CHAPTER XII

ENVIRONMENTAL DESIGN

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1. **PURPOSE:**

The Department of Defense is committed to environmental stewardship as an integral part of its mission. Federal facilities shall at all times be designed, constructed, operated, and maintained in compliance with all applicable Federal, State, and local environmental regulations, including permit requirements. Based on this principle, new designs shall be accomplished in a manner which complies with all applicable environmental laws, eliminates or at least reduces potential sources of pollution, and preserves natural and cultural resources for future generations. In addition to developing environmentally sound designs, necessary measures shall be included in the plans and specifications to eliminate or minimize degradation of the environment during construction.

This chapter provides guidance on the environmental issues to be addressed during the design phase of a project. It is not intended to be all-inclusive. The designer is responsible for identifying all environmental laws and regulations applicable to each project and for ensuring that the project design is accomplished in accordance with them. The following references provide general environmental design guidance applicable to all projects designed by and for the Corps of Engineers.

1.1 **Reference.**

1.1.1 Executive Order (E.O.) 11514, "Protection and Enhancement of Environmental Quality," March 5, 1970, as amended by E.O. 11991, May 24, 1977

1.1.2 E.O. 12088, "Federal Compliance with Pollution Control Standards", October 13, 1978 as amended by E.O. 13148 “Greening The Government Through Leadership In Environmental Management”, April 22, 2000.

1.1.3 DOD Directive 5100-50, "Protection and Enhancement of Environmental Quality," May 24, 1973

1.1.4 DOD Directive 4120-14, "Environmental Pollution Prevention, Control, and Abatement," August 30, 1977

1.1.5 EM 385-1-1, "COE Safety and Health Requirements Manual," September 3, 1996

1.1.6 COE Military Handbook - 1190 (Only for Military Projects), "Facility Planning and Design Guide," 01 September 1987, Chapter 2 Environmental Quality

1.1.7 AR 200-2 (Only for Military Projects), "Environmental Effects of Army Actions," March 29, 2002

1.1.8 EM 1110-2-38 (Only for Civil Works Projects), "Environmental Quality in Design of Civil Works Projects," 3 May 1971

1.1.9 ETL 1110-3-491, “Sustainable Design for Military Facilities,” 1 May, 2001

1.1.10 E.O. 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition", September 14, 1998.

1.1.11 E.O. 13148 “Greening The Government Through Leadership In Environmental Management”, April 22, 2000

2. **CULTURAL AND NATURAL RESOURCES:**

2.1 **General Reference.**

2.1.1 Public Law (P.L.) 91-190, "The National Environmental Policy Act of 1969", as amended, 42 U.S.C. 4321, et seq.

2.1.2 Title 40, Code of Federal Regulations (CFR) 1501-1508, "Council on Environmental Quality Regulations on Implementing National Environmental Policy Act"

2.1.3 P.L. 93-205, "Endangered Species Act of 1973," as amended, 16 U.S.C. 1531, et seq.

2.1.4 P.L. 89-665, "National Historic Preservation Act of 1966," as amended by P.L. 95-515, December 12, 1980, 16 U.S.C. 470, et seq.

