bones, greaves and centrifuge or separator sludge from milk processing;
(f) catering waste from means of transport operating internationally;	(f) animals and parts of animals, other than those classified as Category 1 or Category 3: (i) that died other than by being slaughtered or killed for human consumption, including animals killed for disease control purposes; (ii) foetuses; (iii) oocytes, embryos and semen which are not destined for breeding purposes; and (iv) dead-in-shell poultry;	(f) products of animal origin, or foodstuffs containing products of animal origin, which are no longer intended for human consumption for commercial reasons or due to problems of manufacturing or packaging defects or other defects from which no risk to public or animal health arise;

Table C7.T5. Categorization of Waste Meat, Animal Parts and By-products (continued)

Category 1	**Category 2**	**Category 3**
(g) mixtures of Category 1 material with either Category 2 material or Category 3 material or both.	(g) mixtures of Category 2 material with Category 3 material;	(g) pet food and animal feed of animal origin, or animal feed containing animal by-products or derived products, which are no longer intended for feeding for commercial reasons or due to problems of manufacturing or packaging defects or other defects from which no risk to public or animal health arises;
	(h) animal by-products other than Category 1 material or Category 3 material.	(h) blood, placenta, wool, feathers, hair, horns, hoof cuts and raw milk originating from live animals that did not show any signs of disease communicable through that product to humans or animals;
		(i) aquatic animals, and parts of such animals, except sea mammals, which did not show any signs of disease communicable to humans or animals;
		(j) animal by-products from aquatic animals originating from establishments or plants manufacturing products for human consumption;
		(k) the following material originating from animals which did not show any signs of disease communicable through that material to humans or animals: (i) shells from shellfish with soft tissue or flesh; (ii) the following originating from terrestrial animals: - hatchery by-products, - eggs, - egg by-products, including egg shells, (iii) day-old chicks killed for commercial reasons;
		(l) aquatic and terrestrial invertebrates other than species pathogenic to humans or animals;
		(m) animals and parts thereof of the zoological orders of Rodentia and Lagomorpha, except Category 1 material classified as (a) (iii), (iv) and (v) and Category 2 material classified as (a) to (g);

Table C7.T5. Categorization of Waste Meat, Animal Parts and By-products (continued)

Category 1	**Category 2**	**Category 3**
		(n) hides and skins, hooves, feathers, wool, horns, hair and fur originating from dead animals that did not show any signs of disease communicable through that product to humans or animals, other than those classified as Category 3 (b);
		(o) adipose tissue from animals which did not show any signs of disease communicable through that material to humans or animals, which were slaughtered in a slaughterhouse and which were considered fit for slaughter for human consumption following an ante-mortem inspection;
		(p) catering waste other than as classified as Category 1 (f).

Table C7.T6. Required Parameters and Limit Values for the Application to Soils

Parameter	**Limit Values [1]**			
	Agricultural Application			
	Compost Material [2]		**Sewage Sludge**	**Sewage Sludge Compost [3]**
	Up to 20 metric tons within 3 years	**Up to 30 metric tons within 3 years**	**Up to 5 metric tons within 3 years**	**Up to 10 metric tons within 3 years**
Lead	150	100	900	450
Cadmium	1.5	1	10	5
Chromium, total	100	70	900	450
Copper	100	70	800	400
Nickel	50	35	200	100
Mercury	1	0.7	8	4
Zinc	400	300	2,500	1,250
pH-Value	na	na	≥ 5	≥ 5
PCBs	na	na	0.2	0.1
PCDD/PCDF	na	na	100	50
AOX	na	na	500	

Notes:

[1] All values in mg/kg of dry mass, except for PCDD/PCDF (polychlorinated dibenzodioxins/dibenzofurans) (ng/kg)

[2] Finished compost material consisting of organic material (plant waste, biodegradable waste, wood, etc.), which is produced by rotting under aerobic or anaerobic conditions.

[3] Finished compost material consisting of sewage sludge and organic material, which is produced by rotting under aerobic or anaerobic conditions.

Table C7.T7. Required Parameters and Limit Values for the Application to Light Soils [1]

Parameter	**Limit Values [2]**	
	Sewage Sludge	**Sewage Sludge Compost**
Cadmium	5	2.5
Zinc	2,000	1,000

Notes:

[1] Soils that have been classified as light soils and that have a clay content of < 5 percent or a pH-value of > 5 and < 6.

[2] All values in mg/kg of dry mass.

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. CJD. Creutzfeldt Jakob Disease, a degenerative neurological disorder in humans (brain disease) that is incurable and invariably fatal.

C8.2.2. CPB. Chemico-physical waste treatment facility (*chemisch-physikalische Abfallbehandlung/chemisch-physikalische Behandlungsanlage*).

C8.2.3. Disposal. Generally term used for off-post transportation of waste for treatment, recycling, reuse, recovery, or permanent disposal.

C8.2.4. Hazardous Waste. See Chapter 6, "Hazardous Waste," C6.2. Definitions.

C8.2.5. HMV. Incineration facility for household waste *(Hausmüllverbrennungsanlage)*.

C8.2.6. 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.

C8.2.7. Infectious Medical Waste. Waste from human or animal health care and/or related research requiring special collection and disposal because it has the potential for causing disease in humans or other living organisms and may pose a risk to both individuals or community health if not managed properly. These wastes are defined by the six-digit USEUCOM Waste List (EWL) codes 18 01 03* and 18 02 02* required for offsite transport and disposal (see Table C8.T1.). Infectious medical waste includes the following classes:

C8.2.7.1. 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.

C8.2.7.2. 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.

C8.2.7.3. 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.

C8.2.7.4. 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.

C8.2.7.5. Sharps, including hypodermic needles, cannula of syringes and/or infusion systems, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, Pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste as well as objects with similar risks of cuts and stab wounds.

C8.2.7.6. Infectious waste from isolation rooms, but including only 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.

C8.2.8. Medical Waste. Wastes from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care). Medical waste is defined by the EWL code (18 XX XX) required for offsite transport and disposal.

C8.2.9. Noninfectious Medical Waste. Solid waste from human or animal health care and/or related research determined to be incapable of causing disease in humans or which has been treated to render it noninfectious, as defined by EWL codes: 18 01 01, 18 01 02, 18 01 04, 18 01 06*, 18 01 07, 18 01 08*, 18 01 09, 18 01 10*, 18 02 01, 18 02 03, 18 02 05*, 18 02 06, 18 02 07*, 18 02 08 (see Table C8.T1.). Those denoted by an asterisk (*) are hazardous waste.

C8.2.10. SAV. Incineration facility for HW *(Sonderabfallverbrennungsanlage)*.

C8.2.11. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

C8.2.12. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious or other hazardous medical 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.

C8.2.13. TSE. Transmissible Spongiform Encephalopathy is a prion disease affecting brain and nervous system of humans and animals.

C8.2.14. United States European Command (USEUCOM) Waste List (EWL). See Chapter 6, "Hazardous Waste," C6.2. Definitions.

C8.2.15. Waste Officer. See Chapter 7, "Solid Waste," C7.2. Definitions.

C8.3. CRITERIA

C8.3.1. Medical waste will be separated by EWL code, if practical, from other solid waste at the point of origin.

C8.3.2. Mixtures of infectious medical wastes and other hazardous waste (as defined in Chapter 6, "Hazardous Waste") will be handled as infectious hazardous waste under DoD 4160.21-M, "Defense Materiel Disposition Manual," and are the responsibility of the generating

DoD component. Priority will be given to the hazard that presents the greatest risk. Defense Logistics Agency (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 HW in accordance with Chapter 6, "Hazardous Waste," 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. Receptacles for the Collection of Medical Waste.

C8.3.6.1. Receptacles for the collection of all medical waste shall be chosen according to disposal requirements and have to be transport-proof, moisture proof, and securely lockable.

C8.3.6.2. If reutilization receptacles are used in combination with bags (e.g., for waste with high liquid content), they shall be easy to clean and disinfect in accordance with criterion C8.3.17.

C8.3.6.3. Infectious and noninfectious waste categorized according to EWL codes 18 01 01, 18 01 02, 18 01 03*, 18 01 04, 18 01 08*, 18 02 01, 18 02 02*, 18 02 03 and 18 02 07* shall not be resorted nor transferred into another receptacle. The respective receptacles shall not be reopened.

C8.3.6.4. Infectious medical waste (EWL codes 18 01 03* and 18 02 02*) will be segregated, transported, and stored in disposable bags or receptacles a minimum of 0.0762 mm (3 mils) thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use. Bags shall not be recycled.

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 German ("*Biogefährdung*"), and will include markings that identify the generator, date of generation, and the contents. For additional labeling criteria refer to Chapter 7, "Solid Waste."

C8.3.8. Sharps will only be discarded into rigid, puncture-resistant and securely closable receptacles that shall be securely stored, transported and disposed without access by unauthorized personnel. Receptacles will not be recycled nor opened to recycle or sort the content. Sharps will not be clipped, cut, bent, or recapped before disposal.

C8.3.9. Infectious medical waste will be transported and stored to minimize human and environmental 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. Infectious medical waste containing body parts, organ waste or TSE pathogens will not be converted into noninfectious medical waste and thus will not be compacted, but shall be incinerated without any prior treatment. Containers holding sharps will not be compacted.

C8.3.11. Anatomical Pathology Waste.

C8.3.11.1. 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 by burial in a designated area after being treated for disposal by incineration or cremation.

C8.3.11.2. Noninfectious wastes containing animals and animal parts shall be collected, transported and disposed of by incineration in an approved incineration facility. Exceptions may be made for pets which may be buried in designated areas or private properties under at least 50 cm (1.6 ft) of soil. The burial site shall not be located in a water protection area or in the vicinity of public places.

C8.3.12. Handling of Blood, Blood Products, and other Liquid Wastes.

C8.3.12.1. Bulk blood and blood products shall be handled in accordance with C8.3.6., C8.3.7. and C8.3.17. Emptied containers that contained infectious material will continue to be managed as infectious medical waste.

C8.3.12.2. Suction canister waste from operating rooms will be treated like bulk blood or blood products (refer to C8.3.12.1.) considering the infectious status of the waste.

C8.3.13. All personnel handling infectious medical waste will wear appropriate protective equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

C8.3.14. Storage Criteria. Infectious medical waste that cannot be treated onsite or other organic medical waste, will be managed as follows:

C8.3.14.1. Waste containing organic compounds (i.e., EWL codes 18 01 02, 18 01 03* and 18 02 02*) shall be transported once a day from the place of origin to an internal central storage location.

C8.3.14.2. Infectious medical waste (i.e., EWL codes 18 01 03* and 18 02 02*) and other organic medical waste (i.e., EWL code 18 01 02) will be maintained in a nonputrescent state using refrigeration as necessary and shall be stored in a manner to prevent gas generation in the waste container. Specifically, storage temperatures shall be maintained below 15°C (59°F) and storage is allowable only for a maximum period of 7 days. The period of storage may be extended if the storage temperature is maintained below 8°C (46.4°F) and the hygiene officer at the medical facility agrees with the extended storage period. Medical waste of EWL code 18 01 02 may be stored at a medical facility for a maximum period of 6 months if it is deep frozen, i.e., storage temperatures are maintained below -18°C (0°F).

C8.3.14.3. Infectious medical waste with multiple hazards (i.e., infectious radioactive waste) will be segregated at the point of origin from the general infectious waste stream when additional or alternative treatment is required.

C8.3.15. Storage Sites. Storage sites must meet the following criteria:

C8.3.15.1. All collected medical waste shall be stored at an internal central location that is specifically designated for that function.

C8.3.15.2. The central medical waste storage location shall be designed and constructed to prevent entry of insects, rodents, and other pests.

C8.3.15.3. The central medical waste storage location shall be lockable to prevent access by unauthorized personnel.

C8.3.15.4. The central medical waste storage location shall be marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and German *("Biogefährdung").*

C8.3.16. Handling of Medical Waste.

C8.3.16.1. Internal transfer of wastes to a central storage or transfer site shall occur in a hygienic manner. Receptacles shall not be contaminated on the outside.

C8.3.16.2. Internal collection and transportation systems shall be compatible with the external transportation and disposal procedures.

C8.3.16.3. Containers used for the internal transfer of infectious medical waste shall meet criteria C8.3.6. and C8.3.7.

C8.3.16.4. Bags and receptacles containing infectious medical waste must be placed into rigid or semi-rigid, leakproof containers before being transported offsite. Packaging for offsite transportation shall meet HN requirements. Offsite transportation of medical waste originating from US Army installations in Germany shall comply with provisions outlined in AER 55-50. Transportation of medical waste originating from USAFE installations in Germany shall comply with USAFEI 23-104. For movements through the Defense Transportation System (DTS) follow ECM 4504.01 and DoD 4500.9 R Part II, CH 203,204 and 205. Contact a dangerous goods advisor for advice.

C8.3.17. Treatment and Disposal Criteria. Medical waste shall be treated and disposed of in general accordance with Table C8.T1. "Appropriate Waste Disposal Paths." Infectious medical waste must be treated in accordance with Table C8.T1.and Table C8.T2. "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 29 psi (2 bar). The standard procedure should be steam sterilization at 134°C (273°F).

C8.3.17.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips and/or an equivalent biological performance test as required by the manufacturer of the applied device.

C8.3.17.3. Infectious medical waste (EWL codes 18 01 03* and 18 02 02*) may only be treated using disinfecting methods and substances that are approved and published by the Robert Koch-Institute. Disinfecting devices shall meet the requirements of the Robert Koch-Institute. Disinfection of infectious medical waste is only permitted if the waste contains no organ parts, body parts nor TSE pathogens. The operation shall be documented.

C8.3.17.4. Chemical disinfection must be conducted using procedures and substances approved by appropriate DoD medical authority and Robert Koch- Institute for use on any pathogen or infectious agent. Chemical disinfection is not permitted as a means of treatment for infectious medical waste of EWL codes 18 01 03* and 18 02 02*.

C8.3.17.5. Infectious medical waste (EWL codes 18 01 03* and 18 02 02*) may not be crushed or compacted before sterilization or disinfection.

C8.3.17.6. Medical waste treatment equipment for crushing, compaction, or disinfection shall be operated away from patients and supply areas.

C8.3.17.7. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature of 850°C (1,562°F). Hazardous waste containing > 1% w/w organohalogen substances requires a minimum temperature of 1,100°C (2,012°F). For both operations, the minimum temperature shall be maintained for 2 seconds even under disadvantageous conditions. Homogenous mixing is presumed to be part of the standard operating conditions for the incinerator except when incinerating infectious waste. All treatments including mixing of infectious medical waste are prohibited before incineration. Infectious medical waste shall be handled with respect to pollution control, occupational safety, epidemic hygiene and public safety. Incinerators must also meet applicable criteria in Chapter 2, "Air Emissions," Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

C8.3.17.8. All ash and/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." Incineration residue that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be classified and disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

C8.3.18. Contingency Plans. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

C8.3.19. Medical Waste Spills. 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 subparagraph C8.3.17.4.

C8.3.20. Recordkeeping.

C8.3.20.1. Installations will keep a registry for records of the following information concerning infectious medical waste. Installations operating a disposal facility will register this information concerning all types of medical waste:

C8.3.20.1.1. Origin of waste;

C8.3.20.1.2. Type of waste (in accordance with the EWL);

C8.3.20.1.3. Amount of waste (volume or weight);

C8.3.20.1.4. Preparation for recycling or disposal including any treatment (with respective date);

C8.3.20.1.5. Destination with name and address;

C8.3.20.1.6. Frequency of collection;

C8.3.20.1.7. Type of transport;

C8.3.20.1.8. Type of recycling or disposal, including date of disposition, and if the waste was transferred to German facilities, receipts acknowledging paragraphs C8.3.20.1.1. - C8.3.20.1.7. for each transfer.

C8.3.20.1.9. Registries for hazardous wastes shall be stored electronically. Electronic registers shall store receipts and data permanently and chronologically. Requirements for recordkeeping and documentation of the disposal path (the electronic proof procedure) are outlined in Chapter 6, "Hazardous Waste" for hazardous waste including infectious medical waste (see C6.3.1.4.2.) and Chapter 7, "Solid Waste" for non-hazardous medical waste (see C7.3.15.).

C8.3.21. Additional Medical Waste Criteria.

C8.3.21.1. Dental liquid wastes containing amalgam shall be discharged into public sewer lines only if a discharge license has been issued by the appropriate German authority. Procedures for obtaining licenses are addressed in Chapter 1, "Overview." The amalgam load of the dental wastewater shall be reduced at the place of origin by 95% through the use of amalgam separators. Amalgam-containing wastes shall be segregated, recycled or disposed of in accordance with Chapter 6, "Hazardous Waste."

C8.3.21.2. Outdated Medications, Unconsumed X-ray Contrast Media and Chemotherapy Drugs.

C8.3.21.2.1. Medications and x-ray contrast media (EWL codes 18 01 09 and 18 02 08) shall be collected and handled separately from other wastes in order to prevent misuse. These drugs shall be disposed of by incineration.

C8.3.21.2.2. Carcinogenic, mutagenic and teratogenic medicinal products including cytotoxics and cytostatics (EWL codes 18 01 08* and 18 02 07*) are classified as hazardous waste and shall be segregated from other (outdated) drugs and be disposed of by incineration.

C8.3.21.3. The medical facility shall appoint a waste officer who is responsible for the implementation and surveillance of all regulations concerning waste management. The officer shall be responsible for the instruction of all employees handling wastes.

Table C8.T1. Appropriate Waste Disposal Paths

EWL Code	Description	Components	Collection/Storage	Disposal	Note
18 01 01 (& 18 02 01)	Sharps (except waste classified as 18 01 03*)	• Scalpel, cannula of syringes and infusion systems • Objects with similar risks of cuts and stab wounds	• Collection at the point of generation in puncture-resistant and rigid one-way receptacles • No transfer/decanting, sorting, or pretreatment	• No sorting • Disposal together with waste classified as 18 01 04	
18 01 02	Body parts and organ wastes including blood bags and preserved blood (except waste classified as 18 01 03*; does not include extracted teeth)	• Body parts, organ wastes, blood bags, receptacles containing blood or liquid blood products	• Separate collection at the point of generation • No mixing with municipal wastes • No transfer/decanting, sorting, or pretreatment • Collection in appropriate, securely locked, puncture-resistant, and rigid one-way containers (suitable for incineration) • Limited storage duration to prevent aerosis	• Separate disposal: SAV • respecting hygiene and infection prevention and considering local wastewater regulations, single blood bags may be decanted into the sewer system	
18 01 03* (& 18 02 02*)	Waste that requires special collection and disposal due to its infectious status also sharps, body parts, and organ wastes from patients with respective diseases	• Waste with adhered blood, secretion or excretion or waste containing (liquid) blood • Containers filled with blood or secretion, waste from surgeries soaked with blood or secretion, used dialysis systems from treatments of virus carriers	• Collection at the point of generation in waterproof, leakproof, and tear-proof receptacles • Package in appropriate, securely locked, puncture-resistant, and rigid one-way containers (suitable for incineration, design approved) • No transfer/decanting or sorting	• No reuse • No crushing or compacting • Disposal: SAV; or, after disinfection: HMV • Disposal: SAV (record of proper waste management required); or, after disinfection like waste classified as 18 01 04;	

Table C8.T1. Appropriate Waste Disposal Paths (continued)

EWL Code	Description	Components	Collection/Storage	Disposal	Note
		• Microbiological cultures from, e.g., institutes for hygiene, microbiology and virology, medical laboratories/practices with respective activities	• Limited storage durations to prevent aerosis	Attention: no treatment allowed for certain pathogens (CJD, TSE)!	
18 01 04 (& 18 02 03)	Waste that requires no special collection and disposal due to its noninfectious status (except waste classified as 18 01 03*) (e.g., wound dressings, plaster casts, linen, disposable clothing, diapers)	• Waste with adhered blood, secretion or excretion like wound dressings, plaster casts, diapers, disposable linen or articles (e.g., syringes), etc. • Waste slightly contaminated with cytostatica, like swabs, disposable sleeves, gloves, respirators, disposable gowns, plastic/paper material, floor cloths, empty cytostatica containers after appropriate use, air filters, and other slightly contaminated material from work banks • NOT: separately collected non-contaminated paper, glass, synthetics (attribution to other EWL codes)	• Collection in waterproof, leakproof and tear proof receptacles • Internal transportation in appropriate, securely locked, puncture-resistant, and rigid one-way containers (suitable for incineration), or in combination with reutilization receptacles that are easy to clean and disinfect • No transfer/decanting, sorting or pretreatment	• Disposal: HMV or other thermal utilization • Respecting hygiene and infection prevention and considering local wastewater regulations, receptacles containing body fluids may be decanted into the sewer system; or • Measures to prevent spills have to be applied	Waste is a mixture of many different wastes; other non-dangerous waste may be included if small quantities do not justify the financial expenses for a distinct disposal. If waste is collected and disposed by the public disposer, a separate declaration is not necessary
18 01 06* (& 18 02 05*)	Chemicals consisting of or containing dangerous substances	• Acids, lyes, halogenated and other solvents, inorganic and organic laboratory chemicals including remaining quantities of diagnostic agents, fixing bathes, developing agents, disinfecting and cleaning agent concentrates, non-empty	• No mixing of separately generated chemical wastes in large amounts; instead use separate collection and disposal procedures according to their individual EWL code • Preferably separate collection according to the individual	• Disposal: SAV, CBP; • Record of proper waste management required	Do not mix greater quantities of separately generated chemical wastes, but collect and dispose these wastes separately according to the respective EWL code

Table C8.T1. Appropriate Waste Disposal Paths (continued)

EWL Code	Description	Components	Collection/Storage	Disposal	Note
		pressurized gas containers, methanal solutions	EWL code: 06 01 06*, acids 06 02 05*, lyes 07 01 03*, halogenated solvents 07 01 04*, other organic solvents 09 01 01*, developing agents based on water 09 01 03*, developing agents based on solvents 09 01 04*, fixing bathes 09 01 05*, bleaching solvents 16 05 06*, laboratory chemicals consisting of or containing hazardous substances 16 05 07*, used inorganic chemicals containing hazardous substances 16 05 08*, used organic chemicals consisting of or containing hazardous substances • Larger waste amounts with dangerous contamination: 15 02 02*, filter material, wipes, protective clothes contaminated with dangerous substances • Collection and storage in locked containers, approved for shipment. • Storage sites with sufficient ventilation.		