2.1.5 P.L. 96-95, "Archaeological Resources Protection Act of 1979", as amended, 16 U.S.C. 470 aa-11

2.1.6 P.L. 101-601, "Native American Graves Protection and Repatriation Act (NAGPRA) of 1990", 25 U.S.C. 3001 et seq.

2.1.7 P.L. 95-341, "American Indian Religious Freedom Act of 1978," as amended, 42 U.S.C. 1996 et seq.

2.1.8 Regulatory Program of the Corps of Engineers, 33 CFR Parts 320-330 (inclusive)

2.1.9 E.O. 11593, "Protection and Enhancement of the Cultural Environment"

2.1.10 ER 1130-2-540, "Environmental Stewardship and Maintenance Guidance and Procedures," November 15, 1996

2.1.11 E.O. 11990, "Protection of Wetlands", May 24, 1977

2.1.12 EP 1130-2-540, "Environmental Stewardship and Maintenance Guidance and Procedures," November 15, 1996

2.1.13 ER 200-2-2, "Procedures for Implementing NEPA," March 4, 1988.

2.2 **National Environmental Policy Act (NEPA).** In accordance with AR 200-2, the installation will prepare the NEPA documentation and provide it to the Project Manager, who is responsible for providing it to the design team. If the NEPA documentation is not received, the designer should request it at the pre-design conference. At a minimum, the documentation will consist of Section 15 of DD Form 1391 for military projects and Record of Environmental Consideration, if appropriate. In many cases, the documentation will consist of an Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS) with a Record of Decision (ROD). The design should address any issues raised in the environmental section of DD Form 1391. In addition, the design shall include any mitigation plans, monitoring requirements and/or protective measures identified in the EA or EIS. In some cases, the project will be covered under a categorical exclusion from further NEPA considerations. However, the exclusion does not exempt the project from compliance with all related laws and regulations, such as the National Historic Preservation Act, etc...

2.3 **Protection of Historic Properties.** In Section 18 of the DD Form 1391, the installation will identify any historic properties impacted by the project, will conduct a survey if necessary and describe the coordination with State Historic Preservation Officer and Advisory Council. As a result of their investigation, the installation will indicate if special design criteria apply. If no information on historic properties is provided, the designer should request it at the pre-design conference.

2.4 **Protection of Cultural Resources.** The installation will determine if the project impacts any known archeological sites, Native American cultural sites, or other cultural resources and will indicate if any special design considerations are necessary due to the presence of these resources. NAGPRA requires that Native American cultural items be excavated from Federal land only pursuant to an agreement resulting from consultation with concerned Native American groups. The installation is responsible for the coordination. If the installation has identified Native American cultural resources at the project site, the designer should modify the specifications to comply with the agreement. If no information on cultural resources of any type is provided, the designer should request this information at the pre-design conference.

2.5 **Protection of Endangered Species.** The installation will determine if the project might affect any endangered or threatened species and if so, will coordinate with the U.S. Fish and Wildlife Service to determine appropriate protection measures. If endangered species are present, the contract drawings shall indicate the areas in which no construction activity may occur, and/or other requirements of the Fish and Wildlife Service Biological Opinion. Additional requirements may be provided by the installation. If no information about endangered species is provided, the designer should request this information at the pre-design conference.

2.6 **Wetlands and Floodplains.** In Section 16 of DD Form 1391, the installation will identify whether the project is within a floodplain or a wetland area. If no information is provided, the designer should request this information at the pre-design conference. The project site shall be developed in accordance with all permit requirements of Section 404 of the Clean Water Act.

3. **WATER QUALITY AND PREVENTION OF WATER POLLUTION:**

Innovative treatment technologies and pollution prevention practices should be considered in the design.

3.1 **General Reference.**

3.1.1 P.L. 92-500, "Clean Water Act of 1972," as amended, including Public Law 100-4, "Water Quality Act of 1987", 33 U.S.C. 1341 et seq.

3.1.2 P.L. 93-523, "Safe Drinking Water Act," as amended, 42 U.S.C. 300f et seq.

3.1.3 TM 5-814-8, "Evaluation Criteria Guide for Water Pollution Prevention, Control, and Abatement Programs," April 23, 1987

3.2 **Water Supply.**

3.2.1 Reference.

3.2.1.1 TM 5-813-1/AFM 88-10, Vol. 1, "Water Supply Sources and General Considerations," 4 June 1987

3.2.1.2 TM 5-813-3/AFM 88-10, Vol. 3, "Water Supply, Water Treatment," 16 September 1985

3.2.1.3 TM 5-813-4/AFM 88-10, Vol. 4, "Water Supply, Water Storage," 20 September 1985

3.2.1.4 TM 5-813-5/AFM 88-10, Vol. 5, "Water Supply, Water Distribution," November 3, 1986

3.2.1.5 TM 5-813-7/AFM 88-10, Vol. 7, "Water Supply for Special Projects" September 2, 1986

3.2.1.6 TM 5-813-8/AFM 88-10, Vol. 8, "Water Desalination," September 15, 1986

3.2.1.7 EM 1110-2-503, "Design of Small Water Systems," 27 February 1999

3.2.1.8 54 Federal Register (FR) 27488, June 29, 1989, “Surface Water Treatment Rule”