Table C8.T1. Appropriate Waste Disposal Paths (continued)

EWL Code	Description	Components	Collection/Storage	Disposal	Note
18 01 07 (& 18 02 06)	Chemicals other than those mentioned in 18 01 06*	• E.g., cleaning agents, disinfecting agents for hands, used soda lime • Waste from diagnostic devices that are not attributed to EWL code 18 01 06* due to small quantities of chemical concentrations	• Separate collection of the different waste types according to their EWL code • Collection and storage in locked containers approved for shipment • Storage sites with sufficient ventilation	• Disposal according to the waste composition	Do not mix greater quantities of separately generated chemical wastes, but collect and dispose these wastes separately according to the respective EWL code
18 01 08* (& 18 02 07*)	Cytotoxic cytostatic medical products (wastes with low contamination are assigned to EWL code 18 01 04)	• Expired medication or • Not-emptied original containers, • Residue of dry substance and broken tablets, • Medical devices containing notable contaminated material (> 20 mL); • Material contaminated during preparation or application	• Collection and package in approved, puncture-resistant, and rigid one-way receptacles • No transfer and sorting • No pretreatment • Storage and shipment within appropriate, securely locked containers	• Disposal: SAV • record of proper waste management required	
18 01 09 (& 18 02 08)	Medicines other than those mentioned in 18 01 08* (including expired medication and unconsumed x-ray contrast media)	• Expired medication • X-ray contrast media • Infusion solution	• Separate gathering • Limited accessibility to storage site to prevent misuse	• Preferable disposal: HMV, SAV • Small amounts may be disposed together with waste classified as EWL code 18 01 04	!Attention! Medical facility may be hold responsible for carelessness in cause of misuse!
18 01 10*	Amalgam waste from dental care (amalgam from amalgam separators, amalgam residual,	• Amalgam (mercury) • Extracted teeth containing amalgam • Content of amalgam separators	• Separate collection • Periodic disposal	• Material recycling by the manufacturer or distributor of amalgam products, or an authorized recycler	

Table C8.T1. Appropriate Waste Disposal Paths (continued)

EWL Code	Description	Components	Collection/Storage	Disposal	Note
	extracted teeth containing amalgam)				
15 01 XX	Packaging (including separately collected municipal packaging waste)	Packaging consisting of: • paper • cardboard • plastic • glass • wood • metal • composite material	• Separate collection of each waste type according to the individual EWL code: 15 01 01, paper and cardboard packaging 15 01 02, plastic packaging 15 01 03, wooden packaging 15 01 04, metallic packaging 15 01 05, composite packaging 15 01 06, mixed packaging 15 01 07, glass packaging 15 01 10*, packaging containing residues of hazardous substances or are contaminated by hazardous substances • For packaging of cytotoxic cytostatic medications, see EWL code 18 01 08*	• Disposal via distributors redemption systems (e.g., Dual System Germany – DSD) • Recycling of non-contaminated wastes • Collection and disposal as waste classified as 15 01 10*; record of proper waste management required	• Similar wastes, that do not originate from packaging are classified as 20 01 XX. If the disposer agrees, these wastes may be disposed together with packaging waste

Notes:

*	The asterisk next to the 6-digit EWL code points out that the waste is considered hazardous.
CPB	Chemico-physical waste treatment facility
HMV	Incineration facility for household waste
SAV	Incineration facility for HW
CJD	Creutzfeldt Jakob Disease
TSE	Transmissible Spongiform Encephalopathy

Table C8.T2. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	Method of Treatment	Method of Disposal
Microbiological	Steam sterilization [1] & Incineration (HMV)	MSWLF [2]
	Incineration (SAV)	MSWLF
Pathological	Incineration [3] (SAV)	MSWLF
	Cremation [3]	Burial
	Steam sterilization [4] & Incineration (HMV)	DWTP [5]
Bulk blood & suction canister waste	Steam sterilization [6] & Incineration (HMV)	MSWLF
	Incineration [6] (SAV)	MSWLF
Sharps in sharps containers	Steam sterilization & Incineration (HMV)	MSWLF
	Incineration (SAV)	MSWLF

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 before disposal.

[4] This applies only to placentas, small organs, and small body parts that may be steam-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.

HMV Incineration facility for household waste (*Hausmüllverbrennungsanlage*)
SAV Incineration facility for hazardous waste (*Sonderabfallverbrennungsanlage*)
MSWLF Municipal solid waste landfill
DWTP Domestic wastewater treatment plant

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CHAPTER 9 – PETROLEUM, OIL AND LUBRICANTS

C9.1. SCOPE

This chapter provides criteria to control and abate pollution resulting from the storage, transport, and distribution of petroleum products. Criteria for underground storage tanks (USTs) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are in Chapter 18, "Spill Prevention and Response Planning." Germany classifies all POL (except animal fats and vegetable oil) as a hazardous material; therefore, the criteria addressed in Chapter 5, "Hazardous Material" also apply to all POL. Procedures for obtaining permits or other authorizations are addressed in Chapter 1, "Overview" of these FGS.

C9.2. DEFINITIONS

C9.2.1. Aboveground Storage Tank *(Oberirdische Tankanlage)*. Any stationary POL storage container that does not meet the definition for an underground storage tank, and all mobile POL storage containers with capacities > 208 liters (55 gallons).

C9.2.2. Dispensing Device *(Abgabeeinrichtung)*. Parts of POL facilities used for the filling of fuel containers such as pumps or pump systems. Pumps may be manual or automatic.

C9.2.3. Expert *(Sachverständiger)*. See Chapter 5, "Hazardous Material,"C5.2. Definitions.

C9.2.4. Filling Station *(Tankstelle)*. Facilities designed for fueling aircraft, vessels, or motor vehicles with flammable, highly flammable, or extremely flammable substances. Associated storage tanks or containers are considered part of the filling station. Stationary POL facilities or facilities used temporarily in a stationary manner where vehicles are fueled (e.g., tanker trucks used for the dispensing of fuel).

C9.2.5. Loading/Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

C9.2.6. Loading/Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

C9.2.7. 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.

C9.2.8. POL. Refined POL, 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.

C9.2.9. Piping *(Rohrleitungen)*. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C9.2.10. POL Facility. Independent, stationary or quasi-stationary units, including POL filling facilities *(Abfüllanlagen)*, POL storage facilities, POL using facilities, hard stands, and oil-water separators, regardless of the volume of POL. The temporary storage of POL products in

areas not normally designated for this purpose (i.e., materials in transit) is not covered by this definition.

C9.2.11. Private-Use Filling Stations. A DoD-operated filling station. Filling stations that annually dispense > 40,000 liters (10,567 gallons) in Hessen are excluded from this definition.

C9.2.12. Secondary Containment *(Auffangvorrichtung)*. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C9.2.13. Underground Storage Tank. See Chapter 19, "Underground Storage Tanks," C19.2. Definitions.

C9.2.14. Water-Endangering Substances. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C9.3. CRITERIA

C9.3.1. Applicability. The below criteria apply at all POL facilities as defined in paragraph C9.2.10.

C9.3.2. General POL Storage Tank Criteria.

C9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage tanks in accordance with recognized industry standards.

C9.3.2.2. Secondary Containment. POL storage tanks must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank, or 10% of the total content of all tanks, whichever is greater, plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage tanks that are equipped with a leak-detection device and 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.

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. Containment areas shall not have drain outlets unless permitted by the appropriate German authority in accordance with Chapter 1, "Overview." Drainage of stormwater from containment areas will be controlled by a valve that is locked closed when not in active use. Stormwater will be inspected for petroleum sheen before being removed from containment areas. If a petroleum sheen is present, it must be collected with sorbent materials before removal or treated using an oil-water separator. Disposal of sorbent material 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 tanks shall be periodically inspected in accordance with recognized industry standards. See Chapter 5, "Hazardous Material," for additional criteria for piping systems.

C9.3.3. Additional POL Storage Tank Criteria.

C9.3.3.1. Testing. Buried piping associated with POL storage tanks shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or

replacement. Buried piping must be protected against corrosion in accordance with recognized industry standards.

C9.3.3.2. Storage Tank Design. POL storage tanks shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

C9.3.4. Storage Tank Wastes. POL container cleaning wastes frequently have hazardous characteristics (as provided in Chapter 5, "Hazardous Material," Table C5.T1.) 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, "Hazardous Waste," unless sampling and testing confirms the waste does not exhibit HW characteristics.

C9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, "Hazardous Waste," unless sampling and testing determine that the waste does not exhibit HW characteristics.

C9.3.5. General Transport, Distribution, and Storage 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 railcar 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, weirs, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL.

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.

C9.3.5.2.2. Offsite Pipelines. All pipelines extending beyond the installation boundary shall comply with the criteria included in the permit for the pipeline.

C9.3.5.3. POL Storage Facilities.

C9.3.5.3.1. The permitting, inspection and testing criteria for facilities storing water-endangering substances included in Chapter 5, "Hazardous Material," shall apply to POL storage facilities, including all above- and belowground valves, piping, and appurtenances. Pipeline facilities shall also be installed and inspected as outlined in Chapter 5, "Hazardous Material."

C9.3.5.3.2. In Hessen, heating oil tanks *(Heizölverbraucheranlagen)* with a capacity of > 1,000 liters (264 gallons) and ≤ 10,000 liters (2,642 gallons) used exclusively for heating and not located in water protection zones (see Chapter 3, "Drinking Water") are exempt from the criterion to conduct inspections before starting facility operations after substantial modification of a facility and after repairing damages identified by an expert *(Sachverständiger)* if the facility was constructed or modified by a licensed organization (*Fachbetrieb)* and the organization certifies compliance with the generally accepted rules of technology and the criteria that would otherwise need to be verified during an inspection.

C9.3.5.3.3. In Hessen, new heating oil tanks used exclusively for heating in designated flood plains shall be constructed above the 100-year flood line.

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. In addition, the training criteria outlined in Chapter 5, "Hazardous Material" shall apply.

C9.3.7. Private-Use Filling Stations Located in Hessen.

C9.3.7.1. Drains. Drains within a distance of 5 meters (16 feet) from the fuel dispenser shall be covered or otherwise blocked during fueling.

C9.3.7.2. Fuel Dispensing Equipment.

C9.3.7.2.1. Automatically disconnecting dispensers shall be used.

C9.3.7.2.2. For dispensing fuel from storage tanks with a capacity of ≤ 1,000 liters (264 gallons), man-powered pumps with a valve at the filling hose shall be used.

C9.3.7.2.3. Appropriately designed equipment shall be used to avoid siphoning of aboveground storage tanks in case of a damaged filling hose.

C9.3.7.3. Secondary Containment. At private-use filling stations located in water protection zone III (see Chapter 3, "Drinking Water"), secondary containment shall be provided to retain 150 liters (40 gallons) when using standard fuel-dispensing equipment, 450 liters (119 gallons) when using high-performance fuel-dispensing equipment, or 300 liters (79 gallons) when filling the storage containers of the filling station, unless otherwise waived by the appropriate German water authority.

CHAPTER 10 – ENVIRONMENTAL NOISE

C10.1. SCOPE

This chapter provides criteria to control environmental noise generated within DoD-controlled installations. The environmental noise may originate from any source (e.g., equipment, training, official or non-official activities). Criteria in this chapter shall only apply if the noise generated affects off-installation locations. Operations of U.S. military vessels or U.S. military aircraft, or off-installation operational and training deployments are exempt from the FGS.

C10.2. DEFINITIONS

C10.2.1. A-Weighted Sound Level. A calculation of noise exposure that emphasizes sound in the frequency range where most speech information occurs, and thus closely resembles the frequency response of the human ear. Sound measures on the A-scale are abbreviated dB(A).

C10.2.2. CE Label. The label shown in Appendix C10.A1.

C10.2.3. dB. See decibel.

C10.2.4. dB(A). See A-weighted sound level.

C10.2.5. Decibel. The unit of sound pressure is the decibel and is symbolically represented as dB. Sound pressure is the amplitude or measure of the difference between atmospheric pressure (with no sound present) and total pressure (with sound present). The decibel scale is a logarithmic scale.

C10.2.6. Emissions. Emissions are air pollutions, noise, vibrations, light, heat, radiation, or similar effects emitted by facilities or activities. For the purpose of this chapter, only noise emissions are regulated.

C10.2.7. Equipment for Use Outdoors. Machinery which is either self-propelled or can be moved and is intended to be used in the open air and which contributes to environmental noise. This definition does not apply to equipment designed and constructed for military and police purposes and emergency services nor for equipment primarily intended for the transport of goods or persons by road, rail, waterways or air.

C10.2.8. European Union Eco-Label. The label shown in Appendix C10.A2. The label is awarded to products that comply with criteria for selected key environmental aspects, e.g., noise.

C10.2.9. Guaranteed Sound Power Level. The guaranteed sound power level is the A-weighted sound power in dB/1 pW which includes the uncertainties due to production variation and measurement procedures. An example for a label of guaranteed sound power level is shown in Appendix C10.A3.

C10.2.10. Harmful Environmental Impacts by Noise. Noise emissions which can cause dangers, considerable disadvantages, or considerable disturbance of the general public or the neighborhood depending on their nature, magnitude, or duration.

C10.2.11. Immissions. Immissions are always related to a receptor. They comprise air pollution, noise, vibrations, light, heat, radiation and similar environmental effects impacting

humans, animals, plants, water, soil, the atmosphere, or cultural or material assets. Immissions are the sum of all emissions that influence or impact the assessed area/the receptors. For the purpose of this chapter, only noise immissions are regulated.

C10.2.12. $L_{aeq\ day}$. The time averaged sound level expressed in dB(A) for the hours between 0600 and 2200.

C10.2.13. $L_{aeq\ night}$. The time averaged sound level expressed in dB(A) for the hours between 2200 and 0600.

C10.2.14. L_{Amax}. The maximum noise level expressed in dB(A).

C10.2.15. Sound Devices. Devices used for the generation or replay of sound or audible warning devices (audio devices), in particular speakers, sound reproducing devices, musical instruments, and similar devices.

C10.3. CRITERIA

C10.3.1. General.

C10.3.1.1. The criteria herein shall provide regulatory guidance to prevent harmful environmental noise impacts to off-installation neighborhoods and the general public. It is prohibited to generate avoidable noise without justifiable reason or to an improper extent that can disturb the general public or off-installation neighborhood.

C10.3.1.2. Installations shall identify noise sources that could create environmental noise impacts, investigate possible mitigation measures, and program resources to fund repairs and reduce noise impacts if practical. Such considerations are part of the environmental review required when planning projects or actions. The U.S. Forces may be granted authorization by the German Minister of Defense to emit noise that would normally be contrary to German customs and standards. Such authorization shall be based on compelling reasons of defense or the fulfillment of international commitments regarding the accomplishment of the U.S. Forces military mission. The term “compelling reasons of defense” is defined by the German Minister of Defense and subject to particular case by case events.

C10.3.1.3. Land use types defined for noise management purposes are listed in Table C10.T1. Noise immission guide values based on these land use types are listed in Table C10.T2. Activities resulting in noise levels at off-installation locations exceeding the noise immission guide values listed in Table C10.T2. are prohibited.

C10.3.2. Noise Measurement. Measurements of noise levels shall be conducted if required by the appropriate German authority. Noise measurements shall be performed by a body approved by the appropriate German authorities.

C10.3.3. Permits, Notifications, and Administrative Prescriptions.

C10.3.3.1. Emission-related issues shall be coordinated through the appropriate German authorities.

C10.3.3.2. DoD facilities that have been in operation before 29 March 1998 may continue to operate in their existing scope without the requirement of a permit. A permit may be required for facilities that have been substantially changed (operational or construction) as defined under criterion C1.6.

C10.3.3.3. Facilities shall comply with noise levels or noise controls specified in facility permits or other administrative regulations. Procedures associated with permits are addressed in Chapter 1, "Overview."

C10.3.3.4. A written notification of modification shall be submitted through the appropriate DoD chain of command to the appropriate German authority at least 1 month before the modification of a permitted facility.

C10.3.3.5. If a DoD component foresees the closure of a permitted facility, a written notification of closure shall be submitted through the appropriate DoD chain of command to the appropriate German authority immediately.

C10.3.4. Limiting Noise From Specific Facilities, Equipment, or Activities.

C10.3.4.1. Sports Facilities. Sports facilities shall be operated in such a manner that the applicable noise immission guide values in Table C10.T3. are not exceeded at off-installation locations.

C10.3.4.2. Airfields. Installation commanders shall provide all information related to the determination of noise immissions to the appropriate German authority upon request.

C10.3.4.3. Construction Sites. Construction equipment and machinery at a construction site shall be operated in a manner that the applicable noise immission guide values in Table C10.T4. are not exceeded at off-installation locations.

C10.3.4.4. Equipment for Use Outdoors.

C10.3.4.4.1. The permissible sound power levels in Table C10.T5. shall apply.

C10.3.4.4.2. The following operating hours apply to equipment listed in Table C10.T6. and operated in plain, general, special, or small housing areas (Table C10.T1.), or in special areas for recreation, health and clinic areas, accommodations or nursing homes.

C10.3.4.4.2.1. The operation of equipment listed in Table C10.T6. is neither allowed on Sundays and holidays nor during working days from 2000 to 0700.

C10.3.4.4.2.2. The use of equipment No. 02, 24, 34, and 35 as listed in Table C10.T6. is not allowed on working days from 0700 to 0900, 1300 to 1500, and 1700 to 2000. Exemptions to this criterion are granted for equipment labeled with the European Union eco-label as shown in Appendix C10.A2.

C10.3.4.4.2.3. Exemptions. The restriction for operating hours may be waived by the appropriate German authority. The waiver is not required in particular cases if the equipment is needed for the prevention of hazards due to storms, snow or any other hazards to humans, the environment, or goods. The operator shall inform the appropriate German authority about this usage upon request. Exemptions may also be granted for the prevention of a hazard to the general public or for reasons of public interest.

C10.3.4.5. Firing Ranges. Noise resulting from firing ranges using ≤ 20 mm caliber shall comply with Table C10.T2.

C10.3.5. Labeling of Equipment for Use Outdoors.

C10.3.5.1. Equipment for use outdoors shall have the following labels affixed:

C10.3.5.1.1. A label indicating that the equipment meets safety, health and environmental protection requirements (e.g., UL labels or CE label shown in Appendix C10.A1.); and

C10.3.5.1.2. A label indicating the maximum sound level in decibels (the guaranteed sound power level) as shown in the Appendix C10.A3. example.

C10.3.5.2. The labels shall be affixed in a visible, legible, and indelible form to each item of equipment.

C10.3.6. Regional Environmental Noise Criteria.

C10.3.6.1. Bayern.

C10.3.6.1.1. Operational noise audible at off-installation locations is prohibited on Sundays and public holidays (Table C10.T7.).

C10.3.6.1.2. During the usual local hours of the main church services (Table C10.T8.), the following are prohibited:

C10.3.6.1.2.1. All avoidable noise-generating operations which can be disturbing to the church or rooms used for services; and

C10.3.6.1.2.2. Public entertaining events. This does not apply to sporting events and other events (art, science, education) usually taking place during these times unless they fall under C10.3.6.1.2.1.

C10.3.6.1.3. The criteria C10.3.6.1.1. through C10.3.6.1.2.2. do not apply in emergency cases.

C10.3.6.1.4. Use and Operation of Vehicles. It is prohibited to generate avoidable noise.

C10.3.6.1.5. Appropriate local authorities may impose additional criteria regarding noise or grant exemptions.

C10.3.6.2. Rheinland-Pfalz.

C10.3.6.2.1. Operations of any kind are prohibited during night-time hours (2200 to 0600) if sleep is disturbed at off-installation locations.

C10.3.6.2.2. Exemptions. Measures for the prevention of hazards; abatement of an emergency; and handling of wheeled waste containers with a capacity $\leq$ 1,100 liters (290 gallons) are exempted from C10.3.6.2.1. Appropriate local authorities may impose additional criteria or grant exemptions.

C10.3.6.2.3. Use and Operation of Vehicles. It is prohibited to generate avoidable noise. In particular, it is prohibited to make:

C10.3.6.2.3.1. Unnecessarily loud engine noises;

C10.3.6.2.3.2. Loud sound generated from the closing of vehicle or garage doors (i.e., slamming car doors, loud creaking sound from garage doors upon opening and closing); and

C10.3.6.2.3.3. Loud noises during loading and unloading of vehicles.

C10.3.6.2.4. Sound Devices. Sound devices shall only be used in such a manner that they are not disturbing individuals or the environment at off-installation locations.

C10.3.6.2.5. Alarm Signals. Sirens and acoustic alarm signals shall not be audible at off-installation locations in a disturbing manner. Sirens for alarming the fire brigade or the population of hazards for individuals, animals, or goods are exempted if optic or radio signals are not sufficient or not possible.

C10.3.6.2.6. The operation of equipment listed in Table C10.T6. is not allowed in housing areas and special areas (Table C10.T1.) on working days from 1300 to 1500, 2000 to 0700, and on Sundays and holidays. Equipment for the removal of snow and ice is exempted as it can be used without time limits if required due to weather conditions.

Table C10.T1. Land Use Types for Noise Management Purposes

Type of Land Use	Symbol [1]	Description
Small housing areas (*Kleinsiedlungsgebiete*)	WS	Contains only small housing areas and small supply facilities
Plain housing areas (*reine Wohngebiete*)	WR	Contains only housing
General housing areas (*allgemeine Wohngebiete*)	WA	Contains predominantly: - housing - cultural, social, sanitary, sports, church facilities - supply facilities
Special housing areas (*besondere Wohngebiete*)	WB	Contains predominantly: - housing - cultural, social, sanitary, sports, church facilities - office buildings
Village areas (*Dorfgebiete*)	MD	Contains predominantly: - agricultural and arboricultural facilities - housing - supply facilities - cultural, social, sanitary, sports, church facilities - filling stations - small business enterprises
Mixed areas (*Mischgebiete*)	MI	Contains: - housing - office buildings - small business enterprises - cultural, social, sanitary, sports, church facilities - filling stations - commercial facilities that do not disturb housing considerably
Center areas (*Kerngebiete*)	MK	Contains: - commercial facilities - business and office buildings - cultural, social, sanitary, sports, church facilities - filling stations - housing for owners, managers, supervisory and standby personnel - other housing under certain restrictions
Commercial areas (*Gewerbegebiete*)	GE	Contains: - commercial or industrial facilities - storage areas and buildings - business and office buildings - sports facilities - filling stations - cultural, social, sanitary, sports, church facilities - housing for owners, managers, supervisory and standby personnel exceptionally allowable
Industrial areas (*Industriegebiete*)	GI	Contains: - commercial or industrial facilities - storage areas and buildings - storage areas and storage buildings - filling stations - cultural, social, sanitary, sports, church facilities - housing for owners, managers, supervisory and standby personnel exceptionally allowable
Special areas (*Sondergebiete*)	SO	Any use different from described above.

Table C10.T1. Land Use Types for Noise Management Purposes (continued)

Note:

[1] The type of land use is determined by a city or community. If no type of land use is determined for a particular area, the actual type of land use should be used as the type of land use for these purposes.

Table C10.T2. Noise Immission Guide Values

Immissions	**Land Use**	**Noise Immission Guide Value**	
		Day	**Night**
Outside of Buildings			
Health resorts, hospitals, nursing homes	-	45 dB(A)	35 dB(A)
Area containing only housing [1]	WR	50 dB(A)	35 dB(A)
Area containing predominantly housing [1]	WA, WS	55 dB(A)	40 dB(A)
Area containing commercial facilities and housing	MD, MI, MK	60 dB(A)	45 dB(A)
Commercial area	GE	65 dB(A)	50 dB(A)
Industrial area	GI	70 dB(A)	70 dB(A)
Single short-term noise peaks	all areas	+ 30 dB(A)	+ 20 dB(A)
Exceptional occurrences [2]	all areas except GI	70 dB(A)	55 dB(A)
Single short-term noise peaks for exceptional occurrences	GE	+ 25 dB(A)	+ 15 dB(A)
Single short-term noise peaks for exceptional occurrences	all areas except GI and GE	+ 20 dB(A)	+ 10 dB(A)
Inside of Buildings			
Rooms	all areas	35 dB(A)	25 dB(A)
Single short-term noise peaks	all areas	+ 10 dB(A)	+ 10 dB(A)

Notes:

Unless otherwise defined in an applicable permit or Germany-specific criteria:

- Day is defined as 0600 to 2200.
- Night is defined as 2200 to 0600 (minimum of 8 h).
- Hours of higher sensitivity apply to WA, WS, WR, health resorts, hospitals, and nursing homes. For the calculation of the noise pollution, an overhead of 6 dB shall be added.

Days	**Hours**
Monday to Saturday	0600 to 0700 2000 to 2200
Sunday and public holidays	0600 to 0900 1300 to 1500 2000 to 2200

- Applicable noise immission guide values refer to a noise assessment period of 16 h during the day. At night, the assessment refers to 1 h with the highest assessed noise levels.
- The acceptable noise immission guide value refers to the type of land use as determined in the development plan. If no type of land use is determined, the noise immission guide value shall be based on the actual type of land use.
- In case of an emergency situation, the noise immission guide values can be exceeded.

Table C10.T2. Noise Immission Guide Values (continued)

[1] For mixed areas, where GI or GE border directly on housing areas, the applicable noise immission guide values for housing areas can be higher as long as they do not exceed the values set for MD, MI, MK.

[2] The exceedance of noise immission guide values may be granted for exceptional occurrences during the licensing procedure for new or modified facilities under the following conditions: ≤ 10 times a year, day or night; ≤ 2 following weekends; and the generally accepted industry standards concerning noise emission control are observed. For existing facilities no administrative prescription *(Anordnung)* is required if the number of exceedances remains within the before-mentioned limits.

Table C10.T3. Noise Immission Guide Values (Sports Facilities)

Areas Affected by Noise From Sports Facilities				
		Noise Immission Guide Value		
Area Affected by Noise	**Symbol**	**Day**	**Daytime Rest Hours**	**Night**
Health resorts, hospitals, nursing homes	-	45 dB(A) [1]	45 dB(A) [1]	35 dB(A) [1]
Area containing only housing	WR	50 dB(A) [1]	45 dB(A) [1]	35 dB(A) [1]
Area containing predominantly housing	WA, WS	55 dB(A) [1]	50 dB(A) [1]	40 dB(A) [1]
Area containing commercial facilities and housing	MD, MI, MK	60 dB(A) [1]	55 dB(A) [1]	45 dB(A) [1]
Industrial area containing industrial and commercial facilities without a higher menacing potential	GE	65 dB(A) [1]	60 dB(A) [1]	50 dB(A) [1]
Single short-term noise peaks	all	+ 30 dB(A) [1]	+ 20 dB(A) [1]	
Rooms inside buildings without belonging to the facility	all	35 dB(A)	25 dB(A)	
Single short-term noise peaks (inside buildings)	all	+ 10 dB(A)	+ 10 dB(A)	

Notes:
Unless otherwise defined in an applicable permit or Germany-specific criteria:

Time of day	**Days**	**Hours**
Day	Monday to Saturday	0600 to 2200
	Sunday and public holidays	0700 to 2200
Night	Monday to Saturday	0000 to 0600 and 2200 to 2400
	Sunday and public holidays	0000 to 0700 and 2200 to 2400
Rest hours	Monday to Saturday	0600 to 0800 and 2000 to 2200
	Sunday and public holidays	0700 to 0900, 1300 to 1500 [2] and 2000 to 2200

Table C10.T3. Noise Immission Guide Values (Sports Facilities) (continued)

[1] Values valid only outside of buildings.

[2] Only valid if the time of use of the sports facility/facilities is ≥ 4 hours between 0900 and 2000.

- The acceptable noise immission guide value refers to the type of land use as determined in the development plan. If no type of land use is determined, the noise immission guide value shall be based on the actual type of land use.
- The appropriate German authority can exempt sports facilities permitted or built before 18 October 1991 from the noise immission guide values if the exceedance is < 5 dB(A). This exemption does not apply to health resorts, hospitals and nursing homes.
- If the noise immission guide value is exceeded due to exceptional occurrences, the appropriate German authority may not determine operating hours for the sports facility/facilities. This applies if the noise immission outside of buildings does not exceed the noise immission guide value by 10 dB(A). Exceedances > 70 dB(A) during the day, > 65 dB(A) during rest hours, and > 55 dB(A) during the night are prohibited. Single short-time noise peaks shall not exceed 20 dB(A) during the day and 10 dB(A) during the night.

Table C10.T4. Noise Immission Guide Values (Construction Sites)

Areas Affected by Noise from Construction Sites			
Area Affected by Noise	**Symbol**	**Noise Immission Guide Value**	
		Day	**Night**
Health resorts, hospitals, nursing homes	-	45 dB(A)	35 dB(A)
Area containing only housing	WR	50 dB(A)	35 dB(A)
Area containing predominantly housing	WA, WS	55 dB(A)	40 dB(A)
Area containing commercial facilities and housing	MD, MI, MK	60 dB(A)	45 dB(A)
Industrial area containing industrial and commercial facilities without a higher menacing potential	GE	65 dB(A)	50 dB(A)
Industrial area containing only industrial and commercial facilities	GI	70 dB(A)	70 dB(A)

Notes:

Unless otherwise defined in an applicable permit or Germany-specific criteria:

- Day is defined as 0700 to 2000.
- Night is defined as 2000 to 0700.
- The acceptable noise immission guide value refers to the type of land use as determined in the development plan. If no type of land use is determined, the noise immission guide value shall be based on the actual type of land use.

Table C10.T5. Permissible Sound Power Levels for Equipment for Use Outdoors

Type of Equipment	**Net Installed Power *P* in kW Electric Power P_{el} [1] in kW Mass of Appliance *m* in kg Cutting Width *L* in cm**	**Permissible Sound Power Level in dB/1 pW [2]**	
		Stage I from 3 January 2002	**Stage II from 3 January 2006**
Compaction machines (vibrating rollers, vibratory plates, vibratory rammers)	$P \leq 8$	108	105 [3]
	$8 < P \leq 70$	109	106 [3]
	$P > 70$	$89 + 11 \lg P$	$86 + 11 \lg P$ [3]
Tracked dozers, tracked loaders, tracked excavator-loaders	$P \leq 55$	106	103 [3]
	$P > 55$	$87 + 11 \lg P$	$84 + 11 \lg P$ [3]
Wheeled dozers, wheeled loaders, wheeled excavator-loaders, dumpers, graders, loader-type landfill compactors, combustion-engine driven counterbalanced lift trucks, mobile cranes, compaction machines (non-vibrating rollers), paver-finishers, hydraulic power packs	$P \leq 55$	104	101 [3, 4]
	$P > 55$	$85 + 11 \lg P$	$82 + 11 \lg P$ [3, 4]
Excavators, builders' hoists for the transport of goods, construction winches, motor hoes	$P \leq 15$	96	93
	$P > 15$	$83 + 11 \lg P$	$80 + 11 \lg P$
Hand-held concrete-breakers and picks	$m \leq 15$	107	105
	$15 < m < 30$	$94 + 11 \lg m$	$92 + 11 \lg m$ [3]
	$m \geq 30$	$96 + 11 \lg m$	$94 + 11 \lg m$
Tower cranes		$98 + \lg P$	$96 + \lg P$
Welding and power generators	$P_{el} \leq 2$	$97 + \lg P_{el}$	$95 + \lg P_{el}$
	$2 < P_{el} \leq 10$	$98 + \lg P_{el}$	$96 + \lg P_{el}$
	$P_{el} > 10$	$97 + \lg P_{el}$	$95 + \lg P_{el}$
Compressors	$P \leq 15$	99	97
	$P > 15$	$97 + 2 \lg P$	$95 + 2 \lg P$
Lawnmowers, lawn trimmers/lawn edge trimmers	$L \leq 50$	96	94 [3]
	$50 < L \leq 70$	100	98
	$70 < L \leq 120$	100	98 [3]
	$L > 120$	105	103 [3]

Table C10.T5. Permissible Sound Power Levels for Equipment for Use Outdoors (continued)

Notes:

[1] P_{el} for welding generators: conventional welding current multiplied by the conventional load voltage for the lowest value of the duty factor given by the manufacturer.

[2] 1 pW = 1 pico Watt = $1*10^{-12}$ W

[3] The figures for stage II are merely indicative for the following type of equipment:

- Walk-behind vibrating rollers;
- Vibratory plates (> 3 kW);
- Vibratory rammers;
- Dozers (steel tracked);
- Loaders (steel tracked > 55 kW);
- Combustion-engine driven counterbalanced lift trucks;
- Compacting screed paver-finishers;
- Hand-held internal combustion-engine concrete-breakers and picks (15 < m < 30)
- Lawnmowers, lawn trimmers/lawn-edge trimmers.

Definitive figures will depend on amendment of current regulation. In the absence of any such amendment, the figures for stage I will continue to apply for stage II.

[4] For single-engine mobile cranes, the figures for stage I shall continue to apply until 3 January 2008. After that date, stage II figures apply.

The permissible sound power level shall be rounded to the nearest whole number (< 0.5 use lower number; ≥ 0.5 use higher number).

Table C10.T6. Equipment for Use Outdoors

No.	Equipment/Machinery	Col. 1 [1]	Col. 2 [2]
01	Aerial access platform with combustion motor		X
02	Brush cutters		X
03	Builders' hoist for the transport of goods with		
03.1	Combustion motor	X	
03.2	Electric motor		X
04	Building site band saw machine		X
05	Building site circular saw bench		X
06	Portable chain saw		X
07	Combined high pressure flusher and suction vehicle		X
08	Compaction machine of the type of		
08.1	Vibrating rollers and non-vibrating rollers, vibratory plates and vibratory rammers	X	
08.2	Explosion rammers		X
09	Compressor (< 350 kW)	X	
10	Hand-held concrete-breaker and picks	X	
11	Concrete or mortar mixer		X
12	Construction winch with		
12.1	Combustion motor	X	
12.2	Electric motor		X
13	Conveying and spraying machine for concrete and mortar		X
14	Conveyer belt		X
15	Cooling equipment on vehicles		X
16	Dozer (< 500 kW)	X	
17	Drill rigs		X
18	Dumper (< 500 kW)	X	
19	Equipment for loading and unloading silos or tanks on trucks		X
20	Hydraulic and rope-operated excavator (< 500 kW)	X	
21	Excavator-loader (< 500 kW)	X	
22	Glass recycling container		X
23	Grader (< 500 kW)	X	
24	Grass trimmer/grass edge trimmer		X
25	Hedge trimmer		X
26	High pressure flusher		X
27	High pressure water jet machine		X
28	Hydraulic hammer		X
29	Hydraulic power pack	X	
30	Joint cutter		X
31	Landfill compactor, according to the type a loader with bucket (< 500 kW)	X	

Table C10.T6. Equipment for Use Outdoors (continued)

No.	Equipment/Machinery	Col. 1 [1]	Col. 2 [2]
32	Lawnmower (excluding: - agricultural and forestry equipment - multi-purpose devices the main motorized component of which has an installed power of > 20 kW)	X	
33	Lawn trimmer/lawn edge trimmer	X	
34	Leaf blower		X
35	Leaf collector		X
36	Counterbalanced lift truck with combustion engine		
36.1	Rough terrain truck (wheeled counterbalanced truck intended primarily for operation on unimproved natural terrain and on disturbed terrain of, e.g. construction sites	X	
36.2	Other counterbalanced lift truck with a rated capacity of ≤ 10 metric tons , excluded are counterbalanced lift trucks specifically constructed for container handling		X
37	Loader (< 500 kW)	X	
38	Mobile crane	X	
39	Mobile waste container		X
40	Motor hoe (< 3 kW)	X	
41	Paver-finisher		
41.1	Without high-compaction screed	X	
41.2	With high-compaction screed		X
42	Piling equipment		X
43	Pipe layer		X
44	Piste caterpillar		X
45	Power generator		
45.1	< 400 kW	X	
45.2	≥ 400 kW		X
46	Power sweeper		X
47	Refuse collection vehicle		X
48	Road-milling machine		X
49	Scarifier		X
50	Shredder/chipper		X
51	Snow-removing machine with rotating tools (self-propelled, excluding attachments)		X
52	Suction vehicle		X
53	Tower crane	X	
54	Trencher		X
55	Truck mixer		X
56	Water pump (not for underwater use)		X

Table C10.T6. Equipment for Use Outdoors (continued)

No.	Equipment/Machinery	Col. 1 [1]	Col. 2 [2]
57	Welding generator	X	

Notes:

[1] Equipment marked for column 1 shall apply to permissible sound power levels as listed in Table C10.T4.

[2] Equipment marked for column 2 have to fulfill the labeling obligations only.

Table C10.T7. Holidays in Bayern

Date	Day
Public Holidays for the Federal State of Bayern	
1 January	New Year's Day *(Neujahr)*
6 January	Epiphany *(Heilige Drei Könige)*
- - -	Good Friday *(Karfreitag)*
- - -	Easter Monday *(Ostermontag)*
1 May	Labor Day *(Tag der Arbeit)*
- - -	Ascension Day *(Christi Himmelfahrt)*
- - -	Whit Monday *(Pfingstmontag)*
- - -	Feast of Corpus Christi *(Fronleichnam)*
3 October	Unification Day *(Tag der Deutschen Einheit)*
1 November	All Saints' Day *(Allerheiligen)*
25 December	Christmas *(Erster Weihnachtstag)*
26 December	Christmas *(Zweiter Weihnachtstag)*
Public Holidays for areas with predominately catholic population	
15 August	Assumption of Virgin Mary *(Mariä Himmelfahrt)*
City of Augsburg	
8 August	Feast of Peace *(Friedensfest)*

Table C10.T8. Usual Local Hours of Main Services in Bayern

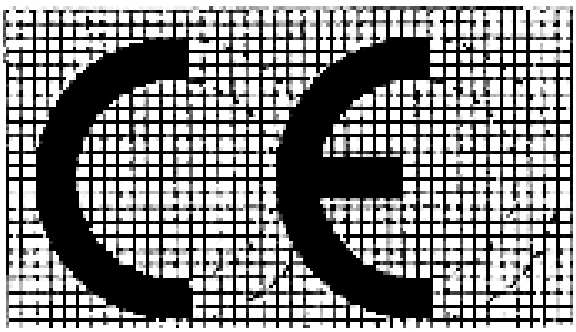
Days	Hours
Sundays and holidays	0700 – 1100 [1,2]

Notes:

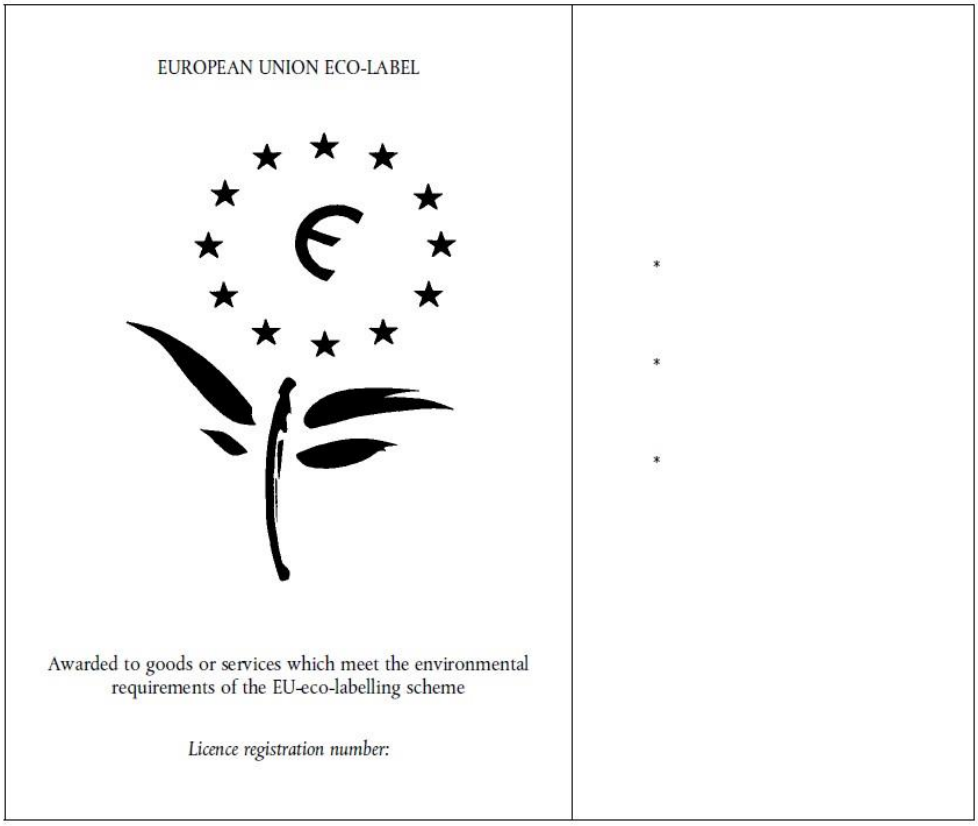
[1] The appropriate local authorities can change these hours if required for local religious customs.

[2] Total duration of noise protected hours shall be ≥ 3 and ≤ 6 hours.

Appendix C10.A1. CE Label



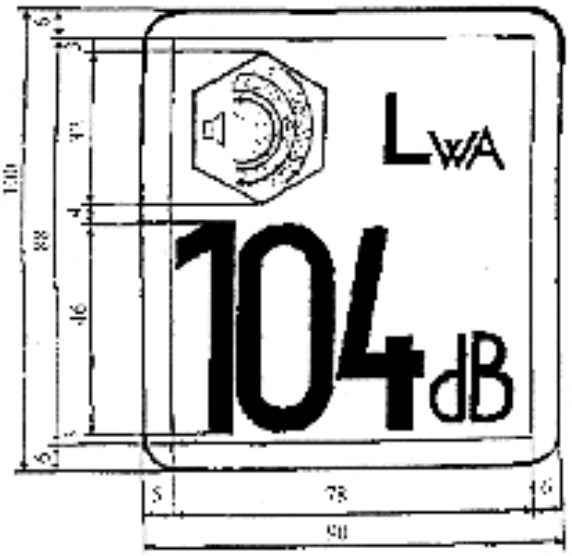
Appendix C10.A2. Example of European Union Eco-Label



Note:

Box 2 contains information about the reasons for the award of the eco-label, e.g., low air pollution. If space on the equipment is limited, only box 1 may be displayed and the full information included elsewhere.

Appendix C10.A3. Example of Label for Guaranteed Sound Power Level



CHAPTER 11 - PESTICIDES

C11.1. SCOPE

This chapter provides criteria regulating the use, storage, and handling of pesticides, but does not address the application of arthropod repellent to skin and clothing, pesticides applied as part of an installation's self-help program, or use of these materials by individuals acting in an unofficial capacity in a residence or garden. The transport and disposal of pesticides is covered in Chapter 5, "Hazardous Material," Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

C11.2. DEFINITIONS

C11.2.1. Authorized Plant Protection Product. A plant protection product authorized by an appropriate German Federal State authority for sale or use in Germany, or identical products that have been authorized in at least one EU member state.

C11.2.2. Bee-Endangering Plant Protection Products.

C11.2.2.1. Those products that an appropriate German authority has authorized with the condition that they be marked "Bee-endangering;" and

C11.2.2.2. Other authorized plant protection products applied in excess of the highest prescribed application quantity, or concentration if no quantity is given, as indicated in the instructions for use.

C11.2.3. Competent Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides and have been formally certified in accordance with the criteria in this chapter. See also C11.3.2.3. and C11.3.10.2.1. for additional applicator qualification criteria.

C11.2.4. GHS Label. See Chapter 5, "Hazardous Material," C5.2, Definitions.

C11.2.5. Hazardous Substance Pesticides (HS-Pesticides). HS-pesticides are pesticide products classified as very toxic *(sehr giftig)*, toxic *(giftig)*, or harmful *(gesundheitsschädlich)* (as indicated on the pesticide label) and include pesticide products and preparations that release very toxic, toxic, or harmful substances.

C11.2.6. 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.

C11.2.7. Outdoor Area. Areas that are not permanently covered by buildings or roofs, irrespective of their constitution or usage; included are traffic areas of any kind, such as railway tracks, roads, sidewalks, yards, and other areas modified by construction measures.

C11.2.8. 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.

C11.2.9. 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.

C11.2.10. Pesticide. Any substance or mixture of substances, including biological control agents in the form of microorganisms that may prevent, destroy, repel, or mitigate pests.

C11.2.11. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

C11.2.11.1. Pesticide that has been identified by the pest management consultant as cancelled under U.S. or German authority;

C11.2.11.2. Pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

C11.2.11.3. Material used to clean up a pesticide spill; or

C11.2.11.4. Containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are not considered HW and can be disposed of as normal solid waste.

C11.2.12. Plant Protection Products. Products consisting of or containing active substances, safeners or synergists, and intended for one of the following uses:

C11.2.12.1. Protecting plants or plant products against all harmful organisms or preventing the action of such organisms, unless the main purpose of these products is considered to be for reasons of hygiene rather than for the protection of plants or plant products;

C11.2.12.2. Influencing the life processes of plants, such as substances influencing their growth, other than as a nutrient;

C11.2.12.3. Preserving plant products, in so far as such substances or products are not subject to special German provisions on preservatives;

C11.2.12.4. Destroying undesired plants or parts of plants, except algae unless the products are applied on soil or water to protect plants; or

C11.2.12.5. Checking or preventing undesired growth of plants, except algae unless the products are applied on soil or water to protect plants.

C11.2.13. Active Substances. Substances, including micro-organisms having general or specific action against harmful organisms or on plants, parts of plants or plant products.

C11.2.14. Safeners. Substances or preparations which are added to a plant protection product to eliminate or reduce phytotoxic effects of the plant protection product on certain plants.

C11.2.15. Synergists. Substances or preparations which, while showing no or only weak activity as referred to in C11.2.12. can give enhanced activity to the active substance(s) in a plant protection product.

C11.2.16. Registered Pesticide. A pesticide registered and approved for sale or use within Germany or another EU member state.

C11.3. CRITERIA

C11.3.1. General Pesticide Management.

C11.3.1.1. 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. Documentation of pesticide application is to be provided to the appropriate German authorities on request.

C11.3.1.2. 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.

C11.3.1.3. Installations will only use registered pesticides and authorized plant protection products approved in writing by the appropriate pest management consultant. This shall be documented as part of the approval of the pest management plan. For additional criteria on authorized plant protection products see C11.3.5.

C11.3.1.4. Installations shall send a written notification to the appropriate German authority before the application of any plant protection product. Notification requirements for HS pesticides are detailed in C11.3.10.1.

C11.3.1.5. A permit is required from the appropriate German authority for the application of all plant protection products in outdoor areas not used for agriculture, forestry, or horticulture.

C11.3.1.6. Pesticides shall not be applied if adverse impacts on human health, non-target organisms, or the environment are to be expected.

C11.3.1.7. Pesticides will be addressed in the installation spill contingency plan (see Chapter 18, "Spill Prevention and Response Planning").

C11.3.1.8. Before initiating work activities involving pesticides, a hazard evaluation *(Gefährdungsbeurteilung)* shall be performed and documented.

C11.3.2. Pesticide Applicators.

C11.3.2.1. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

C11.3.2.2. All pesticide applicators will be provided with personal protective equipment (PPE) appropriate for the work they perform and the types of pesticides to which they

may be exposed. PPE shall be maintained in a ready-to-use and hygienic condition. The use of PPE shall be determined before the onset of work activities for which it is required. Applicators shall wear the PPE they are provided. The supervisor shall ensure that the duration of pesticide exposure is minimized.

C11.3.2.3. An individual who applies plant protection products or an individual who instructs or supervises persons who apply plant protection products during an apprenticeship period shall possess the required expert knowledge and proficiencies.

C11.3.2.3.1. Expert knowledge and proficiency shall be demonstrated by a current certificate (credit card format as introduced in June 2013; certifications in other formats expired in November 2015) issued by the responsible authority in one of the following:

C11.3.2.3.1.1. A passed professional exam meeting German requirements on expert knowledge *(Sachkunde)* in plant protection.

C11.3.2.3.1.2. A passed professional exam as farmer, forestry expert *(Forstwirt/in)*, horticulturist, winegrower, agricultural laboratory assistant, agricultural-technical assistant, agro-service specialist, pest controller, qualified pest controller *(Geprüfter Schädlings-bekämpfer/geprüfte Schädlingsbekämpferin)*, or plant technologist;

C11.3.2.3.1.3. A passed professional exam or a completed course of study and a certificate from the training center or school proofing the appropriate content of teaching; or

C11.3.2.3.1.4. Other certificates issued by the responsible authority of another EU member state.

C11.3.2.3.2. The applicator shall receive further training on a 3-year basis in accordance with DoDI 4150.07, "DoD Pest Management Program." In addition, applicators who have German certification shall receive refresher training on a 3-year basis that is approved by the appropriate German authority.

C11.3.3. Pesticide Storage and Use.

C11.3.3.1. Pest management facilities, including mixing and storage areas, will comply with Military Handbook AFPMB TG-17, "Design of Pest Management Facilities" and the applicable criteria of Chapter 5, "Hazardous Material" (see C5.3.14. Facilities that store, distribute and handle hazardous substances).