3.2.1.9 56 FR 26460, June 7, 1991, "Lead and Copper Rule"

3.2.1.10 American Water Works Association (AWWA) Standards

3.2.2 Design Guidance. In many cases, water supply design of the new facility is merely an additional connection to an existing water supply system. For these projects, the designer should verify that the pressure, quantity, and quality of the existing water supply are adequate to support all equipment within the new facility. If they are not adequate, the facility design should include the items necessary to provide the required pressure, quantity, and quality; i.e. booster pumps, water softeners, etc. Additional criteria for routine designs is presented in the Water Distribution section of Chapter II - Civil.

Projects located in remote areas usually require new distribution lines. Some projects will also require new supply and treatment facilities. Design of these facilities shall be in accordance with the references listed. Where new water wells are required, the water well specification will be provided by the Corps of Engineers, and the designer shall incorporate the information into the contract drawings. For treatment and storage facility designs, the designer shall coordinate with the using service to determine needs and operating capabilities. The design shall provide for a water supply which meets the primary drinking water standards of the Safe Drinking Water Act. At a minimum, the design shall provide the same level of treatment as the existing system, and it shall be fully compatible with the existing system. The use of innovative treatment technology is encouraged. Controls for the new facility shall be connected to the installation's Energy Monitoring and Control System (EMCS), unless directed otherwise by the installation.

3.3 **Municipal Wastewater.**

3.3.1 Reference.

3.3.1.1 TM 5-814-1/AFM 88-11, Vol. 1, "Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances," March 4, 1985

3.3.1.2 TM 5-814-2/AFM 88-11, Vol. 2, "Sanitary and Industrial Wastewater Collection - Pumping Stations and Force Mains," March 15, 1985

3.3.1.3 TM 5-814-3/AFM 88-11, Vol. 3, "Domestic Wastewater Treatment," August 31, 1988

3.3.1.4 EM 1110-1-501, "Process Design Manual for Land Treatment of Municipal Wastewater," May 1982

3.3.1.5 EM 1110-2-501 "Small Wastewater Systems" February 01, 1999

3.3.1.6 EM 1110-2-503 "Design of Small Water Systems," February 27, 1999

3.3.1.7 ETL 1110-3-442, "Ultraviolet Disinfection at Army Wastewater Treatment Facilities," August 24, 1992

3.3.1.8 National Sanitation Foundation (NSF) Standards

3.3.2 Design Guidance. For many projects, wastewater design consists of a routine connection to an existing sanitary sewer system. In these cases, verify that the existing lines are capable of conveying the additional wastewater volume from the new facility. If the system is not adequate, the designer is responsible for notifying the Project Manager, who will coordinate with the installation to determine how the problem will be addressed. Additional criteria for routine designs is discussed in the Sanitary Sewers section of Chapter II - Civil.

Projects located in remote areas often require additional sewer lines, lift stations, pneumatic ejectors, and/or on-site sewage facilities. Design of these facilities shall be in accordance with the references listed. Lift stations are a relatively common design feature, with the following design criteria often not met: 1) The lift station must have a minimum of two pumps, 2) Pumping capacity shall be adequate to discharge the peak flowrate with the largest pump out of service, 3) Each pump shall be capable of passing solids up to 3 inches in diameter, 4) Pumps shall be provided with lifting chains and guide rails, and 5) The maximum retention time in the wet well shall not exceed 30 minutes to prevent septicity. Pre-fabricated, package lift stations are acceptable for small stations pumping extreme peak flowrates of less than 700 gpm, as defined in TM 5-814-1. A performance-type specification is required for a package lift station. A package lift station may not be specified by providing a manufacturer's name and model number.