C11.3.3.2. All pesticide applications will be in accordance with guidance given on the label. Pesticides are to be labeled in accordance with Chapter 5, "Hazardous Material." Labels will also bear the appropriate use instructions and a precautionary message based on the toxicity category of the pesticide (i.e., "danger," "warning" or "caution", or "very toxic *(T+, sehr giftig)*", "toxic *(T, giftig)*" or "harmful *(Xn, gesundheitsschädlich)*"). If foreign nationals will be using the pesticides, the use instructions and the precautionary messages will be in English and the prevalent local languages.

C11.3.3.3. SDSs and GHS labels for all pesticides will be available at the pesticide storage and holding facility. Additionally, operating instructions *(Betriebsanweisungen)* will be available for all pesticides classified as hazardous in accordance with Chapter 5, "Hazardous Material."

C11.3.3.4. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal. The inventory shall identify the name of each pesticide product, the classification of the product, and the range of quantities that are handled. The inventory shall be updated when major changes occur and shall be reviewed at least once per year. Pesticide storage areas should be regularly inspected and secured to prevent unauthorized access.

C11.3.3.5. From 26 November 2015, pesticides authorized for professional use only shall only be handed over to a person owning a valid certificate of expert knowledge.

C11.3.3.6. If pesticides are handed over to a non-professional user, the distributor shall provide information on risks for humans, animals, and the ecosystem; protection of user; and appropriate storage, handling, application, and disposal.

C11.3.4. Pesticide Disposal.

C11.3.4.1. 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:

C11.3.4.1.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6, "Hazardous Waste" of these FGS.

C11.3.4.1.2. Pesticide waste that is determined to be hazardous waste (HW) will be disposed of in accordance with the criteria for HW disposal in Chapter 6, "Hazardous Waste" of these FGS.

C11.3.4.1.3. Pesticide waste that is determined not to be HW will be disposed of in accordance with the label instructions, through Defense Logistics Agency (DLA) Disposition Services, as a solid waste. Pesticide containers shall be crushed or the top and bottom portions of the containers shall be removed to prevent reuse.

C11.3.4.2. Plant protection products that are composed of or contain one of the substances listed in Table C11.T1. shall be disposed of without delay.

C11.3.4.3. Plant protection products containing active ingredients that are no longer approved for use shall be disposed of without delay upon expiration of the specific period for using up such products.

C11.3.5. Authorized Plant Protection Products.

C11.3.5.1. A list of authorized plant protection products is published by the German authorities and available to DoD components from the Lead Environmental Component (LEC) (reference Chapter 1, "Overview," for LEC contact information) or at the following website: http://www.bvl.bund.de/SharedDocs/Downloads/04_Pflanzenschutzmittel/psm_uebersichtsliste-EN.pdf?_blob=publicationFile&v=25.

C11.3.5.2. Only authorized plant protection products, as described in C11.3.1.3., either as single products or as mixtures with other products, shall be applied in Germany.

C11.3.5.3. Authorized plant protection products shall be applied only as outdoor applications in areas that are used for agriculture, forestry, or horticulture unless a permit is obtained (see C11.3.1.5.).

C11.3.5.4. Authorized plant protection products shall not be applied in or near surface waters or coastal waters.

C11.3.5.5. Authorized plant protection products shall be applied only according to the product-specific approved use specifications and approved categories of application.

C11.3.5.6. Authorized plant protection products whose authorization has ended can continue to be used for 18 months after the end date of the authorization.

C11.3.6. Prohibitions and Restrictions.

C11.3.6.1. Plant protection products that are composed of or contain one of the substances listed in Table C11.T1. shall not be used.

C11.3.6.2. Plant protection products that are composed of or contain one of the substances listed in Table C11.T2. shall be used only as indicated in Table C11.T2.

C11.3.6.3. Plant protection products that are composed of or contain one of the substances listed in section A of Table C11.T3. shall not be used for the specific applications prohibited according to Table C11.T3.

C11.3.6.4. Plant protection products that are composed of or contain one of the substances listed in section B of Table C11.T3. shall not be used in water protection areas or mineral spring protection areas unless otherwise exempted by the appropriate German authority. The restriction does not apply if the listed plant protection product comes ready-made in spray cans or is used in weed sticks, or mixed with water used in a manual pump sprayer.

C11.3.6.5. Plant protection products that are composed of or contain one of the substances listed in Table C11.T4. and are intended to be applied in outdoor areas that are not used for agriculture, forestry, or horticulture shall be distributed only to individuals presenting a permit from the appropriate German authority according to C11.3.1.5.

C11.3.6.6. Plant protection products that are composed of or contain one of the substances listed in Table C11.T2. or Table C11.T3. shall not be applied in nature protection areas, national parks, national nature monuments, natural monuments, and biotopes protected by the German Federal States unless the application is specifically authorized.

C11.3.7. Ban on Imports.

C11.3.7.1. Seed stock treated with the plant protection products composed of or containing one of the substances listed in Table C11.T1. shall not be imported.

C11.3.7.2. Seeds, seed stock or substrate treated with plant protection products composed of or containing one of the substances listed in Table C11.T2. shall not be imported. This does not apply if the treatment of seeds, seed stock or substrate is expressly permitted in Table C11.T2. and does not require approval from the appropriate German authority.

C11.3.8. Bee-Endangering Plant Protection Products.

C11.3.8.1. Bee-endangering plant protection products shall not be applied directly to flowering plants and other plants that are visited by bees, or applied in such a way that the plants may be affected. If a time period is indicated for an individual product when its use is not considered bee-endangering, the above-mentioned restriction does not apply for the indicated time period.

C11.3.8.2. Bee-endangering plant protection products shall not be applied in an area of 60 m (197 ft) around a bee yard without prior consent of the beekeeper.

C11.3.8.3. Bee-endangering plant protection products shall not be handled, stored, or disposed of in such a way that bees might come into contact with the products.

C11.3.9. Equipment Criteria. The criteria apply to plant protection equipment that is in use except for hand-held devices or equipment that is carried by one person.

C11.3.9.1. Equipment needs to function in such a way that no adverse impacts on the health of humans and animals, the groundwater and the environment occur if the equipment is used properly and in accordance with its intended use specifications.

C11.3.9.2. New equipment shall be tested for proper operation within 6 months from its initial use.

C11.3.9.3. Equipment shall be inspected for proper operation by an officially authorized inspection body *(Prüfstelle)* at least once every 3 years, beginning 6 July 2013. Compliance with the testing criteria shall be demonstrated by an inspection sticker affixed to the equipment. The inspection sticker shall identify when the next test is required.

C11.3.9.4. Equipment already inspected before 6 July 2013 shall be inspected again at the latest 1 year after the date stated on the inspection sticker and in accordance with the requirements set by the inspection body.

C11.3.9.5. The following pieces of equipment shall be inspected before 31 December 2020 for the first time and according to the 3-year schedule thereafter:

C11.3.9.5.1. Stationary and mobile equipment used for treatment of seeds and seed stock in order to protect them from fungi and pests *(Beizgeräte)*;

C11.3.9.5.2. Granulate spreading equipment *(Granulatstreugeräte)*;

C11.3.9.5.3. Areal spreading equipment *(Streichgeräte)* carried by a tractor or pushed or pulled by one person; and

C11.3.9.5.4. Soil disinfection equipment *(Bodenentseuchungsgeräte)*.

C11.3.9.6. Use of equipment not properly inspected within the 3-year schedule or not displaying a valid inspection sticker is prohibited.

C11.3.10. HS-Pesticides.

C11.3.10.1. Notification. Any installation that plans to conduct pest-control measures using HS-pesticides (or resumes such measures after a nonactivity period of > 1 year) shall notify the appropriate German authority at least 6 weeks in advance.

C11.3.10.2. Application.

C11.3.10.2.1. Applications of HS-pesticides shall be made by suitable and competent pesticide applicators.

C11.3.10.2.2. Suitable pesticide applicators:

C11.3.10.2.2.1. Are at least 18 years old;

C11.3.10.2.2.2. Are functional in the language used on the label of the HS-pesticide container; and

C11.3.10.2.2.3. Possess a current certificate (not older than 5 years) from a physician - who is certified in Germany for occupational medicine and is in a different organizational function than the applicator - that proves that there are no physical or mental reasons that would make them unsuitable for the handling of pesticides.

C11.3.10.2.3. Competent pesticide applicators, in addition to the above have passed the exam as a "qualified pest controller" *("Geprüfter Schädlingbekämpfer/Geprüfte Schädlingsbekämpferin")* or have other certification that will be accepted by the appropriate German authority.

C11.3.10.2.4. Assistants that meet the criteria of suitable pesticide applicators are allowed to handle HS-pesticides only under the continuous supervision of a suitable and competent pesticide applicator as defined above. These assistants shall be regularly trained according to their job duties.

C11.3.10.2.5. If the applicator of HS-pesticides is required to use a breathing apparatus, the current medical certification from the physician shall certify the individual for the use of a breathing apparatus.

C11.3.10.2.6. In accordance with Chapter 5, "Hazardous Material" and based on written operating instructions *(Betriebsanweisungen),* a verbal instruction *(Unterweisung)* of applicators is required before the onset of work with HS-pesticides and annually thereafter.

C11.3.10.3. Equipment Criteria.

C11.3.10.3.1. Modifications to equipment that is used to apply HS-pesticides shall be conducted by the equipment manufacturer or by the manufacturer's authorized technicians.

C11.3.10.3.2. Equipment that is used to apply HS-pesticides shall be tested for functionality and safety at least annually. The results shall be documented. If deficiencies of the equipment are discovered, the equipment shall be operated again only after it has been repaired and retested.

C11.3.11. Infectious Disease Control. Installations shall provide all requested information to the appropriate German authority to assist with protecting against infectious diseases. Designated persons, as determined and instructed by the appropriate German authority, may enter properties, review documents, make copies, take photos, perform investigations, and take or request samples.

Table C11.T1. Substances in Plant Protection Products Prohibited From Application

Number	Substance
1	Acrylonitrile
2	Aldrin
3	Aramite
4	Arsenic compounds
5	Atrazine
6	Binapacryl
7	Lead compounds
8	Bromacil
9	Cadmium compounds
10	Captafol
11	Carbaryl
12	Chlordane
13	Chlordecone *(Kepone)*
14	Chlordimeform
15	Chloroform
16	Chloropicrin
17	Crimidine
18	DDT (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)-ethane and its isomers)
19	1,2-Dibromoethane
20	1,2-Dichloroethane
21	1,3-Dichloropropene
22	Dicofol, with a content of < 780 g/kg dicofol, or > 1 g/kg DDT or DDT compounds
23	Dieldrin
24	Dinoseb, its acetates and salts
25	Endrin
26	Ethylene oxide
27	Fluoride acetic acid and its derivatives
28	HCH, technical
29	Heptachlor
30	Hexachlorobenzene
31	Isobenzan
32	Isodrin
33	Kelevan
34	Lindane
35	Maleic acid hydrazide and its salts, other than choline, potassium, and sodium salts
36	Maleic acid hydrazide-choline, potassium, and sodium salts with a content of > 1 mg/kg free hydrazine expressed as an acid equivalent
37	Morfamquat
38	Nitrofen
39	Pentachlorophenol
40	Toxaphene *(Polychloroterpene)*
41	Mercury compounds
42	Pentachloronitrobenzene *(Quintozene)*
43	Selenium compounds
44	2,4,5-T
45	Carbon tetrachloride *(Tetrachlorocarbon)*

Table C11.T2. Substances in Plant Protection Products With a Limited Ban on Application

Number	Substance	Authorized Application [1]
1	Hydrocyanic acid and hydrocyanic acid-producing compounds	For fumigation: - against pests in mills, store rooms, supply rooms, other rooms in food stores, in means of transportation, and in transport containers; - of dormant plants; - in greenhouses.
2	Diquat (deiquat)	For destroying leaves of potato plants. For accelerating the maturity process of: - rapeseed, field beans, and field peas, and - legume, oil seed radish, flax, and phacelia whose seeds are used for seed production; For hops clearing also with simultaneous weed control in the period from 1 July to 31 August.
3	Methyl bromide (monobromomethane)	For fumigation against pests in mills, store rooms, supply rooms, and other rooms in food stores, vacuum chambers, airtight small silos, in means of transportation, in transport containers, and beneath airtight canvas covers; For soil treatment outside of water protection areas and mineral spring protection areas for the cultivation of ornamental plants, nurseries, grape nurseries; For the production of plant potatoes in cultivation gardens.
4	Paraquat	For treatment: - against weeds and covering crops in cultivations of maize and sugar beets before seeding (in the same area at a maximum of every fourth year); - against weeds in viniculture in the first year and until the third cultivation year; For speeding up the ripening of cultivated grasses used for seed production.
5	Compounds developing phosphorous hydride, except for zinc phosphide used as rodenticide bait	For fumigation: - against pests in store rooms, supply rooms, silos, means of transportation, transport containers, and beneath airtight canvas covers; - outside of water protection areas and mineral spring protection areas against the water vole *(Arvicola terrestris L.*); against the hamster *(Cricetus cricetus L.)* and the mole (*Talpa europaea L.)* only with approval of the local German authority.
6	Carbon disulfide	For soil treatment against the vine fretter *(Daktylosphaira vitifoliae Fitch)* in viticulture only with approval of the local German authority.
7	Thallium-I-sulfate	In closed rooms.
8	Zinc phosphide	In bait; outside of forests, only in hidden laid-out bait.

Note:

[1] Additional restrictions and prohibitions with regard to the use and application of these substances are addressed in C11.3.6.6.

Table C11.T3. Substances in Plant Protection Products with Specific Application Restrictions

Number	Substance	Specific Restrictions [1]
SECTION A		
1	Amitrole	Application is prohibited from aircrafts, in the period from 1 September to 30 April, and in amounts of > 4 kg active substance per hectare.
2	Daminozide	Application for the growing of plants that serve for the production of food is prohibited.
3	Diuron	Application is prohibited: - on railroad embankments; - on non-paved surfaces that are covered with slag, stone chips, gravel, and similar materials (paths, squares, and other non-cultivated land) where the danger exists that the product can be washed away into surface waters, drainage systems, street drains, or stormwater and wastewater sewers; - on or directly adjacent to surfaces paved with concrete, bitumen, plaster, plates, and similar materials (paths, squares, and other non-cultivated land) where the danger exists that the product can be washed away into surface waters, drainage systems, street drains, or stormwater and wastewater sewers; and - domestic and allotment gardens.
4	Glyphosate	Application is prohibited: - on non-paved surfaces that are covered with slag, stone chips, gravel, and similar materials (paths, squares, and other non-cultivated land) where the danger exists that the product can be washed away into surface waters or into sewers, drainage systems, street drains, stormwater and wastewater sewers. This prohibition does not apply if the responsible authority prescribes in the permit a method of application ensuring that the danger of washing away does not exist. - on or directly adjacent to surfaces paved with concrete, bitumen, plaster, plates, and similar materials (paths, squares, and other non-cultivated land) where the danger exists that the product can be washed away into surface waters or into sewers, drainage systems, street drains, stormwater and wastewater sewers. This prohibition does not apply if the responsible authority prescribes in the permit a method of application ensuring that the danger of washing away does not exist.
5	Glyphosate-Trimesium	
6	Quartz powder (quartz flour)	Application for grain supplies and in rooms that store grain is prohibited.
SECTION B		
1	Alloxydim	NA
2	Asulam	NA
3	Benalaxyl	NA
4	Benazolin	NA
5	Bendiocarb	NA

Table C11.T3. Substances in Plant Protection Products with Specific Application Restrictions (continued)

Number	Substance	Specific Restrictions [1]
6	Calcium carbide	NA
7	Chloramben	NA
8	Chlorthiamid	NA
9	Cyanazine	NA
10	Diazinon	NA
11	Dichlobenil	NA
12	Dikegulac	NA
13	Ethridimuron	NA
14	Ethiofencarb	NA
15	Ethoprop (Ethoprofos)	NA
16	Etrimfos	NA
17	Flamprop	NA
18	Hexazinon	NA
19	Isocarbamide	NA
20	Karbutilate	NA
21	Mefluidide	NA
22	Methamidophos	The restriction applies only when poured as a water mixture (*Gießmittel*).
23	Methomyl	NA
24	Monochlorobenzene	NA
25	Sodium chlorate	NA
26	Nitrothal-isopropyl	NA
27	Anthracene oil	NA
28	Oxadixyl	NA
29	Oxamyl	NA
30	Oxycarboxin	NA
31	Picloram	NA
32	Propachlor	NA
33	Propazine	NA
34	Prothoate	NA
35	S 421 (Synergist)	NA
36	Sethoxydim	NA
37	Simazine	NA
38	TCA	NA
39	Tebuthiuron	NA
40	Terbacil	NA
41	Terbumeton	NA
42	Thiazafluron	NA
43	Thiofanox	NA

Note:

[1] General restrictions and prohibitions with regard to the use and application of these plant protection products are addressed in C11.3.6.4. and C11.3.6.6.

Table C11.T4. Substances in Plant Protection Products Subject to Special Distribution Criteria

Number	Substance
1	Diuron
2	Glyphosate
3	Glyphosate-Trimesium

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CHAPTER 12 – HISTORIC AND CULTURAL RESOURCES

C12.1. SCOPE

This chapter provides 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 German 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 and 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 Germany's traditional culture and history. The term also includes any property listed on the World Heritage List or the German equivalent of the U.S. National Register of Historic Places. German lists of properties should be evaluated to determine if they are equivalent with the U.S. National Register of Historic Places before 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. Byproducts, 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. Preservation of cultural monuments encompasses all conservation actions and measures (e.g., immediate maintenance of cultural monuments, consultation with owners of cultural monuments and expert authorities).

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. Protection of cultural monuments encompasses all administrative conservation measures (e.g., permitting, establishment, and implementation of protective actions and prohibitions).

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 inventories of registered historic and cultural resources maintained by individual German cultural protection authorities for purposes of avoiding or mitigating any adverse effects.

C12.3.2. Installations shall have access to the World Heritage List and the inventories of registered historic and cultural resources maintained by the individual German cultural protection authorities.

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 locally responsible German Federal Authority for Real Estate Matters *(Bundesanstalt für Immobilienaufgaben (BImA))* or, as appropriate, the regional Center of Expertise for Construction Management *(Kompetenzzentrum für Baumanagement)*, prepare, maintain, and implement a cultural resources management plan that includes 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 *BImA* or, as appropriate, the regional Center of Expertise for Construction Management, 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.

C12.3.5.4. Bayern, Hessen, and Rheinland-Pfalz. If sufficient protective measures are not established and the resources may be adversely affected, the installation commander shall take the necessary actions to protect or restore the resources in coordination with the German authorities.

C12.3.6. Installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the host nation. Once a permit has been obtained through the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management, any actions that disturb or remove historic or cultural resources, change their appearance or their location shall be conducted in accordance with the permit conditions (see C12.3.10.).

C12.3.7. Installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources (see C12.3.10.).

C12.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the installation will immediately notify the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management. 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 *BImA* or, as appropriate, the regional Center of Expertise for Construction Management.

C12.3.9. Immediate notification to the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management is required if protected monuments are damaged and the damage could adversely impact their historical value.

C12.3.10. Any planned modification to a protected historic or cultural resource requires the issuance of a permit through the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management if the historic or cultural resource, or parts thereof, will be demolished, dismantled, or removed; transformed, restored, repaired, or modified; or removed from its current location or repository. A permit shall be obtained to erect, modify, or remove structural installations in the surroundings that would significantly affect the appearance of

protected cultural resources. A permit shall be obtained through the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management to conduct investigations, especially those involving excavation, aimed at discovering cultural resources or monuments. In areas designated by Germany as protected excavation areas, work through which concealed cultural resources could be discovered or could become endangered shall be performed only with the permission of the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management. A permit issued by the appropriate German cultural protection authorities does not substitute for a permit required by other legislation. For example, permits required for construction include provisions also found in permits issued to protect historical monuments.

C12.3.10.1. Bayern and Hessen. Monuments shall be used in their original manner to the extent possible and may be subjected only to those activities that guarantee the greatest possible preservation.

C12.3.10.2. Bayern, Hessen, and Rheinland-Pfalz. If activities requiring a permit are conducted without the required permit or are not conducted in accordance with the instructions in the permit, those persons conducting such activities are obligated, by order of the responsible authorities, to restore the historical monument in its original condition or as determined by the authorities.

C12.3.10.3. Hessen and Rheinland-Pfalz. If required by the appropriate German cultural protection authorities due to the unique characteristics of the cultural resource, the installation commander shall ensure that only cultural protection experts conduct permit-requiring measures.

C12.3.10.4. Rheinland-Pfalz. The surroundings of an unmovable cultural monument shall be considered part of the cultural resource to be protected, if they are relevant for its existence, appearance or urbanistic effect.

C12.3.11. The installation commander shall provide all relevant information to the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management, for their consideration to forward to the German cultural protection authorities to enable protection of cultural resources.

C12.3.12. The installation commander shall, after coordination with the *BImA* or, as appropriate, the regional Center of Expertise for Construction Management, enable the appropriate German cultural protection authorities, or their designated agents to enter facilities and inspect cultural resources as necessary. They may enter residences, if necessary to avert immediate danger to cultural resources. All access shall be subject to considerations of military security and mission requirements.

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 the U.S. or German governments.

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. Alien Species *(gebietsfremde Art)*. Wild animal or plant species that has not naturally occurred in a certain area for > 100 years.

C13.2.3. Biotope. Specific habitat or type of habitat of wild animals and plants.

C13.2.4. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

C13.2.5. Environmental Impact Assessment *(Umweltverträglichkeitsprüfung (UVP))*. A procedure that identifies, describes, and objectively assesses the direct and indirect effects, both temporary and permanent, of a proposed project or actions on the following factors: human beings, fauna, and flora; soil, water, air, climate, and the landscape; material assets and the cultural and historical heritage; and the interaction between these factors.

C13.2.6. Flood Areas. Areas located between surface waters and dikes or elevated banks or shores, as well as other areas that, in case of flooding, may be inundated or subject to flow through, or that may be required for the control of flooding or for water retention.

C13.2.7. Germany-Protected Species. Any species of flora or fauna listed or designated by Germany, 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.

C13.2.8. Invasive Species. Species living outside its native distributional range representing a significant threat to local natural ecosystems, biotopes or species.

C13.2.9. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

C13.2.10. Natura 2000 Areas. German designated sites as incorporated in the European Union network of sites of community importance (SCI) and special protection areas (SPA).

C13.2.11. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

C13.2.12. 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.

C13.2.13. Riparian Zone *(Gewässerrandstreifen)*. The area extending 5 meters (16 feet) outside the shoreline or, if present, the slope top. In Hessen, the area is defined to extend 10 meters (33 feet) outside the shoreline.

C13.2.14. Significant Disturbance. A disturbance impairing the state of the local population of a species.

C13.2.15. Significant Land or Water Area. Land or water area that is normally ≥ 202 hectares (500 acres) outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

C13.2.16. Site of Community Importance (SCI) *(Gebiet von gemeinschaftlicher Bedeutung)*. A site contributing significantly to the maintenance or restoration of a natural habitat type or of a specially or strictly protected species. SCIs may also contribute significantly to the coherence of Natura 2000 and/or to the maintenance of biological diversity within the biogeographic region of regions concerned.

C13.2.17. Special Areas of Conservation (SAC) *(besondere Schutzgebiete)*. Site of Community importance designated by Germany where the necessary conservation measures are applied for the maintenance or restoration of the natural habitats and/or the populations of the species for which the site is designated.

C13.2.18. Special Protection Areas (SPA) *(Vogelschutzgebiete)*. Germany-designated European bird protection areas.

C13.2.19. Thermophilic Saums. Thermophilic saums are the perennial herb border between forest and adjacent land, e.g., plant-free rocks.

C13.2.20. Threatened and Endangered Species. Legally protected species of fauna or flora as listed under https://www.us.army.mil/suite/files/30846085. The species are either specially protected *(besonders geschützte Arten)* or strictly protected *(streng geschützte Arten)*. Strictly protected species are a subset of specially protected species.

C13.2.21. Wild Flowing Water. Water following the natural slope outside of a riverbed.

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 Germany-protected species and their habitat.

C13.3.1.1. For specially protected animal and plant species, the following restrictions on activities apply:

C13.3.1.1.1. It is prohibited to cut, pick, collect, uproot, destroy, or otherwise damage specially protected species of wild plants, including any part or developing form of the plant.

C13.3.1.1.2. It is prohibited to prey, catch, injure, or kill specially protected species of wild animals; and it is prohibited to destroy, remove from nature, or otherwise damage developing forms, nests, breeding areas, living areas, or refuge areas of specially protected species of wild animals.

C13.3.1.1.3. It is prohibited to take possession of or to take charge of, to work on, or to process specially protected plant and animal species.

C13.3.1.1.4. It is prohibited to sell, keep for sale, offer for sale, transport, acquire, exhibit, or to otherwise use as a trading commodity specially protected plant and animal species.

C13.3.1.1.5. New electrical pylons and components of middle-voltage (ca. 3 to 30 kV) electric lines shall be constructed in such a way that prevents birds from getting an electric shock and/or electrocution, e.g., when perched on the lines. Upgrades and repair for existing pylons and middle-voltage lines to prevent electric shock and/or electrocution of birds shall be completed before 31 December 2012.

C13.3.1.2. In addition to the protection criteria for specially protected species, it is prohibited to significantly disturb strictly protected animal and plant species as well as European bird species during procreation, breeding, molting, hibernation, and migration periods.

C13.3.2. Installations shall maintain or have access to the list of threatened and endangered species as mentioned in C13.2.20.

C13.3.3. Installations with significant land or water areas shall, after coordination with the appropriate German nature protection authorities, develop natural resources management plans.

C13.3.3.1. The following areas designated by the appropriate German Federal State Governments, as applicable, shall be addressed in the natural resources management plan: nature protection areas, national parks, national nature monuments, biosphere reservations, landscape protection areas, nature parks, natural landmarks, habitat patch connectivity areas, protected portions of landscapes, Natura 2000 areas, water protection areas, source protection areas, floodplains, protective forests, and forest protection areas.

C13.3.3.2. The natural resources management plan shall specify management measures and restrictions appropriate to the areas listed in C13.3.3.1.

C13.3.4. Installations with natural resources management plans shall, after coordination with the appropriate German nature protection 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 Germany-protected species, or support German 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 Germany-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 German facilities where practical.

C13.3.6.1. Landscapes shall not be disturbed without good reason. During the planning phase for development of facilities, roadways, and energy corridors (e.g., gas and electric power lines), the structure of the natural landscape shall be taken into account such that the consumption of land and the fragmenting of habitats are minimized.

C13.3.6.2. Landscape diversity shall be conserved by environmentally compatible management. Vegetation, especially forests, riparian vegetation, and other continuous vegetation covers, shall be protected through proper use. Damage to valuable areas shall be avoided.

C13.3.6.3. It is prohibited to burn the ground cover on meadows, balks, unused land, and along hedges and slopes without a permit.

C13.3.6.3.1. In Baden-Württemberg, it is prohibited to burn hedges, living fences, trees, bushes, and reeds.

C13.3.6.3.2. In Rheinland-Pfalz, it is prohibited to burn the ground cover on stubble fields (reaped cornfields).

C13.3.6.4. It is prohibited to handle areas not used for agriculture, forestry, or fisheries in such a manner that flora and fauna are significantly disturbed.

C13.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., legally 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 and expertise 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.

C13.3.8.1. In protected biotopes, measures that may cause destruction or other major impairment of biotopes are prohibited. Protected biotopes include natural and semi-natural running or standing inland water bodies, including their banks, their natural or semi-natural riparian vegetation, and their natural and semi-natural areas of siltation, bayous, and regularly flooded areas, bogs, swamps, reeds (areas containing *Phragmites spp.* grass), large sedge reeds, wet meadows containing sedges and rushes, areas with water sources, salt meadows, open inland dunes, open natural boulder and scree tips (an area on the side of a mountain covered with large loose broken stones), clay and loess walls, dwarf shrub, broom, and juniper heaths (where grass and other small plants grow, but where there are few trees or bushes), mat-grass swards, dry swards, calaminarian grasslands, woods and shrubs on warm and dry sites, marsh forests, swamp forests, floodplain forests, ravine forests, subalpine larch forests and larch-stone pine forests, open rock formations, alpine meadows, snow valleys, and elfin woodland shrubs. If a DoD component foresees activities in coastal areas, contact the Lead Environmental Component (LEC) for further environmental criteria.

C13.3.8.1.1. In Baden-Württemberg, additional protected biotopes include *Molinia* swards, thermophilic saums, the natural shallow water zone of the *Bodensee*, field woods and field bushes, hollow ways (embankments with crevices), dry stone walls, stone dams, caves, and dolines.

C13.3.8.1.2. In Bayern, additional protected biotopes include *Molinia* swards, bog forests, thermophilic saums, neglected grassland, rock heaths, and high perennial vegetation in alpine areas.

C13.3.8.1.3. In Hessen, additional protected biotopes include orchards/fruit meadows *(Streuobstbestände im Außenbereich)* and avenues of trees.

C13.3.8.1.4. In Rheinland-Pfalz, additional protected biotopes include bog forests, small sedge swamps, moist meadows rich in sedges, rushes or tall forbs, sandy grassland, *Arnica, Gentiana* or orchid swards, rock shrubs, and rock vegetation.

C13.3.8.2. The execution of a planning assessment procedure *(Planfeststellungs-verfahren)* shall be required before the construction, removal, or essential transformation of surface waters or riparian zones. The planning assessment procedure shall address all measures to avoid affecting natural resources and, in most cases, an environmental impact assessment shall be required (see C13.3.11.). Any plan or project likely to have a significant effect on Germany-designated areas of the European net "Natura 2000" shall be subjected to an appropriate assessment of its implications for the site in view of the site's conservation objectives *(FFH-Verträglichkeitsprüfung)*.

C13.3.8.3. Between March 1 and September 30, it is prohibited to clear, cut, cut back, cut down, coppice (i.e., cut back in order to form a small, closely planted area), or otherwise damage or destroy trees outside of forests, short rotation coppice plantations or horticultural areas, hedges, living fences, bushes, and reeds. As a preservation measure, trimming and pruning of plants and trees is allowed.

C13.3.8.3.1. Outside the period mentioned in C13.3.8.3., reeds shall only be cut back in sections.

C13.3.8.4. For the protection of wild animal and plant species, the following restrictions on activities apply:

C13.3.8.4.1. It is prohibited to willfully disturb, harm, kill, or, without good reason, catch wild animals (including developing forms such as eggs, larvae, pupae, or others).

C13.3.8.4.2. It is prohibited to remove wild plants from their habitat or to use, cut, or otherwise destroy them without good reason. In derogation of this restriction, it is allowed to carefully remove small amounts of wild flowers, grasses, ferns, mosses, lichens, fruits, mushrooms, herbs, and branches from their habitat for personal use, if there are no entrance restrictions.

C13.3.8.4.3. It is prohibited to disturb or destroy habitats of wild animals and plants without good reason.

C13.3.8.4.4. It is prohibited to visit caves, earth cellars or similar rooms used by bats for hibernation from October 1 through March 31. However, access is permissible for non-deferrable and those activities that only minimally disturb species, and within areas of heavy human traffic.

C13.3.8.5. Appropriate measures shall be taken to prevent potential threats to ecosystems, biotopes, and species posed by alien or invasive animal and plant species.

C13.3.8.6. Potentially invasive species shall be monitored.

C13.3.8.7. To introduce or establish alien animal or plant species, permission shall be obtained by the appropriate German nature protection authorities. This is not applicable to the cultivation of plants in agriculture or forestry.

C13.3.8.8. The use, transport, and disposal of water-endangering substances shall be managed in accordance with Chapter 5, "Hazardous Material," and Chapter 6, "Hazardous Waste," of these FGS.

C13.3.8.9. The natural soil system shall be conserved and protected against pollution. Soils shall be handled in a manner preventing harmful changes to the soil's functions. This especially applies to soil functioning as living space for soil organisms, as a site for natural vegetation and for crop plants, as a balancing system in the water cycle, as a filter and buffer for harmful substances, and as a reflection of landscape history.

C13.3.8.10. Installation commanders shall:

C13.3.8.10.1. Undertake defensive measures to prevent changes occurring on facilities that impair soil function or interfere with neighboring property;

C13.3.8.10.2. Allow representatives from the appropriate German authorities access to the property or, in case of imminent danger, access to structures;

C13.3.8.10.3. Allow representatives from the German authorities to perform appropriate investigations;

C13.3.8.10.4. Immediately inform, through the appropriate chain of command, the German Federal Authority for Real Estate Matters *(Bundesanstalt für Immobilienaufgaben (BImA))* or, as appropriate, the Center of Expertise for Construction Management *(Kompetenz-zentrum für Baumanagement)* of known or suspected soil contamination or pollution that may cause harm to human beings or material values or may result in significant adverse impacts to natural resources;

C13.3.8.10.5. Provide all information related to soil protection to the appropriate German authority upon request; and

C13.3.8.10.6. Remove soil and surface water contamination in a manner that causes no significant pollution and no permanent danger to the public. Soil and water contamination shall be addressed in accordance with Chapter 18, "Spill Prevention and Response Planning," of these FGS or DoDI 4715.08 (Environmental Remediation for DoD Activities Overseas) as appropriate.

C13.3.8.11. Additional Restrictions in Bayern.

C13.3.8.11.1. It is prohibited to remove or considerably impair caves, ecologically or geomorphologically significant dolines, dead-ice holes, open artificial subterranean hollow spaces, dry or other stone walls, as well as pools and small water bodies.

C13.3.8.11.2. Actions destroying or greatly diminishing the productivity of forest soils, or causing significant erosion of forest soils, are prohibited.

C13.3.8.12. Additional Restrictions in Baden-Württemberg.

C13.3.8.12.1. The following actions are prohibited in the riparian zone:

C13.3.8.12.1.1. Transforming permanent grassland.

C13.3.8.12.1.2. Handling water-endangering substances, except their transportation on public roads or the required handling in fixed facilities.

C13.3.8.12.1.3. Constructing or extending buildings not required for water management.

C13.3.8.12.2. It is prohibited to climb trees with nests or breeding cavities between March 1 and September 30.

C13.3.8.13. Additional Restrictions in Hessen.

C13.3.8.13.1. A permit is required by the appropriate German Federal State authority for the following actions:

C13.3.8.13.1.1. Constructing or extending buildings in riparian zones, including walls, ramparts, and similar constructions transversely to the flow direction of the water during floods as well as a change of the earth's surface level.

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).

C13.3.9.1. Significant adverse effects on natural resources shall be avoided. Significant adverse effects that cannot be avoided shall, after coordination with the appropriate German Federal State nature protection authorities, be compensated through compensation measures or, if not possible, through a compensation payment.

C13.3.9.2. Surface waters including their riparian and floodplain zones shall be conserved and their aerial extent increased as part of natural resources management as habitat for plants and animals.

C13.3.9.2.1. On facilities subject to flooding, appropriate measures shall be established to protect against risks resulting from flooding and to minimize damages.

C13.3.9.2.2. Flood areas shall be maintained as retention areas.

C13.3.9.2.3. The management of flood areas shall be considered and coordinated with the appropriate German authorities.

C13.3.9.2.4. The construction of buildings or extension of existing buildings in flood areas requires a permit from the appropriate German authority. In most cases, an environmental impact assessment will be required (see C13.3.11.).

C13.3.9.3. Surface waters shall be protected against pollution and their natural self-purification abilities conserved. Extensions of surface waters shall be made as naturally as possible.

C13.3.9.4. Surface waters in a natural or unobstructed condition shall be conserved. Natural but obstructed surface waters shall be transformed back to natural conditions to the extent possible.

C13.3.9.5. A permit by the appropriate German authority and, in many cases, an environmental impact assessment will be required for the following actions (see C13.3.11.):

C13.3.9.5.1. To extract, remove, or mine surface water.

C13.3.9.5.2. To build a dam or to decrease surface waters.

C13.3.9.5.3. To excavate or dredge solids from surface waters if this action influences the condition of surface water or water flow.

C13.3.9.5.4. To discharge substances into surface or coastal waters.

C13.3.9.5.5. To dam, decrease, or change the flow of groundwater with equipment determined or made for this purpose.

C13.3.9.5.6. Any measures that may cause permanent or major damage to the physical, chemical, or biological conditions of water.

C13.3.9.6. In case of unauthorized or unintentional exposure of groundwater, the appropriate German authority shall be informed immediately. The associated earthworks shall be stopped until resumption is allowed by the appropriate German authority.

C13.3.9.7. The use of milling machines is prohibited in water-filled ditches if this significantly impairs the natural ecosystem (especially the fauna).

C13.3.9.8. It is prohibited to impair hedges, bushes, balks, and vegetation on paths, reeds, or non-cultivated areas by the application of substances.

C13.3.9.9. Bayern.

C13.3.9.9.1. The following activities are prohibited within the forest or within 100 meters (330 feet) of the forest:

C13.3.9.9.1.1. To use an open flame outside of an established and marked place for fire management;

C13.3.9.9.1.2. To throw away or carelessly handle burning or smoldering objects; and/or

C13.3.9.9.1.3. To leave a fire unattended or without appropriate safety measures.

C13.3.9.9.2. A permit is required by the appropriate German Federal State authority for the following activities within the forest or within a distance < 100 meters (330 feet) of the forest:

C13.3.9.9.2.1. To kindle or maintain a fire; C13.3.9.9.2.2.

To build or use a charcoal pile; and/or C13.3.9.9.2.3. To burn

soil cover or plants and plant remains;

C13.3.9.9.3. It is prohibited to smoke in the forest between March 1 and October 31.

C13.3.9.10. Baden-Württemberg.

C13.3.9.10.1. It is prohibited to perform unauthorized heaping or digging within the forest without authorization by the appropriate German Federal State forest authority.

C13.3.9.10.2. Within the forest, it is prohibited to damage or destroy anthills, or to collect ants or their pupas, without authorization from the appropriate German Federal State forest authority.

C13.3.9.10.3. A permit is required by the appropriate German Federal State authority for the following activities within the forest or within a distance < 100 meters (330 feet) from the forest:

C13.3.9.10.3.1. To kindle or maintain a fire or use an open flame outside of an established and marked place for fire management;

C13.3.9.10.3.2. To burn soil cover or plants and plant remains;

C13.3.9.10.3.3. To build an installation for the operation of a place for fire management.

C13.3.9.10.4. It is prohibited to throw away or carelessly handle burning or smoldering objects.

C13.3.9.10.5. It is prohibited to smoke in the forest between March 1 and October 31.

C13.3.9.10.6. It is prohibited to use chemical substances to control plants and animals as well as substances that damage the natural resources or the development of plants and animals. This restriction does not apply to the use of chemical substances within the limits of proper soil use by agriculture, forestry, and fishery. See Chapter 11, "Pesticides," for more information on pesticide use.

C13.3.9.10.7. Waters shall be used in a manner that minimizes impairment of their ecological functions.

C13.3.9.10.8. A permit by the appropriate German Federal State authority is required for:

C13.3.9.10.8.1. Quarrying and extraction of gravel, sand, marl, clay, loam, stones, and other soil components;

C13.3.9.10.8.2. Digging or heaping of soils;

C13.3.9.10.8.3. Erosion of streams; and

C13.3.9.10.8.4. Filling of soil depressions; and

C13.3.9.10.8.5. Creating or changing artificial surface waters, e.g., fish ponds, fire water reservoirs or similar small ponds that are only artificially connected to surface water.

C13.3.9.10.9. Persons who remove, mine, or draw off water from surface waters shall install a gauge measuring the amount of water removed. Results shall be recorded and stored.

C13.3.9.10.10. Wild flowing water shall not be changed in a manner that may negatively alter upstream or downstream properties.

C13.3.9.11. Rheinland-Pfalz.

C13.3.9.11.1. A permit by the appropriate German Federal State authority is required to kindle or maintain a fire or use an open flame within the forest or within a distance < 100 meters (330 feet) from the forest.

C13.3.9.11.2. It is prohibited to throw away or carelessly handle burning or smoldering objects in the forest or within a distance < 100 meters (330 feet) from the forest.

C13.3.9.11.3. It is prohibited to smoke in the forest.

C13.3.9.11.4. For wild flowing water, the owner or person with the right of use of a property shall not change the flow of the water in a manner that may negatively alter upstream or downstream properties.

C13.3.9.11.5. Within riparian zones and designated flood areas, the short-term storage or accumulation of objects is prohibited if they hinder the flow of receding water or if they can be swept away. Exemptions can be granted by the appropriate German Federal State authority.

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.

C13.3.10.1. The owner or person with the right of use of a property shall prevent changes that impair soil function or interfere with neighboring properties. This applies to changes based on erosion of soil by water. To meet this obligation, owners or persons with the right of use of a property shall take precautions to avoid or minimize soil changes to the extent possible with regard to the use of the property.

C13.3.10.2. The loss of natural soil fertility shall be avoided. Natural or restored vegetative covers shall be preserved. For areas not in agricultural, silvicultural, or horticultural use and on which vegetative cover has been removed, reestablishment of natural vegetative cover shall be allowed to occur. Paved surfaces no longer required shall be returned to their natural vegetative state or, if the unsealing/removal of the pavement is not possible, the area shall be left undisturbed to redevelop naturally.

C13.3.11. Planned projects that may affect the character and type of use of natural resources and the landscape require a permit from the appropriate German Federal State authority. In most cases, the project proponent shall be required to conduct an environmental impact assessment as part of the permitting process, which may include surveys of plant and animal species in the area.

C13.3.11.1. Any plan or project not directly connected with or necessary for the management of German designated areas of the European net "Natura 2000," but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall

be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives *(FFH Verträglichkeitsprüfung)*.

C13.3.12. Any actions that destroy, dispose, damage, change, impair, or otherwise disturb a designated protected area are prohibited.

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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, storage, and disposal of polychlorinated biphenyls (PCB).

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. Leak or Leaking. Any instance in which a PCB article or PCB item has any PCBs on any portion of its external surface.

C14.2.3. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to these FGS.

C14.2.4. Marked. PCB items, PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

C14.2.5. PCB. Polychlorinated biphenyls include: polychlorinated terphenyls, monomethyl-dibromo-diphenyl methane, monomethyl-dichloro-diphenyl methane, and monomethyl-tetrachloro-diphenyl methane (or any mixtures that contain such substances).

C14.2.6. PCB Article. Any article that contains PCBs and whose surface(s) has been in direct or potential contact with PCB.

C14.2.7. PCB Item. Any PCB article, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB(s) at a concentration of $\geq$ 50 ppm.

C14.2.8. 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.

C14.2.9. 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.

C14.3. CRITERIA

C14.3.1. General Criteria. All PCB items should have been properly disposed of prior to 31 December 2010. If previously unidentified PCB items are discovered, they shall be decommissioned immediately and disposed of according to C14.3.2.

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 at concentrations of ≥ 50 ppm (or suspected PCB liquids of unknown concentrations) 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 ≤ 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 25.4 cm (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 PCBs items at concentrations ≥ 50 ppm (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any containers used to store the preceding items, must be prominently and permanently marked in English and German. 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. If the PCB content is between 0.005% (50 ppm) and 0.05% (500 ppm), the label shall state "PCBs Contaminated <0.05%", "PCBs Kontaminiert <0.05%." These marking criteria also apply 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 PCB items' removal from use if not already marked: PCB capacitors and equipment containing a PCB transformer or PCB capacitor.

C14.3.1.4. Each installation that has PCB items will maintain a written inventory that includes a current list by type of all 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. 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.

C14.3.1.6. Any PCB item removed from service will be marked with a permanent and irremovable mark showing the date it was removed from service.

C14.3.2. Disposal.

C14.3.2.1. Upon discovery of a PCB item, disposal shall be immediately initiated. Temporary storage and inspections while awaiting disposal shall be in accordance with the criteria of Chapter 6, "Hazardous Waste."

C14.3.2.2. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing Defense Logistics Agency (DLA).

C14.3.2.3. Disposal of PCB items will only be through the servicing DLA Disposition Services in accordance with DoD 4160.21-M, "Defense Materiel Disposition Manual," utilizing companies and facilities approved by the responsible German Federal State authorities, unless authorized exceptions are approved.

C14.3.2.4. Installations will coordinate and obtain concurrence from the responsible German Federal State authority for in-country PCB disposal as for HW disposal. The disposal of PCB waste shall be conducted by an approved disposal company (See Chapter 6, "Hazardous Waste").

C14.3.2.5. The off-installation transport of this waste shall be conducted in accordance with Chapter 6, "Hazardous Waste."

C14.3.2.6. Installations that generate PCB waste of ≥ 50 ppm PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, "Hazardous Waste."

C14.3.2.7. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the United States (US) will be returned to the US for delivery to a permitted disposal facility if German 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 subparagraph C14.3.1.3.

C14.3.3. Elimination of PCB Products.

C14.3.3.1. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

C14.3.3.2. 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 (< 2 ppm) at the time of shipment.

C14.3.3.3. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

CHAPTER 15 - ASBESTOS

C15.1. SCOPE

This chapter provides 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 addressed in this chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1, "DoD Safety and Occupational Health (SOH) Program," DoDI 6055.05, "Occupational and Environmental Health (OEH)," and concomitant service instructions.

C15.2. DEFINITION

C15.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions coming from asbestos-containing material (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, anthophyllite asbestos, actinolite asbestos, and any other of these materials that has been chemically treated and/or altered.

C15.2.3. Asbestos Cement Products. Prefabricated cement-bound products with an asbestos content of < 15% by weight and a gross density of > 1,400 kilograms per cubic meter (kg/m^3).

C15.2.4. Asbestos-Containing Material (ACM). Any material containing > 1% asbestos by weight.

C15.2.5. Asbestos Fiber. An asbestos fiber has the following dimensions: length of > 5 micrometer (µm), diameter of < 3 µm, and the ratio between the length and the diameter of > 3:1.

C15.2.6. Demolition Work. Demolition work includes pulling down structural installations, breaking up vehicles including ships, dismantling installations or equipment, and the associated secondary work.

C15.2.7. Friable Asbestos. Any material containing > 1% asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.8. Operating Instruction *(Betriebsanweisung)*. Workplace-specific instruction that provides information on handling hazardous substances as well as information on the risk for human health and the environment associated with hazardous substances handled at each specific workplace.

C15.2.9. Regulated ACM. Means (a) Friable asbestos, to include ACM that has become friable, (b) ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or

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

C15.3.1.1. Project inspectors responsible for ACM repair, removal or replacement services shall be certified and appointed in writing.

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, that shall also include the urgency of abatement.

C15.3.2.1.1. The urgency of abatement of friable asbestos shall be determined based on Table C15.T1. The risks are assessed by criteria such as asbestos type, surface structure, location of the asbestos products, and use of the area/room. Assessment points are assigned to each criterion. The sum of these assessment points yields the urgency of abatement as follows:

C15.3.2.1.1.1. $\geq$ 80 points: Priority Level I: immediate abatement required to reduce the release of asbestos fibers;

C15.3.2.1.1.2. 70 to 79 points: Priority Level II: medium-term reassessment required at least every 2 years; and

C15.3.2.1.1.3. < 70 points: Priority Level III: long-term reassessment required at least every 5 years.

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 (Q&M) work practices to avoid or minimize fiber release during activities affecting ACM.

C15.3.2.6. Recordkeeping to document Q&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.

C15.3.2.9. Procedures to prohibit the introduction of additional ACM in construction, operation, and maintenance activities.

C15.3.2.10. Operating Instructions *(Betriebsanweisung)*. An instruction sheet specific to the particular workplace and associated hazards shall be provided to workers in English. If the workforce includes host nationals, the instruction sheet shall also be provided in German.