For treatment facility designs, designers must coordinate with the using service to determine needs and operating capabilities. Septic tanks with leach field or evapo-transpiration (ET) beds shall be used for small, remote facilities where connections to existing sewer lines are not feasible. Wastewater treatment plant additions shall be fully compatible with the existing treatment plant. Unless the life cycle cost of an innovative treatment method exceeds the life cycle cost of the most cost- effective alternative by more than 15 percent, all designs of new wastewater treatment plants and wastewater treatment plant additions shall utilize innovative treatment processes and techniques, such as recycle and reuse techniques, land treatment, etc... Best Available Technology (BAT) shall be used where required by the Clean Water Act.

3.4 **Industrial Wastewater.**

3.4.1 Reference.

3.4.1.1 TM 5-814-1, "Sanitary and Industrial Wastewater Collection - Gravity Sewers and Appurtenances," March 4, 1985

3.4.1.2 TM 5-814-2, "Sanitary and Industrial Wastewater Collection - Pumping Stations and Force Mains," March 15, 1985

3.4.1.3 ETL 1110-3-481,"Containment and Disposal of Aqueous Film-Forming Foam (AFFF) Solution", May 23, 1997

3.4.1.4 American Petroleum Institute (API) Pub. No. 421-90, "Monographs on Refinery Environmental Control - Management of Water Discharges, Design and Operation of Oil-Water Separators," First Edition

3.4.1.5 Appropriate treatment design guidance as listed under the Municipal Wastewater section of this chapter

3.4.1.6 ETL 1110-3-466, "Selection and Design of Oil/Water Separators at Army Facilities", August 26, 1994.

3.4.2 Design Guidance. Prior to discharge into a sanitary sewer, appropriate pretreatment (i.e. acid neutralization basins, oil/water separators) of industrial wastewater shall be included in the design. If the discharge ultimately reaches a Publicly Owned Treatment Works (POTW), the design shall comply with all pretreatment requirements of the POTW. Discharge of

industrial wastewater, including wastewater that has been pretreated, to a storm drain system is not permitted. An exception may be made only if written authorization is provided by the installation's environmental office which is responsible for wastewater and/or storm water permitting.

Oil-water separators and grease traps are the most common pretreatment methods. Grease traps shall provide a minimum detention time of 30 minutes. The invert of the outlet pipe should be located at least one pipe diameter below the invert of the inlet pipe.

Oil-water separators shall be designed in accordance with API Publication Number 421-90, ETL 1110-3-466, and with the Oil-Water Separators section of Chapter II - Civil. Depending on the type of industrial activity, new storm water regulations (See Storm Water section of this chapter) may require outdoor oil-water separators to be sized to handle the storm water runoff. Many Air Force installations are requiring the designer to use a standard design for an oil-water separator based on HQ SAC/DEE letter of 1 Aug 91, subject: Oil/Water Separator Design Criteria. The design is based on a design flow of 100 gpm. If this standard design is requested by the installation, verify that it is appropriate for the intended use. Coordinate design alternatives with the using service, if the standard design is not adequate.

Aqueous Film Forming Foam (AFFF) acts as a toxicant to natural environments and biological treatment systems. If AFFF is to be included in a facility design, contact the installation to determine if the treatment plant receiving waste from the facility is capable of handling an AFFF surge. If not, the facility shall be designed within the restrictions of the receiving treatment plant. Also, evaluate the size of the sanitary sewer lines to verify that they can accommodate the volume of flow that would result. At no time may AFFF be discharged to the storm drainage system. If there is no feasible way to discharge the AFFF to the sanitary sewer system, provide a retention pond with an impermeable liner to impound the AFFF flow for collection and proper disposal.