C15.3.2.10.1. As a minimum, the instruction sheet shall include information on:

C15.3.2.10.1.1. ACM present at the workplace and associated health hazards;

C15.3.2.10.1.2. Appropriate rules and measures to be conducted at the workplace, including hygiene measures, information on measures to reduce exposure to asbestos, and information on PPE;

C15.3.2.10.1.3. Emergency and first aid measures;

C15.3.2.10.1.4. Information on waste treatment and disposal.

C15.3.2.10.2. The instruction sheet shall be updated whenever work conditions are substantially modified.

C15.3.2.11. Verbal Instruction *(Unterweisung)*. Verbal instruction for workers handling ACM in the workplace shall be proved before initiating work activities and annually thereafter. The contents and date of instruction shall be recorded and signed by the attendees. Instruction records shall be maintained at least until the next instruction. Verbal instruction shall include the following:

C15.3.2.11.1. Workplace specifics (i.e., the particular locations and types of ACM present);

C15.3.2.11.2. Properties of asbestos and its health impacts and the synergistic effect of smoking on asbestos exposure;

C15.3.2.11.3. Types of products and materials that may contain asbestos;

C15.3.2.11.4. Work activities that may involve asbestos exposure and the significance of protective measures to reduce the exposure;

C15.3.2.11.5. The professional application of safe methods and use of PPE;

C15.3.2.11.6. Measures to implement during disturbance of the flow of operations;

C15.3.2.11.7. Proper asbestos waste disposal;

C15.3.2.11.8. Preventive medical examinations.

C15.3.2.12. Workplan *(Arbeitsplan)*. A workplan shall be developed before initiating work activities involving asbestos removal or repair and before ACM disposal. The workplan shall address the following:

C15.3.2.12.1. Procedures for the removal and disposal of asbestos and ACM;

C15.3.2.12.2. Engineering controls for the protection and decontamination of personnel;

C15.3.2.12.3. PPE required.

C15.3.3. Before demolition or renovation of a facility, the installations 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). If there is any doubt

about whether an ACM is involved, a sample of the suspect material shall be collected and analyzed.

C15.3.4. Before demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and provided 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.

C15.3.5.1. ACM that has been repaired or isolated (e.g., using coating or spatial separation) shall be labelled as follows:

CAUTION WHILE WORKING ON THIS BUILDING COMPONENT!

CONTAINS ASBESTOS

HEALTH HAZARD BY INHALING ASBESTOS FIBERS

FOLLOW HEALTH AND SAFETY REGULATIONS!

VORSICHT BEI ARBEITEN AN DIESEM BAUTEIL!

ENTHÄLT ASBEST GESUNDHEITSGEFÄHRDUNG BEI EINATMEN

VON ASBESTFASERN SICHERHEITSVORSCHRIFTEN BEACHTEN!

C15.3.6. Before disturbing ACM or demolishing a facility or part of a facility, installations will remove affected regulated ACM.

C15.3.7. When collecting, storing, or disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leakproof container, and properly dispose of it in a landfill as defined in Chapter 6, “Hazardous Waste.” Permanent records documenting the disposal action and site will be maintained. Containers will be labelled in English and German:

DANGER

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

ACHTUNG

ENTHÄLT ASBEST

GESUNDHEITSGEFÄHRDUNG BEI EINATMEN VON ASBESTFASERN

SICHERHEITSVORSCHRIFTEN BEACHTEN

BEHÄLTER GESCHLOSSEN HALTEN

C15.3.7.1. ACM waste shall not be co-mingled with non-ACM waste before landfilling.

C15.3.7.1.1. Asbestos cement pipes may be co-mingled with non-ACM waste when unavoidable; however, it shall be done in a manner that ensures no asbestos fibers are released.

C15.3.7.1.2. Transfer of ACM waste between containers and/or enclosures shall be minimized to the maximum extent practical.

C15.3.8. Department of Defense Dependents Schools will comply with applicable requirements of 15 U.S.C. 2643(1) and implementing regulations in 40 CFR Part 763, Subpart E.

C15.3.9. General Criteria.

C15.3.9.1. Machines operating at high speeds, such as grinders and drills, are prohibited for use on ACM.

C15.3.9.2. Asbestos fibers otherwise generated shall be collected using a type-tested (e.g., HEPA) vacuum cleaner. Dust shall be transported in appropriately sealed containers. The transfer of container contents is prohibited.

C15.3.9.3. During the disassembly of worn friction linings (e.g., brakes, clutches), friction dust shall be collected using a type-tested (e.g., HEPA) vacuum cleaner. A dust-binding wet method is also permitted. Use of compressed air to remove dust is prohibited.

Table C15.T1. Standard Form for the Assessment of Friable Asbestos

Line	Group	Asbestos Products – Assessment of the Urgency of Abatement		
		Building:	**Assessment***	**Assessment Points**
		Room:		
		Product:		
	I	**Type of Asbestos Use**		
1		Sprayed-on asbestos		20
2		Asbestos-containing plaster		10
3		Lightweight asbestos-containing panels		5, 10, or 15
4		Other asbestos-containing products		5, 10, 15, or 20
	II	**Type of Asbestos**		
5		Amphibole asbestos		2
6		Other asbestos		0
	III	**Surface Structure of the Asbestos Product**		
7		Highly friable fiber structure		10
8		Non-friable fiber structure with or without a sufficiently impermeable surface coating		4
9		Coated, impermeable surface		0
	IV	**Surface Condition of the Asbestos Product**		
10		Severe damages		6
11		Minor damages		3
12		No damages		0
	V	**External Impacts on the Asbestos Product**		
13		Product is subjected to impacts via direct access (floor level to arm's reach)		10
14		Product is worked on occasionally		10
15		Product is subjected to physical impacts		10
16		Product is subjected to vibrations		10
17		Product is subjected to severe climatic changes		10
18		Product is located in an area of strong air currents		10
19		Strong air currents are present in the room in which the asbestos product is located		7
20		If handled improperly, the product may be subject to abrasion		3
21		Product is not subject to external impacts		0

Table C15.T1. Standard Form for the Assessment of Friable Asbestos (continued)

	VI	**Room Use**		
22		Room is used regularly by children, youth and athletes		25
23		Room is used constantly or frequently by other persons		20
24		Room is used occasionally		15
25		Room is used only rarely		8
	VII	**Location of the Product**		
26		Directly in the room		25
27		In the ventilation system for the room (in lining or outer wrapping of non-airtight ducts)		25
28		Behind a non-airtight suspended ceiling or paneling		25
29		Behind an airtight suspended ceiling or paneling, behind airtight underpinnings or coatings, or outside of airtight ventilation ducts		0
30		**Sum of the Assessment Points**		
31		Abatement required immediately (Priority Level I)		≥ 80
32		New assessment required in medium term (Priority Level II)		70 – 79
33		New assessment required in the long term (Priority Level III)		< 70

Note:

* Mark the assessment that suits the situation. When in a group more than one assessment is chosen, then because of the sum, only the one with the highest point can be chosen.

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CHAPTER 16 - [RESERVED]

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CHAPTER 17 - LEAD-BASED PAINT

C17.1. SCOPE

This chapter provides 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 Department of Defense Instruction (DoDI) 6055.1, "DoD Safety and Occupational Health (SOH) Program," DoDI 6055.5 "Occupational and Environmental Health (OEH)", 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 two different days within any week, provided that each day's 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, daycare 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 two 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 $\geq$ 1.0 milligram per cm^2, or 0.5% by weight or 5,000 part per million (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 subparagraph 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. Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead $\geq$ 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

C17.2.16.3. Soil-Lead Hazard. Bare soil on residential real property or on the property of a child-occupied facility that contains total lead $\geq$ 400 ppm ($\mu g/g$) 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 onsite 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 windowsills, 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 $\mu g/ft^2$ for floors, >125 $\mu g/ft^2$ for interior windowsills, 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-based paint hazard reduction. In addition, prior to conducting remodeling or renovation projects, inform occupants of military family housing of the hazards associated with these activities, and provide information on protecting family members from the hazards of 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 as hazardous waste in accordance with Chapter 6, “Hazardous Waste.”

CHAPTER 18 - SPILL PREVENTION AND RESPONSE PLANNING

C18.1. SCOPE

This chapter provides 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 4715.08, "Remediation of Environmental Contamination Outside the United States."

C18.2. DEFINITIONS

C18.2.1. Aboveground Storage Container *(Oberirdische Anlagen oder Anlagenteile)*. Hazardous substance storage containers exempt from UST criteria that are normally placed on or above the surface of the ground. Hazardous substance 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. Breakdown in Operations *(Betriebsstörung)*. When the proper functioning of a facility, particularly its safety systems, is no longer ensured. Any deviation from the proper functioning of the facility shall be considered a breakdown in operations. A breakdown in operations includes an event in which there is a release of a hazardous substance from its normal container into secondary containment.

C18.2.3. 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.

C18.2.4. Facility Incident Commander (FIC) (Previously Known as 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 Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

C18.2.6. Hazardous Material. See definition in Chapter 5, "Hazardous Material," C5.2. Definitions.

C18.2.7. Hazardous Substance. See definition in Chapter 5, "Hazardous Material," C5.2. Definitions.

C18.2.8. Hazardous Waste. See definition in Chapter 6, "Hazardous Waste," C6.2. Definitions.

C18.2.9. Oil. Oil of any kind or in any form, including but not limited to petroleum, fuel POL, lube oil, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

C18.2.10. Operating Instructions *(Betriebsanweisung)*. See definition in Chapter 15, "Asbestos," C15.2. Definitions.

C18.2.11. POL. See definition in Chapter 9, "Petroleum, Oil, and Lubricants," C9.2. Definitions.

C18.2.12. Secondary Containment *(Auffangvorrichtung)*. Leakproof constructions, rooms in buildings (fluid retention rooms), and pre-fabricated building components (collecting vats) designed to collect leaking products from tanks, containers, or piping, including leakproof drainage areas designed to channel off leaking products from containers or pipelines. For additional criteria see Chapter 5, "Hazardous Material," C5.2. Definitions.

C18.2.13. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

C18.2.13.1. For hazardous waste or hazardous substances identified as a result of inclusion in Table AP1.T1., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

C18.2.13.2. For POL or liquid or semi-liquid hazardous material, hazardous waste, or hazardous substances in excess of 417 liters (110 gallons);

C18.2.13.3. For other solid hazardous material in excess of 225 kg (500 pounds);

C18.2.13.4. 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

C18.2.13.5. If a spill is contained inside an impervious berm, 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. The spill shall, however, be considered a breakdown in operations (see C18.2.2.).

C18.2.14. Spill *(Schadensfall)*. When a hazardous substance is released contrary to its intended purpose *(bestimmungsgemäßer Betrieb)*.

C18.2.15. 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 AP2., "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 that 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. The plan shall be available in English and the predominant language at the workplace. In addition, work- and substance-related operating instructions *(Betriebsanweisungen)* shall be

available for all workplaces where hazardous substances or dangerous work equipment that may be subject to spills are present.

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; or

C18.3.1.1.3. When there has been a spill of ≥ 3,785 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, 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, as a minimum, include 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 list, 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, certification by experts *(Sachverständige)*, and, where deemed appropriate, another form of non-destructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, etc.), type of hazardous substances stored, and industry standards.

C18.3.2.6. Procedures for periodic inspection for all aboveground 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 signals 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. Operational and security deficiencies shall be promptly corrected.

C18.3.2.14. Written procedures for:

C18.3.2.14.1. Operations to preclude spills of POL and hazardous substances;

C18.3.2.14.2. Inspections; and

C18.3.2.14.3. Recordkeeping requirements.

C18.3.2.15. Site-specific procedures shall be maintained as a part of the operating instructions at each site on the installation where 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. As 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, including 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 the 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 workhours.

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 before 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.

C18.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency; the In-Theater Component Commander and/or Defense

Agency will inform the Lead Environmental Command (LEC), the United States European Command (USEUCOM) and submit a follow-up written report 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 417 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.

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 HN drinking water resource, a water body, a wastewater-treatment plant, or the ground, the appropriate In-Theater Component Commander and/or Defense Agency, the LEC, USEUCOM and the appropriate German authorities will be notified immediately. If the appropriate German authority (*Wasserbehörde* in Hessen and Baden-Württemberg, *Kreisverwaltungsbehörde* in Bayern, and *Untere Wasser-behörde* in Rheinland-Pfalz) cannot be reached, the nearest police station shall be notified. In addition, incidents in which spill prevention and control components or equipment failed or were damaged shall also be reported to the appropriate German authority *(Aufsichtsbehörde)*.

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 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 DoDI 4715.08, “Remediation of Environmental Contamination Outside the United States.”

C18.3.7. The facility operator shall immediately discontinue operations after a spill or other breakdown in operations, unless it is possible to prevent impacting waters of Germany (see Chapter 4, “Wastewater”) or if the discontinuation of operations would cause greater harm.

CHAPTER 19 – UNDERGROUND STORAGE TANKS

C19.1. SCOPE

This chapter provides criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing HW 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." The criteria for general hazardous material storage are addressed in Chapter 5, "Hazardous Material."

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. Piping (*Rohrleitungen*). See Chapter 5, "Hazardous Material," C5.2. Definitions.

C19.2.3. POL. See Chapter 9, "Petroleum, Oil, and Lubricants," C9.2. Definitions.

C19.2.4. Underground Storage Tank (UST) *(Unterirdische Tankanlage)*. Any tank wholly or partially embedded in the ground or in structures that are directly connected to the ground and not easily accessible for visual inspections, including underground piping connected thereto. This definition does not include:

C19.2.4.1. Septic tanks;

C19.2.4.2. Stormwater or wastewater collection systems;

C19.2.4.3. Flowthrough process tanks;

C19.2.4.4. Surface impoundments, pits, ponds, or lagoons;

C19.2.4.5. 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;

C19.2.4.6. UST containing *de minimis* concentrations of regulated substances, except where paragraph C19.3.2.7. is applicable; and

C19.2.4.7. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

C19.2.5. Water-Endangering Substances. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C19.2.6. Water Hazard Category. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C19.2.7. Water Hazard Class. See Chapter 5, "Hazardous Material," C5.2. Definitions.

C19.3. CRITERIA

C19.3.1. All installations will maintain a UST inventory.

C19.3.2. USTs. All UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below. Personnel shall verify that the equipment is in proper condition before commencing the filling or emptying of a UST with a water-endangering substance and supervise the complete filling/emptying process. USTs shall be double-walled.

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. USTs shall be emptied or filled using only rigid piping connections. A spill containment box must be installed around the fillpipe. Overfill prevention will be provided by one of the following methods:

C19.3.2.2.1. Automatic shutoff 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.

C19.3.2.3.1. USTs shall be equipped with a leak-detection system that uses interstitial monitoring as the detection method. Detection methods using automatic tank gauging, vapor monitoring, or groundwater monitoring are not acceptable.

C19.3.2.3.2. All pressurized UST piping must comply with the criteria addressed in Chapter 5, "Hazardous Material."

C19.3.2.3.3. Suction piping will comply with the criteria addressed in Chapter 5, "Hazardous Material."

C19.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced. If USTs used for storing water-endangering substances are no longer required, they shall receive a final inspection by an expert *(Sachverständiger)*.

C19.3.2.5. Any USTs and piping not incorporating a functioning leak-detection system will require immediate corrective action and shall not be operated until corrected.

C19.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking 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 4715.08, "Remediation of Environmental Contamination Outside the United States." 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 1 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.

C19.3.3. UST Recordkeeping. Installations will maintain a tank system inventory, including tank system installation, repair, removal, replacement, or upgrade; operation of corrosion-protection equipment; and tank system inspection reports (e.g., *TÜV*) for the life of the tank.

C19.3.4. Deferred USTs. Deferred USTs constructed after 8 May 1985 shall comply with all UST criteria.

C19.3.5. USTs Located in Water Protection Zone III.

C19.3.5.1. The installation and operation of water hazard category C or D USTs is prohibited in Bayern, Hessen, and Rheinland-Pfalz.

C19.3.5.2. The installation and operation of USTs is prohibited in Baden-Württemberg if the below capacity limits are exceeded:

Water Hazard Class *(WGK)*	**Capacity Limit (m^3)**
1	1,000
2	40
3	1[1]

[1] A capacity limit of 40 m^3 is applicable for fuel stored at filling stations.

C19.3.5.3. These prohibitions may be waived by the appropriate German Federal State authority.

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APPENDIX 1 – HAZARDOUS SUBSTANCES LIST

Table AP1.T1. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No. [1]	RQ (Pounds) [2]
Acenaphthene	83329	100
Acenaphthylene	208968	5,000
Acetaldehyde (I)	75070	1,000
Acetaldehyde, chloro-	107200	1,000
Acetaldehyde, trichloro-	75876	5,000
Acetamide	60355	100
Acetamide, N-(aminothioxomethyl)-	591082	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442	100
Acetamide, 2-fluoro-	640197	100
Acetamide, N-9H-fluoren-2-yl-	53963	1
Acetic acid	64197	5,000
Acetic acid (2,4-dichlorophenoxy)-salts and esters	94757	100
Acetic acid, lead(2+) salt	301042	10
Acetic acid, thallium(1+) salt	563688	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765	1,000
Acetic acid, ethyl ester (I)	141786	5,000
Acetic acid, fluoro-, sodium salt	62748	10
Acetic anhydride	108247	5,000
Acetone (I)	67641	5,000
Acetone cyanohydrin	75865	10
Acetone thiosemicarbazide	1752303	1
Acetonitrile (I,T)	75058	5,000
Acetophenone	98862	5,000
2-Acetylaminofluorene	53963	1
Acetyl bromide	506967	5,000
Acetyl chloride (C,R,T)	75365	5,000
1-Acetyl-2-thiourea	591082	1
Acrolein	107028	1
Acrylamide	79061	5,000
Acrylic acid (I)	79107	5,000
Acrylonitrile	107131	100
Acrylyl chloride	814686	1
Adipic acid	124049	5,000
Adiponitrile	111693	1
Aldicarb	116063	1
Aldrin	309002	1
Allyl alcohol	107186	100
Allylamine	107119	1
Allyl chloride	107051	1,000
Aluminum phosphide (R,T)	20859738	100
Aluminum sulfate	10043013	5,000
4-Aminobiphenyl	92671	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
5-(Aminomethyl)-3-isoxazolol	2763964	1,000
Aminopterin	54626	1
4-Aminopyridine	504245	1,000
Amiton	78535	1
Amiton oxalate	3734972	1
Amitrole	61825	10
Ammonia	7664417	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 5972736 14258492	5,000
Ammonium picrate I	131748	10
Ammonium silicofluoride	16919190	1,000
Ammonium sulfamate	7773060	5,000
Ammonium sulfide	12135761	100
Ammonium sulfite	10196040	5,000
Ammonium tartrate	14307438 3164292	5,000
Ammonium thiocyanate	1762954	5,000
Ammonium vanadate	7803556	1,000
Amphetamlne	300629	1
Amyl acetate	628637	5,000
Iso-Amyl acetate	123922	
Sec-Amyl acetate	626380	
Tert-Amyl acetate	625161	
Aniline (I,T)	62533	5,000
Aniline, 2,4,6- trimethyl	88051	1
o-Anisidine	90040	100
Anthracene	120127	5,000
Antimony++	7440360	5,000
Antimony pentachloride	7647189	1,000
Antimony pentafluoride	7783702	1
Antimony potassium tartrate	28300745	100
Antimony tribromide	7789619	1,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Antimony trichloride	10025919	1,000
Antimony trifluoride	7783564	1,000
Antimony trioxide	1309644	1,000
Antimycin A	1397940	1
ANTU (Thiourea 1-Naphthalenyl)	86884	100
Argentate(1-), bis(cyano-C)-, potassium	506616	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 7778394	1
Arsenic disulfide	1303328	1
Arsenic oxide As_2O_3	1327533	1
Arsenic oxide As_2O_5	1303282	1
Arsenic pentoxide	1303282	1
Arsenic trichloride	7784341	1
Arsenic trioxide	1327533	1
Arsenic trisulfide	1303339	1
Arsenous oxide	1327533	1
Arsenous trichloride	7784341	5,000
Arsine	7784421	1
Arsine, diethyl-	692422	1
Arsinic acid, dimethyl-	75605	1
Arsorous dichloride, phenyl-	696286	1
Asbestos+++	1332214	1
Auramine	492808	100
Azaserine	115026	1
Aziridine	151564	1
Azindine, 2-methyl-	75558	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	10
Azinphos-ethyl	2642719	100
Azinphos-methyl	86500	1
Barium cyanide	542621	10
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495	10
Benz[c]acridine	225514	100
Benzal chloride	98873	5,000
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23950585	5,000
Benz[a]anthracene	56553	10
1,2-Benzanthracene	56553	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Benz[a]anthracene, 7,12-dimethyl-	57976	1
Benzenamine (I,T)	62533	5,000
Benzenamine, 3-(Trifluoromethyl)	98168	1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808	100
Benzenamine, 4-chloro-	106478	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933	100
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117	10
Benzenamine, 2-methyl-	95534	100
Benzenamine, 4-methyl-	106490	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144	10
Benzenamine, 2-methyl-, hydrochloride	636215	100
Benzenamine, 2-methyl-5-nitro-	99558	100
Benzenamine, 4-nitro-	100016	5,000
Benzene (I,T)	71432	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	1
Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156	10
Benzene, 1-bromo-4-phenoxy-	101553	100
Benzenearsonic Acid	98055	1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033	10
Benzene, chloro-	108907	100
Benzene, chloromethyl-	100447	100
Benzenediamin, ar-methyl-	25376458 95807 496720 823405	10
1,2-Benzenedicarboxylic acid, dioctyl ester	117840	5,000
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817	100
1,2-Benzenedicarboxylic acid, dibutyl ester	84742	10
1,2-Benzenedicarboxylic acid, diethyl ester	84662	1,000
1,2-Benzenedicarboxylic acid, dimethyl ester	131113	5,000
Benzene, 1,2-dichloro-	95501	100
Benzene, 1,3-dichloro-	541731	100
Benzene, 1,4-dichloro-	106467	100
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548	1
Benzene, dichloromethyl-	98873	5,000
Benzene, 1,3-diisocyanotomethyl- (R,T)	584849 91087 264716254	100
Benzene, dimethyl (I,T)	1330207	100
m-Benzene, dimethyl	108383	1,000
o-Benzene, dimethyl	95476	1,000
p-Benzene, dimethyl	106423	100
1,3-Benzenediol	108463	5,000
1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- (R) -	51434	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098	5,000
Benzene, hexachloro-	118741	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Benzene, hexahydro- (I)	110827	1,000
Benzene, hydroxy-	108952	1,000
Benzene, methyl-	108883	1,000
Benzene, 2-methyl-1,3-dinitro-	606202	100
Benzene, 1-methyl-2,4-dinitro-	121142	10
Benzene, 1-methylethyl- (I)	98828	5,000
Benzene, nitro-	98953	1,000
Benzene, pentachloro-	608935	10
Benzene, pentachloronitro-	82688	100
Benzenesulfonic acid chloride (C,R)	98099	100
Benzenesulfonyl chloride	98099	100
Benzene, 1,2,4,5-tetrachloro-	95943	5,000
Benzenethiol	108985	100
Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro-	50293	1
Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435	1
Benzene, (trichloromethyl)-	98077	10
Benzene, 1,3,5-trinitro-	99354	10
Benzidine	92875	1
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	1
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072	100
Benzo[a]anthracene	56553	10
Benzo[b]fluoranthene	205992	1
Benzo[k]fluoranthene	207089	5,000
Benzo[j,k]fluorene	206440	100
1,3-Benzodioxole, 5-(1-propenyl)-	120581	100
1,3-Benzodioxole, 5-(2-propenyl)-	94597	100
1,3-Benzodioxole, 5-propyl-	94586	10
Benzoic acid	65850	5,000
Benzonitrile	100470	5,000
Benzo[rst]pentaphene	189559	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	100
Benzo[a]pyrene	50328	1
3,4-Benzopyrene	50328	1
p-Benzoquinone	106514	10
Benzotrichloride (C,R,T)	98077	10
Benzoyl chloride	98884	1,000
1,2-Benzphenanthrene	218019	100
Benzyl chloride	100447	100
Benzyl cyanide	140294	1
Beryllium++	7440417	10
Beryllium chloride	7787475	1
Beryllium fluoride	7787497	1
Beryllium nitrate	13597994 7787555	1
alpha-BHC	319846	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
beta-BHC	319857	1
delta-BHC	319868	1
gamma-BHC	58899	1
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	1
2,2'-Bioxirane	1464535	10
Biphenyl	92524	100
(1,1'-Biphenyl)-4,4'diamine	92875	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904	10
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937	10
Bis(chloromethyl) ketone	534076	1
Bis(2-chloroethyl)ether	111444	10
Bis(2-chloroethoxy)methane	111911	1,000
Bis(2-ethylhexyl)phthalate	117817	100
Bitoscanate	4044659	1
Boron trichloride	10294345	1
Boron trifluoride	7637072	1
Boron trifluoride compound with methyl ether (1:1)	353424	1
Bromoacetone	598312	1,000
Bromadiolone	28772567	1
Bromine	7726956	1
Bromoform	75252	100
4-Bromophenyl phenyl ether	101553	100
Brucine	357573	100
1,3-Butadiene	106990	10
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683	1
1-Butanamine, N-butyl-N-nitroso-	924163	10
1-Butanol	71363	5,000
2-Butanone	78933	5,000
2-Butanone peroxide (R,T)	1338234	10
2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamno)carbonyl] oxime	39196184	100
2-Butenal	123739 4170303	100
2-Butene, 1,4-dichloro- (I,T)	764410	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	10
Butyl acetate	123864	5,000
iso-Butyl acetate	110190	
sec-Butyl acetate	105464	
tert-Butyl acetate	540885	
n-Butyl alcohol (I)	71363	5,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Butylamine	109739	1,000
iso-Butylamine	78819	
sec-Butylamine	513495	
tert-Butylamine	13952846 75649	
Butyl benzyl phthalate	85687	100
n-Butyl phthalate	84742	10
Butyric acid	107926	5,000
iso-Butyric acid	79312	
Cacodylic acid	75605	1
Cadmium++ (2+)	7440439	10
Cadmium acetate	543908	10
Cadmium bromide	7789426	10
Cadmium chloride	10108642	10
Cadmium oxide	1306190	1
Cadmium stearate	2223930	1
Calcium arsenate	7778441	1
Calcium arsenite	52740166	1
Calcium carbide	75207	10
Calcium chromate	13765190	10
Calcium cyanamide	156627	1,000
Calcium cyanide Ca(CN)2	592018	10
Calcium dodecylbenzenesulfonate	26264062	1,000
Calcium hypochlorite	7778543	10
Camphechlor	8001352	1
Camphene, octachloro-	8001352	1
Cantharidin	56257	1
Carbachol chloride	51832	1
Caprolactum	105602	5,000
Captan	133062	10
Carbamic acid, ethyl ester	51796	100
Carbamic acid, methylnitroso-, ethyl ester	615532	1
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	1
Carbamic chloride, dimethyl-	79447	1
Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546	5,000
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164	100
Carbaryl	63252	100
Carbofuran	1563662	10
Carbon disulfide	75150	100
Carbon oxyfluoride (R,T)	353504	1,000
Carbon tetrachloride	56235	10
Carbonic acid, dithallium(1+) salt	6533739	100
Carbonic dichloride	75445	10
Carbonic difluoride	353504	1,000
Carbonochloridic acid, methyl ester	79221	1,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
Carbonyl Sulfide	463581	100
Carbophenothion	786196	1
Catechol	120809	100
Chloral	75876	5,000
Chlorambem	133904	100
Chlorambucil	305033	10
Chlordane	57749	1
Chlordane, alpha & gamma isomers	57749	1
Chlordane, technical	57749	1
Chlorfenvinfos	470906	1
Chlorinated champhene (Campheclor)	8001352	1
Chlorine	7782505	10
Chlormephos	24934916	1
Chlormequat chloride	999815	1
Chlornaphazine	494031	100
Choroacetaldehyde	107200	1,000
Chloroacetophenone	532274	100
Chloroacetic acid	79118	100
p-Chloroaniline	106478	1,000
Chlorobenzene	108907	100
Chlorobenzilate	510156	10
p-Chloro-m-cresol (4)	59507	5,000
1-Chloro-2,3-epoxypropane	106898	100
Chlorodibromomethane	124481	100
Chloroethane	75003	100
Chloroethanol	107073	1
Chloroethyl chlorofomate	627112	1
2-Chloroethyl vinyl ether	110758	1,000
Chloroform	67663	10
Chloromethane	74873	100
Chloromethyl ether	542881	1
Chloromethyl methyl ether	107302	10
beta-Chloronaphthalene	91587	5,000
2-Chloronaphthalene	91587	5,000
Chlorophacinone	3691358	1
o-Chlorophenol (2)	95578	100
4-Chlorophenyl phenyl ether	7005723	5,000
1-(o-Chlorophenyl)thiourea	5344821	100
Chloroprene	126998	100
3-Chloropropionitrile	542767	1,000
Chlorosulfonic acid	7790945	1,000
4-Chloro-o-toluidine, hydrochloride	3165933	100
Chlorpyrifos	2921882	1
Chloroxuron	1982474	1
Chlorthiophos	21923239	1
Chromic acetate	1066304	1,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Chromic acid	11115745 7738945	10
Chromic acid H_2CrO_4, calcium salt	13765190	10
Chromic chloride (Chromium chloride)	10025737	1
Chromic sulfate	10101538	1,000
Chromium++	7440473	5,000
Chromous chloride	10049055	1,000
Chrysene	218019	100
Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-,	62207765	1
Cobaltous bromide	7789437	1,000
Cobalt carbonyl	10210681	1
Cobaltous formate	544183	1,000
Cobaltous sulfamate	14017415	1,000
Coke Oven Emissions	NA	1
Colchicine	64868	1
Copper++	7440508	5,000
Copper cyanide	544923	10
Coumaphos	56724	10
Coumatetralyl	5836293	1
Creosote	8001589	1
Cresol(s) (Phenol, Methyl)	1319773	100
m-Cresol	108394	100
o-Cresol	95487	100
p-Cresol	106445	100
Cresylic acid	1319773	100
m-Cresylic acid	108394	100
o-Cresylic acid	95487	100
p-Cresylic acid	106445	100
Crimidine	535897	1
Crotonaldehyde	123739 4170303	100 100
Cumene (I)	98828	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	10
Cyanogen	460195	100
Cyanogen bromide	506683	1,000
Cyanogen chloride	506774	10
Cyanogen iodide (Iodine cyanide)	506785	1
Cyanophos	2636262	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Cyanuric fluoride	675149	1
2,5-Cyclohexadiene-1,4-dione	106514	10
Cyclohexane (I)	110827	1,000
Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)-	58899	1
Cyclohexanone (I)	108941	5,000
2-Cyclohexanone	131895	100
Cycloheximide	66819	1
Cyclohexylamine	108918	1
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474	10
Cyclophosphamide	50180	10
2,4-D Acid	94757	100
2,4-D Ester	94111 94791 94804 1320189 1928387 1928616 1929733 2971382 25168267 53467111	100
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757	100
Daunomycin	20830813	10
Decarborane(14)	17702419	1
Demeton	8065483	1
Demeton-S-Methyl	919868	1
DDD, 4,4'DDD	72548	1
DDE, 4,4'DDE	72559	1
DDT, 4,4'DDT	50293	1
DEHP (Diethylhexyl phthalate)	117817	100
Diallate	2303164	100
Dialifor	10311849	1
Diazinon	333415	1
Diazomethane	334883	100
Dibenz[a,h]anthracene	53703	1
1,2:5,6-Dibenzanthracene	53703	1
Dibenzo[a,h]anthracene	53703	1
Dibenzofuran	132649	100
Dibenz[a,i]pyrene	189559	10
1,2-Dibromo-3-chloropropane	96128	1
Dibromoethane	106934	1
Diborane	19287457	1
Dibutyl phthalate	84742	10
Di-n-butyl phthalate	84742	10
Dicamba	1918009	1,000
Dichlobenil	1194656	100
Dichlone	117806	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Dichlorobenzene	25321226	100
m-Dichlorobenzene (1,3)	541731	100
o-Dichlorobenzene (1,2)	95501	100
p-Dichlorobenzene (1,4)	106467	100
3,3'-Dichlorobenzidine	91941	1
Dichlorobromomethane	75274	5,000
1,4-Dichloro-2-butene (I,T)	764410	1
Dichlorodifluoromethane	75718	5,000
1,1-Dichloroethane	75343	1,000
1,2-Dichloroethane	107062	100
1,1-Dichloroethylene	75354	100
1,2-Dichloroethylene	156605	1,000
Dichloroethyl ether	11444	10
Dichloroisopropyl ether	108601	1,000
Dichloromethoxy ethane	111911	1,000
Dichloromethyl ether	542881	10
Dichloromethylphenylsilane	149746	1
2,4-Dichlorophenol	120832	100
2,6-Dichlorophenol	87650	100
Dichlorophenylarsine	696286	1
Dichloropropane	26638197	1,000
1,1-Dichloropropane	78999	
1,3-Dichloropropane	142289	
1,2-Dichloropropane	78875	1,000
Dichloropropane--Dichloropropene (mixture)	8003198	100
Dichloropropene	26952238	100
2,3-Dichloropropene	78886	
1,3-Dichloropropene	542756	100
2,2-Dichloropropionic acid	75990	5,000
Dichlorvos	62737	10
Dicofol	115322	10
Dicrotophos	141662	1
Dieldrin	60571	1
1,2:3,4-Diepoxybutane (I,T)	1464535	10
Diethanolamine	111422	100
Diethyl chlorophosphate	814493	1
Diethylamine	109897	1,000
Diethylarsine	692422	1
Diethylcarbmazine citrate	1642542	1
1,4-Diethylenedioxide	123911	100
Diethylhexyl phthalate	117817	100
N,N-Diethylaniline	91667	1,000
N,N'-Diethylhydrazine	1615801	10
O,O-Diethyl S-methyl dithiophosphate	3288582	5,000
Diethyl-p-nitrophenyl phosphate	311455	100
Diethyl phthalate	84662	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972	100

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Diethylstilbestrol	56531	1
Diethyl sulfate	64675	10
Digitoxin	71636	1
Diglycidyl ether	2238075	1
Digoxin	20830755	1
Dihydrosafrole	94586	10
Diisopropyfluorophosphate	55914	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	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	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	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	1
Dimethoate	60515	10
3,3'-Dimethoxybenzidine	119904	10
Dimefox	115264	1
Dimethoate	60515	10
Dimethyl Phosphorochloridothioate	2524030	1
Dimethyl sulfate	77781	100
Dimethylamine (I)	124403	1,000
p-Dimethylaminoazobenzene	60117	10
7,12-Dimethylbenz[a]anthracene	57976	1
3,3'-Dimethylbenzidine	119937	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159	10
Dimethylcarbamoyl chloride	79447	1
Dimethylformamide	68122	100
Dimethyldichlorosilane	75785	1
1,1-Dimethylhydrazine	57147	10
1,2-Dimethylhydrazine	540738	1
alpha, alpha-Dimethylphenethylamine	122098	5,000
Dimethyl-p-phenylenediamine	99989	1
2,4-Dimethylphenol	105679	100
Dimethyl phthalate	131113	5,000
Dimethyl sulfate	77781	100
Dimetilan	644644	1
Dinitrobenzene (mixed)	25154545	100
m-Dinitrobenzene	99650	
o-Dinitrobenzene	528290	
p-Dinitrobenzene	100254	
4,6-Dinitro-o-cresol and salts	534521	10
Dinitrophenol	25550587	10
2,5-Dinitrophenol	329715	
2,6-Dinitrophenol	573568	

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
2,4-Dinitrophenol	51285	10
Dinitrotoluene	25321146	10
3,4-Dinitrotoluene	610399	
2,4-Dinitrotoluene	121142	10
2,6-Dinitrotoluene	606202	100
Dinoseb	88857	1,000
Dinoterb	1420071	1
Di-n-octyl phthalate	117840	5,000
1,4-Dioxane	123911	100
Dioxathion	78342	1
Diphacinone	82666	1
1,2-Diphenylhydrazine	122667	10
Diphosphoramide, octamethyl-	152169	100
Diphosphoric acid, tetraethyl ester	107493	10
Dipropylamine	142847	5,000
Di-n-propylnitrosamine	621647	10
Diquat	85007 2764729	1,000
Disulfoton	298044	1
Dithiazanine iodide	514738	1
Dithiobiuret	541537	100
Diuron	330541	100
Dodecylbenzenesulfonic acid	27176870	1,000
Emetine, Dihydrochloride	316427	1
Endosulfan	115297	1
alpha-Endosulfan	959988	1
beta-Endosulfan	33213659	1
Endosulfant sulfate	1031078	1
Endothall	145733	1,000
Endothion	2778043	1
Endrin	72208	1
Endrin aldehyde	7421934	1
Endrin & metabolites	72208	1
Epichlorohydrin	106898	100
Epinephrine	51434	1,000
EPN	2104645	1
1,2-Epoxybutane	106887	100
Ergocalciferol	50146	1
Ergotamine tartrate	379793	1
Ethanal	75070	1,000
Ethanamine, N-ethyl-N-nitroso-	55185	1
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805	5,000
Ethane, 1,2-dibromo-	106934	1
Ethane, 1,1-dichloro-	75343	1,000
Ethane, 1,2-dichloro-	107062	100
Ethanedinitrile	460195	100
Ethane, hexachloro-	67721	100

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	111911	1,000
Ethane, 1,1'-oxybis-	60297	100
Ethane, 1,1'-oxybis(2-chloro-	111444	10
Ethane, pentachloro-	76017	10
Ethanesulfonyl chloride, 2-chloro	1622328	1
Ethane, 1,1,1,2-tetrachloro-	630206	100
Ethane, 1,1,2,2-tetrachloro-	79345	100
Ethanethioamide	62555	10
Ethane, 1,1,1-trichloro-	71556	1,000
Ethane, 1,1,2-trichloro-	79005	100
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752775	100
Ethanol, 1,2-Dichloro-, acetate	10140871	1
Ethanol, 2-ethoxy-	110805	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547	1
Ethanone, 1-phenyl-	98862	5,000
Ethene, chloro-	75014	1
Ethene, 2-chloroethoxy-	110758	1,000
Ethene, 1,1-dichloro-	75354	100
Ethene, 1,2-dichloro- (E)	156605	1,000
Ethene, tetrachloro-	127184	100
Ethene, trichloro-	79016	100
Ethion	563122	10
Ethoprophos	13194484	1
Ethyl acetate (I)	141786	5,000
Ethyl acrylate (I)	140885	1,000
Ethylbenzene	100414	1,000
Ethylbis(2-Chloroethyl)amine	538078	1
Ethyl carbamate (urethane)	51796	100
Ethyl chloride	75003	100
Ethyl cyanide	107120	10
Ethylenebisdithiocarbamic acid, salts & esters	111546	5,000
Ethylenediamine	107153	5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004	5,000
Ethylene dibromide	106934	1
Ethylene dichloride	107062	100
Ethylene fluorohydrin	371620	1
Ethylene glycol	107211	5,000
Ethylene glycol monoethyl ether	110805	1,000
Ethylene oxide (I,T)	75218	10
Ethylenediamine	107153	5,000
Ethylenethiourea	96457	10
Ethyleneimine	151564	1
Ethyl ether (I)	60297	100
Ethylthiocyanate	542905	1
Ethylidene dichloride	75343	1,000
Ethyl methacrylate	97632	1,000
Ethyl methanesulfonate	62500	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Famphur	52857	1,000
Fenamlphos	22224926	1
Fenltrothion	122145	1
Fensulfothion	115902	1
Ferric ammonium citrate	1185575	1,000
Ferric ammonium oxalate	2944674 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
Ferrous sulfate	7720787 7782630	1,000
Fluenetil	4301502	1
Fluoranthene	206440	100
Fluorene	86737	5,000
Fluorine	7782414	10
Fluoroacetamide	640197	100
Fluoracetic acid	144490	1
Fluoroacetic acid, sodium salt	62786	10
Fluoroacetyl chloride	359068	1
Fluorouracil	51218	1
Fonofos	944229	1
Formaldehyde	50000	100
Formaldehyde cyanohydrin	107164	1
Formetanate hydrochloride	23422539	1
Formothion	2540821	1
Formparanate	17702577	1
Formic acid (C,T)	64186	5,000
Fosthletan	21548323	1
Fubendazole	3878191	1
Fulminic acid, mercury(2^-) salt (R,T)	628864	10
Fumaric acid	110178	5,000
Furan (I)	110009	100
Furan, tetrahydro- (I)	109999	1,000
2-Furancarboxaldehyde (I)	98011	5,000
2,5-Furandione	108316	5,000
Furfural (I)	98011	5,000
Furfuran (I)	110009	100
Gallium trichloride	13450903	1
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664	1
Glycidylaldehyde	765344	10
Glycol ethers[3]		**
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Guthion	86500	1
Heptachlor	76448	1
Heptachlor epoxide	1024573	1
Hexachlorobenzene	118741	10
Hexachlorobutadiene	87683	1
Hexachlorocyclohexane (gamma isomer)	58899	1
Hexachlorocyclopentadiene	77474	10
Hexachloroethane	67721	100
Hexachlorophene	70304	100
Hexachloropropene	1888717	1,000
Hexaethyl tetraphosphate	757584	100
Hexamethylene-1, 6-diisocyanate	822060	100
Hexamethylphosphoramide	680319	1
Hexamethylenediamine, N,N'-Dibutyl	4835114	1
Hexane	110543	5,000
Hexone (Methyl isobutyl ketone)	108101	5,000
Hydrazine (R,T)	302012	1
Hydrazine, 1,2-diethyl-	1615801	10
Hydrazine, 1,1-dimethyl-	57147	10
Hydrazine, 1,2-dimethyl-	540738	1
Hydrazine, 1,2-diphenyl-	122667	10
Hydrazine, methyl-	60344	10
Hydrazinecarbothioamide	79196	100
Hydrochloric acid	7647010	5,000
Hydrocyanic acid	74908	10
Hydrofluoric acid	7664393	100
Hydrogen chloride (gas only)	7647010	5,000
Hydrogen cyanide	74908	10
Hydrogen fluoride	7664393	100
Hydrogen peroxide (Conc. >52%)	7722841	1
Hydrogen phosphide	7803512	100
Hydrogen selenide	7783075	1
Hydrogen sulfide	7783064	100
Hydroperoxide, 1-methyl-1-phenylethyl-	80159	10
Hydroquinone	123319	100
2-Imidazolidinethione	96457	10
Indeno(1,2,3-cd)pyrene	193395	100
Iodomethane	74884	100
Iron, Pentacarbonyl-	13463406	1
Isobenzan	297789	1
1,3-Isobenzofurandione	85449	5,000
Isobutyronitrile	78820	1
Isobutyl alcohol (I,T)	78831	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	1
Isodrin	465736	1
Isofluorphate	55914	100
Isophorone	78591	5,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
Isophorone Diisocyanate	4098719	1
Isoprene	78795	100
Isopropanolamine dodecylbenzene sulfonate	42504461	1,000
Isopropyl chloroformate	108236	1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	1
Isosafrole	120581	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964	1,000
Kepone	143500	1
Lactonitrile	78977	1
Lasiocarpine	303344	10
Lead acetate	301042	#
Lead arsenate	7784409 7645252 10102484	1
Lead, bis(acetato-O)tetrahydroxytri	1335326	10
Lead chloride	7758954	10
Lead fluoborate	13814965	10
Lead fluoride	7783462	10
Lead iodide	10101630	10
Lead nitrate	10099748	10
Lead phosphate	7446277	10
Lead stearate	7428480 1072351 52652592 56189094	10
Lead subacetate	1335326	10
Lead sulfate	15739807 7446142	10
Lead sulfide	1314870	10
Lead thiocyanate	592870	10
Leptophos	21609905	1
Lewisite	541253	1
Lindane	58899	1
Lithium chromate	14307358	10
Lithium hydride	7580678	1
Malathion	121755	100
Maleic acid	110167	5,000
Maleic anhydride	108316	5,000
Maleic hydrazide	123331	5,000
Malononitrile	109773	1,000
Manganese, tricarbonyl methylcyclopentadienyl	12108133	1
MDI (Methylene diphenyl diisocyanate)	101688	5,000
Mechlorethamine	51752	1
MEK (Methyl ethyl ketone)	78933	5,000
Melphalan	148823	1
Mephosfolan	950107	1
Mercaptodimethur	2032657	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Mercuric acetate	1600277	1
Mercuric chloride	7487947	1
Mercuric cyanide	592041	1
Mercuric nitrate	10045940	10
Mercuric oxide	21908532	1
Mercuric sulfate	7783359	10
Mercuric thiocyanate	592858	10
Mercurous nitrate	10415755 7782867	10
Mercury	7439976	1
Mercury (acetate-O)phenyl-	62384	100
Mercury fulminate	628864	10
Methacrolein diacetate	10476956	1
Methacrylic anhydride	760930	1
Methacrylonitrile (I,T)	126987	1,000
Methacryloyl chloride	920467	1
Methacryloyloxyethyl isocyanate	30674807	1
Methamidophos	10265926	1
Methanamine, N-methyl-	124403	1,000
Methanamine, N-methyl-N-nitroso-	62759	10
Methane, bromo-	74839	1,000
Methane, chloro- (I,T)	74873	100
Methane, chloromethoxy-	107302	1
Methane, dibromo-	74953	1,000
Methane, dichloro-	75092	1,000
Methane, dichlorodifluoro-	75718	5,000
Methane, iodo-	74884	100
Methane, isocyanato-	624839	10
Methane, oxybis(chloro-	542881	1
Methanesulfenyl chloride, trichloro-	594423	100
Methanesulfonyl fluoride	558258	1
Methanesulfonic acid, ethyl ester	62500	1
Methane, tetrachloro-	56235	10
Methane, tetranitro- (R)	509148	10
Methane, tribromo-	75252	100
Methane, trichloro-	67663	10
Methane, trichlorofluoro-	75694	5,000
Methanethiol (I,T)	74931	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	1
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one,1,1a,3,3a,4,5,5a,5b,6-decachloroctahydro-	143500	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro-	76448	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro-	57749	1
Methanol (I)	67561	5,000
Methapyrilene	91805	5,000
Methidathion	950378	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
Methiocarb	2032657	10
Methomyl	16752775	100
Methoxychlor	72435	1
Methoxyethylmercuric acetate	151382	1
Methyl alcohol (I)	67561	5,000
Methyl aziridine	75558	1
Methyl bromide	74839	1,000
1-Methylbutadiene (I)	504609	100
Methyl chloride (I,T)	74873	100
Methyl 2-chloroacrylate	80637	1
Methyl chlorocarbonate (I,T)	79221	1,000
Methyl chloroform	71556	1,000
Methyl chloroformate	79221	1,000
3-Methylcholanthrene	56495	10
4,4'-Methylenebis(2-chloroaniline)	101144	10
Methylene bromide	74953	1,000
Methylene chloride	75092	1,000
4,4'-Methylenedianiline	101779	10
Methylene diphenyl diisocyanate (MDI)	101688	5,000
Methyl ethyl ketone (MEK) (I,T)	78933	5,000
Methyl ethyl ketone peroxide (R,T)	1338234	10
Methyl hydrazine	60344	10
Methyl iodide	74884	100
Methyl isobutyl ketone	108101	5,000
Methyl isocyanate	624839	10
Methyl isothiocyanate	556616	1
2-Methyllactonitrile	75865	10
Methyl mercaptan	74931	100
Methyl methacrylate (I,T)	80626	1,000
Methyl parathion	298000	100
Methyl phenkapton	3735237	1
Methyl phosphonic dichloride	676971	1
4-Methyl-2-pentanone (I)	108101	5,000
Methyl tert-butyl ether	1634044	1,000
Methyl thiocyanate	556649	1
Methylthiouracil	56042	10
Methyl vinyl ketone	78944	1
Methylmercuric dicyanamide	502396	1
Methyltrichlorosilane	75796	1
Metolcarb	1129415	1
Mevinphos	7786347	10
Mexacarbate	315184	1,000
Mitomycin C	50077	10
MNNG	70257	10
Monocrotophos	6923224	1
Monoethylamine	75047	100
Monomethylamine	74895	100