Historically, floor drains and trenches have been provided in maintenance shops and other industrial facilities regardless of the need for them. Coordinate with the installation to determine if the facility requires floor drains to meet operational requirements. If not, the design should minimize

the potential for unplanned and untreated industrial releases by limiting floor drains to rooms and areas that require them for facility operation. If floor drains are necessary, ensure that chemical storage and use areas within the room are separated from the drains by curbing or other structural method to prevent accidental releases. The drains should flow into the sewer system, storm water collection system, or other retention area. The environmental shop should be consulted with to ensure the proper collection requirements.

3.5 **Storm Water.**

3.5.1 Reference.

3.5.1.1 55 Federal Register (FR) 47990, November 16, 1990, "National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges," 40 CFR Parts 122, 123, and 124

3.5.1.2 57 FR 41209, September 9, 1992, "Final NPDES General Permits for Storm Water Discharges from Construction Sites"

3.5.1.3 57 FR 41297, September 9, 1992, "Final NPDES General Permits for Storm Water Discharges Associated with Industrial Activity"

3.5.1.4 ETL 1110-1-151, "Erosion Control to Meet NPDES Requirements," November 30, 1991

3.5.1.5 60 FR 50804, "Final National Pollutant Discharge Elimination System Storm Water Multi-Sector General Permit for Industrial Activities", September 29, 1995

3.5.1.6 63 FR 7858, "Reissuance of NPDES General Permits for Storm Water Discharges From Construction Activities", February 17, 1998.

3.5.1.7 63 FR 36490, "Reissue of NPDES General Permits for Storm Water Discharges from Construction Activities in Region 6", July 6, 1998.

3.5.1.8 63 FR 52430, "Final Modification of the National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities; Termination of the EPA NPDES Storm Water Baseline Industrial General Permit", September 30, 1998.

3.5.1.9 64 FR 68722, "National Pollutant Discharge Elimination System Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges", December 8, 1999

3.5.1.10 40 CFR 122.26 “Storm water discharges”

3.5.2 Design Guidance. Current policy is that the Corps will obtain the NPDES Storm Water Discharge Permit for Construction Contracts. In compliance with the requirements of a General Permit for Storm Water Discharges from Construction Sites, designers shall prepare and submit to the Project Manager a storm water pollution prevention plan (SWPPP) for all sites 5 acres in size or greater. A December 8, 1999 EPA final rule designates that construction sites (equal to or greater than 1 acre and less than 5 acres) must also be addressed in the NPDES program by March 2003. Construction that disturbs less than an acre of land, but which is part of a larger common plan of development or sale that will ultimately disturb an acre or more must be permitted, unless the activities qualify for a waiver. Many states and municipalities are issuing storm water criteria that are more stringent than the Federal requirements. The SWPPP must meet all State and local storm water requirements in addition to the Federal requirements. The Corps of Engineers will be responsible for submitting the Notice of Intent (NOI) and pollution prevention plan for each project. Pollution prevention measures must be in place before any construction or other earth disturbance may take place.

The designer is responsible for coordinating with the Technical Leader and the installation to determine if the installation will be obtaining a storm water permit for operation of the new facility. If the installation will be obtaining a storm water permit to operate the facility, the design shall include any features necessary for the level of storm water monitoring and Best Management Practices (BMP) required by the permit. If an operational storm water permit is not required, the Corps of Engineers will assist the installation in preparing the Notice of Termination (NOT) of the construction storm water permit once all construction activities for the project have been completed and all areas are finally stabilized.

4. **AIR QUALITY AND PREVENTION OF AIR POLLUTION:**

4.1 **Reference.**

4.1.1 P.L. 91-604, "Clean Air Act," as amended, including P.L. 101-549, "Clean Air Act Amendments of 1990", 42 U.S.C. 1857h-7, et seq., 42 U.S.C. 7401 et seq.