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Muscimol	2763964	1,000
Mustard gas	505602	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	10
1-Naphthalenamine	134327	100
2-Naphthalenamine (beta-Naphthylamine)	91598	1
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031	100
Naphthalene	91203	100
Naphthalene, 2-chloro-	91587	5,000
1,4-Naphthalenedione	130154	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	10
Naphthenic acid	1338245	100
1,4-Naphthoquinone	130154	5,000
alpha-Naphthylamine	134327	100
beta-Naphthylamine (2-Naphthalenamine)	91598	1
alpha-Naphthylthiourea	86884	100
Nickel++	7440020	100
Nickel ammonium sulfate	15699180	100
Nickel carbonyl	13463393	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393	10
Nickel chloride	7718549 37211055	100
Nickel cyanide	557197	10
Nickel hydroxide	12054487	10
Nickel nitrate	14216752	100
Nickel sulfate	7786814	100
Nicotine & salts	54115	100
Nicotine sulfate	65305	1
Nitric acid	7697372	1,000
Nitric acid, thallium(1+) salt	10102451	100
Nitric oxide	10102439	10
p-Nitroaniline	100016	5,000
Nitrobenzene (I,T)	98953	1,000
4-Nitrobiphenyl	92933	10
Nitrocyclohexane	1122607	1
Nitrogen dioxide	10102440 10544726	10
Nitrogen oxide	10102439	10
Nitroglycerine	55630	10
Nitrophenol (mixed)	25154556	100
m-Nitrophenol	554847	100
o-Nitrophenol (2)	88755	100
p-Nitrophenol (4)	100027	100
2-Nitropropane (I,T)	79469	10
N-Nitrosodi-n-butylamine	924163	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
N-Nitrosodiethanolamine	1116547	1
N-Nitrosodiethylamine	55185	1
N-Nitrosodimethylamine	62759	10
N-Nitrosodiphenylamine	86306	100
N-Nitroso-N-ethylurea	759739	1
N-Nitroso-N-methylurea	684935	1
N-Nitroso-N-methylurethane	615532	1
N-Nitrosomethylvinylamine	4549400	10
N-Nitrosomorpholine	59892	1
N-Nitrosopiperidine	100754	10
N-Nitrosopyrrolidine	930552	1
Nitrotoluene	1321126	1,000
m-Nitrotoluene	99081	
o-Nitrotoluene	88722	
p-Nitrotoluene	99990	
5-Nitro-o-toluidine	99558	100
Norbromide	991424	1
Octamethylpyrophosphoramide	152169	100
Organorhodium complex (PMN-82-147)	0	1
Osmium tetroxide	20816120	1,000
Ouabain	630604	1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733	1,000
Oxamyl	23135220	1
1,2-Oxathiolane, 2,2-dioxide	1120714	10
2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180	10
Oxetane, 3,3-bis(chloromethyl)-	78717	1
Oxirane (I,T)	75218	10
Oxiranecarboxyaldehyde	765344	10
Oxirane, (chloromethyl)-	106898	100
Oxydisulfoton	2497076	1
Ozone	10028156	1
Paraformaldehyde	30525894	1,000
Paraldehyde	123637	1,000
Paraquat	1910425	1
Paraquat methosulfate	2074502	1
Parathion	56382	10
Parathion-methyl	298000	100
Paris green	12002038	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

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
PCNB (Pentachloronitrobenzene)	82688	100
Pentaborane	19624227	1
Pentachlorobenzene	608935	10
Pentachloroethane	76017	10
Pentachlorophenol	87865	10
Pentachloronitrobenzene (PCNB)	82688	100
Pentadecylamine	2570265	1
Paracetic acid	79210	1
1,3-Pentadiene (I)	504609	100
Perachloroethylene	127184	100
Perchloromethylmercaptan	594423	100
Phenacetin	62442	100
Phenanthrene	85018	5,000
Phenol	108952	1,000
Phenol, 2-chloro-	95578	100
Phenol, 4-chloro-3-methyl-	59507	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895	100
Phenol, 2,4-dichloro-	120832	100
Phenol, 2,6-dichloro-	87650	100
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531	1
Phenol, 2,4-dimethyl-	105679	100
Phenol, 2,4-dinitro-	51285	10
Phenol, methyl-	1319773	1,000
m-Cresol	108394	
o-Cresol	95487	
p-Cresol	106445	
Phenol, 2-methyl-4,6-dinitro-and salts	534521	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	1
Phenol, 4-nitro-	100027	100
Phenol, pentachloro-	87865	10
Phenol, 2,3,4,6-tetrachloro-	58902	10
Phenol, 2,4,5-trichloro-	95954	10
Phenol, 2,4,6-trichloro-	88062	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748	10
Phenoxarsine, 10,10'-oxydi-	58366	1
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823	1
Phenyl dichloroarsine	696286	1
1,10-(1,2-Phenylene)pyrene	193395	100
p-Phenylenediamine	106503	5,000
Phenylhydrazine hydrochloride	59881	1
Phenylmercury acetate	62384	100
Phenylsilatrane	2097190	1
Phenylthiourea	103855	100
Phorate	298022	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Phosacetim	4104147	1
Phosfolan	947024	1
Phosgene	75445	10
Phosmet	732116	1
Phosphamidon	13171216	1
Phosphine	7803512	100
Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester	2587908	1
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	1
Phosphoric acid	7664382	5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	1
Phosphoric acid, lead(2+) salt (2:3)	7446277	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515	10
Phosphorofluondic acid, bis(1-methylethyl) ester	55914	100
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857	1,000
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972	100
Phosphorus	7723140	1
Phosphorus oxychloride	10025873	1,000
Phosphorous pentachloride	10026138	1
Phosphorus pentasulfide (R)	1314803	100
Phosphorus pentoxide	1314563	1
Phosphorus trichloride	7719122	1,000
Phthalic anhydride	85449	5,000
Physostigmine	57476	1
Phosostigmine, salicylate (1:1)	57647	1
2-Picoline	109068	5,000
Picotoxin	124878	1
Piperidine	110894	1
Piperidine, 1-nitroso-	100754	10
Pirimifos-ethyl	23505411	1
Plumbane, tetraethyl-	78002	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363	1
Potassium arsenate	7784410	1
Potassium arsenite	10124502	1
Potassium bichromate	7778509	10
Potassium chromate	7789006	10
Potassium cyanide	151508	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Potassium hydroxide	1310583	1,000
Potassium permanganate	7722647	100
Potassium silver cyanide	506616	1
Promecarb	2631370	1
Pronamide	23950585	5,000
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063	1
1-Propanamine (I,T)	107108	5,000
1-Propanamine, N-propyl-	142847	5,000
1-Propanamine, N-nitroso-N-propyl-	621647	10
Propane, 1,2-dibromo-3-chloro	96128	1
Propane, 2-nitro- (I,T)	79469	10
1,3-Propane sultone	1120714	10
Propane 1,2-dichloro-	78875	1,000
Propanedinitrile	109773	1,000
Propanenitrile	107120	10
Propanenitrile, 3-chloro-	542767	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865	10
Propane, 2,2'-oxybis[2-chloro-	108601	1,000
1,2,3-Propanetnol, trinitrate- (R)	55630	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727	10
1-Propanol, 2-methyl- (I,T)	78831	5,000
2-Propanone (I)	67641	5,000
2-Propanone, 1-bromo-	598312	1,000
Propargite	2312358	10
Propargyl alcohol	107197	1,000
Propargyl bromide	106967	1
2-Propenal	107028	1
2-Propenamide	79061	5,000
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717	1,000
1-Propene, 1,3-dichloro-	542756	100
2-Propenenitrile	107131	100
2-Propenenitrile, 2-methyl- (I,T)	126987	1,000
2-Propenoic acid (I)	79107	5,000
2-Prepenoic acid, ethyl ester (I)	140885	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626	1,000
2-Propen-1-o1	107186	100
Propiolactone, beta-	57578	1
Propionaldehyde	123386	1,000
Propionic acid	79094	5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721	100
Propionic anhydride	123626	5,000
Propoxor (Baygon)	114261	100
Propionitrile	107120	10
Propionitrile, 3-chloro-	542767	1,000
Propiophenone, 1, 4-amino phenyl	70699	1
n-Propylamine	107108	5,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Propyl chloroformate	109615	1
Propylene dichloride	78875	1,000
Propylene oxide	75569	100
1,2-Propylenimine	75558	1
2-Propyn-1-o1	107197	1,000
Prothoate	2275185	1
Pyrene	129000	5,000
Pyrethrins	121299 121211 8003347	1
3,6-Pyridazinedione, 1,2-dihydro-	123331	5,000
4-Pyridinamine	504245	1,000
Pyridine	110861	1,000
Pyridine, 2-methyl-	109068	5,000
Pyridine, 2-methyl-5-vinyl-	140761	1
Pyridine, 4-amino-	504245	1,000
Pyridine, 4-nitro-, 1-oxide	1124330	1
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)	54115	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042	10
Pyriminil	53558251	1
Pyrrolidine, 1-nitroso-	930552	1
Quinoline	91225	5,000
Quinone (p-Benzoquinone)	106514	10
Quintobenzene	82688	100
Reserpine	50555	5,000
Resorcinol	108463	5,000
Saccharin and salts	81072	100
Salcomine	14167181	1
Sarin	107448	1
Safrole	94597	100
Selenious acid	7783008	10
Selenious acid, dithallium (1+) salt	12039520	1,000
Selenium ++	7782492	100
Selenium dioxide	7446084	10
Selenium oxychloride	7791233	1
Selenium sulfide (R,T)	7488564	10
Selenourea	630104	1,000
Semicarbazide hydrochloride	563417	1
L-Serine, diazoacetate (ester)	115026	1
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1
Silver ++	7440224	1,000
Silver cyanide	506649	1
Silver nitrate	7761888	1
Silvex (2,4,5-TP)	93721	100
Sodium	7440235	10
Sodium arsenate	7631892	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
Sodium arsenite	7784465	1
Sodium azide	26628228	1,000
Sodium bichromate	10588019	10
Sodium bifluoride	1333831	100
Sodium bisulfite	7631905	5,000
Sodium cacodylate	124652	1
Sodium chromate	7775113	10
Sodium cyanide	143339	10
Sodium dodecylbenzenesulfonate	25155300	1,000
Sodium fluoride	7681494	1,000
Sodium fluoroacetate	62748	10
Sodium hydrosulfide	16721805	5,000
Sodium hydroxide	1310732	1,000
Sodium hypochlorite	7681529 10022705	100
Sodium methylate	124414	1,000
Sodium nitrite	7632000	100
Sodium prentachlorophenate	131522	1
Sodium phosphate, dibasic	7558794 10039324 10140655	5,000
Sodium phosphate, tribasic	7601549 7758294 7785844 10101890 10124568 10361894	5,000
Sodium selenate	13410010	1
Sodium selenite	10102188 7782823	100
Sodium tellurite	10102202	1
Stannane, acetoxytriphenyl	900958	1
Streptozotocin	18883664	1
Strontium chromate	7789062	10
Strychnidin-10-one	57249	10
Strychnidin-10-one, 2,3-dimethoxy-	357573	100
Strychnine, & salts	572494	10
Strychnine sulfate	60413	1
Styrene	100425	1,000
Styrene oxide	96093	100
Sulfotep	3689245	100
Sulfoxide, 3-chloropropyl octyl	3569571	1
Sulfur monochloride	12771083	1,000
Sulfur dioxide	7446095	1
Sulfur phosphide (R)	1314803	100
Sulfur tetrafluoride	7783600	1
Sulfur trioxide	7446119	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
Sulfuric acid	7664939 8014957	1,000
Sulfuric acid, dithallium (1+) salt	7446186 10031591	100
Sulfuric acid, dimethyl ester	77781	100
Tabun	77816	1
2,4,5-T acid	93765	1,000
2,4,5-T amines	2008460 1319728 3813147 6369966 6369977	5,000
Tellurium	13494809	1
Tellurium hexafluoride	7783804	1
2,4,5-T esters	93798 1928478 2545597 25168154 61792072	1,000
2,4,5-T salts	13560991	1,000
2,4,5-T	93765	1,000
TDE (Dichloro diphenyl dichloroethane)	72548	1
TEPP (Tetraethyl ester diphosphoric acid)	107493	10
Terbufos	13071799	1
1,2,4,5-Tetrachlorobenzene	95943	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016	1
1,1,1,2-Tetrachloroethane	630206	100
1,1,2,2-Tetrachloroethane	79345	100
Tetrachloroethene	127184	100
Tetrachloroethylene	127184	100
2,3,4,6-Tetrachlorophenol	58902	10
Tetraethyl lead	78002	10
Tetraethyl pyrophosphate	107493	10
Tetraethyldithiopyrophosphate	3689245	100
Tetraethyltin	597648	1
Tetramethyllead	75741	1
Tetrahydrofuran (I)	109999	1,000
Tetranitromethane (R)	509148	10
Tetraphosphoric acid, hexaethyl ester	757584	100
Thallic oxide	1314325	100
Thallium ++	7440280	1,000
Thallium acetate	563688	100
Thallium carbonate	6533739	100
Thallium chloride	7791120	100
Thallium nitrate	10102451	100
Thallium oxide	1314325	100
Thallium selenite	12039520	1,000

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Thallium sulfate	7446186 10031591	100
Thallous carbonate (Thallium (I) carbonate)	6533739	100
Thallous chloride (Thallium (I) chloride)	7791120	100
Thallous malonate (Thallium (I) malonate)	2757188	1
Thallous sulfate (Thallium (I) sulfate)	7446186	100
Thioacetamide	62555	10
Thiocarbazide	2231574	1
Thiodiphosphoric acid, tetraethyl ester	3689245	100
Thiofanox	39196184	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537	100
Thiomethanol (I,T)	74931	100
Thionazin	297972	100
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl-	137268	10
Thiophenol	108985	100
Thiosemicarbazide	79196	100
Thiourea	62566	10
Thiourea, (2-chlorophenyl)-	5344821	100
Thiourea, (2-methylphenyl)-	614788	1
Thiourea, 1-naphthalenyl-	86884	100
Thiourea, phenyl-	103855	100
Thiram	137268	10
Titanium tetrachloride	7550450	1,000
Toluene	108883	1,000
Toluenediamine	95807 496720 823405 25376458	10
Toluene diisocyanate (R,T)	584849 91087 26471625	100
o-Toluidine	95534	100
p-Toluidine	106490	100
o-Toluidine hydrochloride	636215	100
Toxaphene	8001352	1
2,4,5-TP acid	93721	100
2,4,5-TP acid esters	32534955	100
1H-1,2,4-Triazol-3-amine	61825	10
Trans-1,4-dichlorobutene	110576	1
Triamiphos	1031476	1
Triazofos	24017478	1
Trichloroacetyl chloride	76028	1
Trichlorfon	52686	100
1,2,4-Trichlorobenzene	120821	100
1,1,1-Trichloroethane	71556	1,000
1,1,2-Trichloroethane	79005	100

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.** [1]	**RQ (Pounds)** [2]
Trichloroethene	79016	100
Trichloroethylene	79016	100
Trichloroethylsilane	115219	1
Trichloronate	327980	1
Trichloromethanesulfenyl chloride	594423	100
Trichloromonofluoromethane	75694	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	10
2,4,6-Trichlorophenol	88062	10
3,4,5-Trichlorophenol	609198	
Trichlorophenylsilane	98135	1
Trichloro(chloromethyl)silane	1558254	1
Trichloro(dichlorophenyl)silane	27137855	1
Triethanolamine dodecylbenzene-sulfonate	27323417	1,000
Triethoxysilane	998301	1
Trifluralin	1582098	10
Triethylamine	121448	5,000
Trimethylamine	75503	100
Trimethylchlorsilane	75774	1
2,2,4-Trimethylpentane	540841	1,000
Trimethylolpropane phosphite	824113	1
Trimethyiltin chloride	1066451	1
1,3,5-Trinitrobenzene (R,T)	99354	10
1,3,5-Trioxane, 2,4,6-trimethyl-	123637	1,000
Triphenyltin chloride	639587	1
Tris(2-chloroethyl)amine	555771	1
Tris(2,3-dibromopropyl) phosphate	126727	10
Trypan blue	72571	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA	100
Unlisted Hazardous Wastes Characteristic of **Corrosivity**	NA	100
Unlisted Hazardous Wastes Characteristic of **Reactivity**	NA	100
Unlisted Hazardous Wastes Characteristic of **Toxicity**		

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No. [1]	RQ (Pounds) [2]
Arsenic		1
Barium		1,000
Benzene		10
Cadmium		10
Carbon Tetrachloride		10
Chlordane		1
Chlorobenzene		100
Chloroform		10
Chromium		10
o-Cresol		100
m-Cresol		100
p-Cresol		100
Cresol		100
2,4-D (Dichlorophenoxyacetic acid)		100
1,4-Dichlorobenzene		100
1,2-Dichloroethane		100
1,1-Dichloroethylene		100
2,4-Dinitrotoluene		10
Endrin		1
Heptachlor (and epoxide)		1
Hexachlorobenzene		10
Hexachlorobutadiene		1
Hexachloroethane		100
Lead		10
Lindane		1
Mercury		1
Methoxychlor		1
Methyl ethyl ketone		5,000
Nitrobenzene		1,000
Pentachlorophenol		10
Pyridine		1,000
Selenium		10
Silver		1
Tetrachloroethylene		100
Toxaphene		1
Trichloroethylene		100
2,4,5 Trichlorophenol		10
2,4,5-TP		100
Vinyl chloride		1
Uracil mustard	66751	10
Uranyl acetate	541093	100
Uranyl nitrate	10102064 36478769	100
Urea, N-ethyl-N-nitroso	759739	1
Urea, N-methyl-N-nitroso	684935	1
Urethane (Carbamic acid ethyl ester)	51796	100
Valinomycin	2001958	1

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No. [1]**	**RQ (Pounds) [2]**
Vanadic acid, ammonium salt	7803556	1,000
Vanadic oxide V_20_5	1314621	1,000
Vanadic pentoxide	1314621	1,000
Vanadium pentoxide	1314621	1,000
Vanadyl sulfate	27774136	1,000
Vinyl chloride	75014	1
Vinyl acetate	108054	5,000
Vinyl acetate monomer	108054	5,000
Vinylamine, N-methyl-N-nitroso-	4549400	10
Vinyl bromide	593602	100
Vinylidene chloride	75354	100
Warfarin, & salts, when present at concentrations > 0.3%	81812	100
Warfarin sodium	129066	100
Xylene (mixed)	1330207	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	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	5,000
Zinc ++	7440666	1,000
Zinc acetate	557346	1,000
Zinc ammonium chloride	52628258 14639975 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	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	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	100
Zinc phosphide Zn_3P_2, when present at concentrations > 10%	1314847	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

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No. [1]	USEPA HW No. [4]	RQ (Pounds) [2]
F001		**F001**	**10**
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ≥ 10% (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% (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.			
(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 t ifluoroethane	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

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

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.		
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 sludge from metal heat treating operations where cyanides are used in the process.		
F019	**F019**	**10**
Wastewater-treatment sludge 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 list 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 list 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 list does not include light ends, spent filters and filter aids, spent dessicants (sic), wastewater, wastewater-treatment sludge, spent catalysts, and wastes listed in section 261.32.)		
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 and up to and including five, with varying amounts and positions of chlorine substitution.		

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

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.		
F027	**F027**	**1**
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This list 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 numbers F020, F021, F022, F023, F026, and F027.		
F032	**F032**	**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 currently use or have previously used clorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as HW (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This list 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 list 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 list 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 wastewaters and oily cooling wastewaters 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 stormwater units receiving dry weather flow. Sludge generated in stormwater 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 generated in aggressive biological treatment units as defined in 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment unites) and K051 wastes are not included in this list.		
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 wastewaters 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 stormwater units that do not receive dry weather flow, sludges generated from once-through non-contact cooling waters segregated from treatment from other process or oil cooling wastes, sludges and floats generated in aggressive biological treatment units as defined in 261.31(b) (2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this list.		

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K001	**K001**	**1**
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or 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.		
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.		

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

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**
Byproduct 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.		
K043	**K043**	**10**
2,6-Dichlorophenol waste from the production of 2,4-D.		
K044	**K044**	**10**
Wastewater-treatment sludge from the manufacturing and processing of explosives.		
K045	**K045**	**10**
Spent carbon from the treatment of wastewater containing explosives.		
K046	**K046**	**10**
Wastewater-treatment sludge 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.		

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

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 or 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.		
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.		

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.	**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.	**K099**	**10**
K100 Waste leaching solution from acid leaching of emission control dust or sludge from secondary lead smelting.	**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.	**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.	**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	**K105**	**10**
K106 Wastewater-treatment sludge from the mercury cell process in chlorine production.	**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines.	**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K109**	**10**
K110 Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.	**K111**	**10**
K112 Reaction byproduct water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K114**	**10**
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.	**K116**	**10**

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.	**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.	**K118**	**1**
K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.	**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.	**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.	**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.	**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.	**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.	**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	**K136**	**1**
K141 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 byproducts produced from coal. This list does not include K087 (decanter tank tar sludge from coking operations).	**K141**	**1**
K142 Tar storage tank residues from the production of coke or from the recovery of coke byproducts produced from coal.	**K142**	**1**
K143 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 byproducts produced from coal.	**K143**	**1**
K144 Wastewater-treatment sludge from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke byproducts produced from coal.	**K144**	**1**
K145 Residues from naphthalene collection and recovery operations from the recovery of coke byproducts produced from coal.	**K145**	**1**
K147 Tar storage tank residues from coal tar refining.	**K147**	**1**
K148 Residues from coal tar distillation, including, but not limited to still bottoms.	**K148**	**1**
K149 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.)	**K149**	10
K150 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.	**K150**	10

Table AP1.T1. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K151	**K151**	10
Wastewater-treatment sludge, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl 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 list 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 list does not include K125 or K126.)		

Notes:

[1] Chemical Abstract Service (CAS) Registry Number.

[2] Reportable quantity release that requires notification. (See Chapter 18, "Spill Prevention and Response Planning").

[3] 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.

[4] U.S. Environmental Protection Agency hazardous waste number (USEPA HW no.).

++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is ≥ 100 micrometers (0.004 inches).

+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.

# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.

1* Indicates that the 1-pound RQ is a statutory RQ.

** Indicates that no RQ is being assigned to the generic or broad class.

(1+) Indicates that the statutory source for designation of this hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is Clean Water Act (CWA) section 311(b)(4).

(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 30711(a)(4).

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 ≥ 39,747 liters (10,500 gallons or 250 barrels), the WCD planning volume is calculated as follows:

AP2.3.1. Where applicable, the loss of the entire capacity of all inline and breakout tanks 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 aboveground 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 aboveground storage containers at the facility have adequate secondary containment, the worst-case planning volume equals the total aboveground oil and hazardous substance storage capacity at the facility.

AP2.4.2.2. Facilities having complete secondary containment. If every aboveground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single aboveground oil or hazardous substance storage container.

AP2.4.2.3. Facilities having partial secondary containment. If some, but not all aboveground 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 aboveground oil and hazardous substance storage container that lacks adequate secondary containment; plus

AP2.4.2.3.2. The capacity of the largest single aboveground 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.