4.1.2 40 CFR Part 82, "Protection of Stratospheric Ozone"

4.1.3 TM 5-815-1, "Air Pollution Control Systems for Boilers and Incinerators," May 9, 1988

4.1.4 ASHRAE Standard 62-1989, "Ventilation for Acceptable Indoor Air Quality"

4.1.5 ETL 1110-3-438, "Indoor Radon Prevention and Mitigation," September 15, 1993

4.2 **Design Guidance.** Identify any air emissions from the new facility that are regulated under the Clean Air Act. At a minimum, emissions containing asbestos, beryllium, carbon monoxide, hydrocarbons, mercury, oxides of nitrogen, particulates, and/or sulfur dioxide must be provided with emission controls in accordance with the Clean Air Act. In addition, the designer is responsible for meeting the design criteria of all applicable regulations at the time of design.

The designer shall specify equipment that complies with 40 CFR Part 82. Safe alternatives and products containing safe alternatives to Class I and II ozone-depleting substances shall be utilized in the design, unless otherwise approved. To comply with 40 CFR 83 Subpart F, project specifications should include requirements to evacuate and recycle refrigerants in all appliances, including air conditioners and chillers, to be removed from service (demolished) by the project.

Air pollution regulations are rapidly changing at the both the Federal and State level. It is the designer's responsibility to stay abreast of new design requirements in the field of air pollution control. Emission standards are expected to become more stringent as individual states address secondary ambient air quality standards under the Clean Air Act. To the extent possible, engineering decisions should be made to accommodate future additions or modifications at a minimum cost.

ETL 1110-3-438 provides design guidance for the prevention and mitigation of indoor radon. The design requirements are mandatory for all new construction and substantially altered

facilities on Army installations. The Army installation will provide data on the level of indoor radon in facilities near the project. This data will serve as the basis for establishing the level of design required in accordance with ETL 1110-3-438.

The design shall include measures to control the emission of air pollutants, particularly dust, during construction. Burning shall not be allowed unless the plans and specifications contain measures to control air pollution. In cases where burning is allowed, the specifications should include provisions for obtaining a burning permit. Project areas classified as non-attainment, or adjoining non-attainment locations with respect to criteria pollutants may have more stringent emission requirements.

5. **SOLID WASTE (NON-HAZARDOUS):**

5.1 **Reference.**

5.1.1 P.L. 89-272, "Solid Waste Disposal Act" (SWDA), as amended by P.L. 94-580, the "Resource Conservation and Recovery Act" (RCRA), 42 U.S.C. 6901 et seq.

5.1.2 P.L. 102-386, "Federal Facility Compliance Act "of 1992", 42 U.S.C. 6961 et seq.

5.1.3 DoD Directive 4165.60, "Solid Waste Management - Collection, Disposal, Resource Recovery, and Recycling Program," October 4, 1976

5.1.4 TM 5-814-5, "Sanitary Landfill," January 15, 1994

5.1.5 TM 5-634/AFR 91-8, "Solid Waste Management," May 1990

5.1.6 EO 12780 Federal Agency Recycling and the Council on Federal Recycling and Procurement Policy, October 31, 1991

5.1.7 DoD Directive 4145.19-1 Storage and Handling

5.1.8 EP 200-2-3 Environmental Compliance Guidance and Procedures, October 30, 1996

5.1.9 EO 13101 "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition", September 14, 1998

5.1.10 EO 13148 “Greening the Government through Leadership in Environmental Management”, April 21, 2000

5.2 **Design Guidance.** The designer shall calculate the volume of waste which will be generated by the new facility and provide appropriate design features for solid waste management. In most cases, the design will only require that dumpster pads be provided to accommodate the waste volume generated. In more complex projects, trash compactors, sorting bins, and/or storage areas may be required. The designer shall identify any solid waste management problems that may result from operation of the new facility and notify the Project Manager, who will coordinate a design solution with the installation. The design should consider opportunities for pollution prevention through source reduction, recycling, treatment, and disposal in an environmentally acceptable manner. The designer should also consider incorporating materials with recycled content into the design to encourage market development.

6. HAZARDOUS, TOXIC, AND RADIOACTIVE WASTES (HTRW):

6.1 **General Reference.**

6.1.1 P.L. 89-272, "Solid Waste Disposal Act" (SWDA), as amended, P.L. 94-580, including the "Resource Conservation and Recovery Act" (RCRA), 42 U.S.C. 6901 et seq.

6.1.2 P.L. 102-386, "Federal Facility Compliance Act of 1992", 42 U.S.C. 6961 et seq.

6.1.3 P.L. 94-469, "Toxic Substances Control Act" (TSCA), as amended, 15 U.S.C. 2601, et seq.

6.1.4 P.L.99-499, "Comprehensive Environmental Response, Compensation and Liability Act of 1980" (CERCLA), as amended, 42 U.S.C. 9601,

6.1.5 40 CFR Part 112, "Oil Pollution Prevention"

6.1.6 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," latest version

6.1.7 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities", latest version.

6.1.8 ETL 1110-3-459, "Hazardous Waste Storage Criteria," November 30, 1993

6.1.9 Public Law 102-550, "The Residential Lead-based Paint Reduction Act of 1992", 42 U.S.C. 4851 et seq.

6.1.10 EP 1110-1-11, "Asbestos Abatement Guideline Detail Sheets," 15 July 1992

6.1.11 American Petroleum Institute (API) Standards and Publications

6.1.12 ER 1110-1-263, "Chemical Data Quality Management for Hazardous, Toxic and Radioactive Waste Remedial Activities," April 30, 1998

6.1.13 ER 385-1-92, "Safety and Occupational Health Document for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OEW) Activities," September 01, 2000

6.1.14 ER 200-2-3, "Environmental Compliance Policies," October 30, 1996

6.1.15 29 CFR 1910.120 and 1926.65, "Hazardous Waste Operations and Emergency Response"

6.1.16 29 CFR Subpart Z, "Toxic and Hazardous Substances"

6.1.17 EM 385-1-1, "COE Safety and Health Requirements Manual", September 3, 1996

6.1.18 "Sampling Protocol for Building Demolition Debris and Buildings Painted with Lead-Based Paint", U.S. Army Environmental Hygiene Agency (USAEHA)

6.1.19 AFI 32-7044m "Storage Tank Compliance", 25 April 1994

6.1.20 USAF Occupational Safety and Health Standard 127-43, "Flammable and Combustible Liquids", September 21, 1980

6.1.21 USAF Occupational Safety and Health Standard 127-4-, "Fuel Storage Systems", February 7, 1980

6.1.22 EM 1110-1-4006, "Removal of Underground Storage Tanks (UST)", September 30, 1998.

6.1.23 EP 200-2-3, "Environmental Compliance Guidance and Procedures," October 30, 1996

6.1.24 PL 93-633, "Hazardous Materials Transportation Act of 1974", 49 U.S.C. 5101 et seq.

6.1.25 DoD Directive 6050.8 Storage and Disposal of Non-DoD Owned Hazardous or Toxic Materials on DoD Installations, February 27, 1986

6.1.26 ETL 1110-3-491, "Sustainable Design for Military Facilities", May 01, 2001.

6.1.27 Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition", September 14, 1998.

6.1.28 EP 1110-1-28, Lead Hazard Risk Assessment for Target Housing/Child Occupied Facilities Standard Scope of Work, August 31, 2001.

6.1.29 EP 1110-1-29, Lead Hazard Clearance Inspection Standard Scope of Work, August 31, 2001.

6.1.30 EP 1110-1-30, Pre-Design Lead/Asbestos Surveys Standard Scope of Work, August 31, 2001.

6.1.31 EP 1110-1-31, Combined Lead Inspection/Risk Assessment for Target Housing Property Transfer - Standard Scope of Work, August 31, 2001.

6.1.32 EO 13148 “Greening the Government through Leadership in Environmental Management”, April 21, 2000

6.2 **Asbestos Containing Material (ACM).** The Technical Leader will provide the designer with information as to whether existing facilities impacted by a project contain ACM. If ACM is present, the Technical Leader will identify how it will be addressed. The designer's role can vary from preparing the abatement specifications, to inserting specifications and notes prepared by others, to doing nothing because the problem is addressed under separate contract. If this information is not provided, the designer is responsible for requesting it at the pre-design conference. If the designer is required to conduct a

survey for ACM and/or develop plans and specifications for abatement of ACM, the following actions shall be completed.

6.2.1 Survey:

6.2.1.1 Review as-built drawings, if available, to identify where ACM may be located.

6.2.1.2 Inspect the structure(s) to identify all potential ACM.

6.2.1.3 Collect representative samples of the suspected ACM.

6.2.1.4 Present the results of the ACM survey, providing the following information:

6.2.1.4.1 Sampling and testing methodologies.

6.2.1.4.2 Photos of all sampling locations.

6.2.1.4.3 A summary of all test results.

6.2.1.4.4 Quantities of ACM requiring abatement.

6.2.1.4.5 All field and laboratory data in appendices.

6.2.2 Plans & Specifications:

6.2.2.1 Review the survey, if conducted by others, to ensure the items listed above are included. If data is missing, notify the Technical Leader and request guidance.

6.2.2.2 Present all test data, clearly identifying where the samples were collected.

6.2.2.3 Identify the quantity of ACM to be abated, using suitable units of measure such as LF, SF, EA. Avoid lump sum items.

6.2.2.4 Edit the appropriate guide specification, usually Section 2080, to reflect the specific job requirements.

6.2.2.5 Ensure that adequate information is presented for the bidders to determine the amount of ACM present, the abatement methods that may be used, worker protection requirements, and disposal requirements.

6.3 **Lead Based Paint (LBP).** The Technical Leader will provide the designer with information as to whether or not existing facilities impacted by a project contain LBP. If LBP is present, the Technical Leader will identify how it will be addressed. The designer's role can vary from preparing the abatement specifications, to inserting specifications and notes prepared by others, to doing nothing because the problem is addressed under separate contract. If this information is not provided, the designer is responsible for requesting it at the pre-design conference. If directed to prepare the LBP abatement plans and specifications, the designer should determine if the USAEHA Sampling Protocol is approved by the State regulatory agency with jurisdiction over the project site. If the Protocol is approved by the State, complete the survey discussed in paragraph 6.3.1 Survey and prepare plans and specifications in accordance with the USAEHA Sampling Protocol. If the Protocol is not approved by the State, prepare plans and specifications in accordance with paragraphs 6.3.1 Survey and 6.3.2 Plans and Specifications.

6.3.1 Survey:

6.3.1.1 Review as-built drawings, if available, to identify where LBP may be located.

6.3.1.2 Screen the structure(s) to identify all potential surfaces with LBP. Screening may be done by collecting paint chip samples for analysis or by using an XRF spectrometric analyzer. Results greater than 0.5% by weight or 1.0 mg/cm^2, respectively, are considered positive and require abatement.

6.3.1.3 Collect representative samples of the suspected LBP surfaces for the Toxicity Characteristic Leaching Procedure (TCLP) and for total lead testing. The samples should cover the different substrates and the range of lead contents present. The samples should typically consist of both the paint and the substrate on which it is applied. The goal of this testing program is to provide the Contractor with enough information to determine disposal requirements for LBP debris generated by the project, and not to generate all of the data needed for disposal.

6.3.1.4 Present the results of the LBP survey, providing the following information:

6.3.1.4.1 Sampling and testing methodologies.

6.3.1.4.2 Photos of all sampling locations.

6.3.1.4.3 A summary of all test results.

6.3.1.4.4 Quantities of LBP requiring abatement.

6.3.1.4.5 All field and laboratory data in appendices.

6.3.2 Plan & Specifications:

6.3.2.1 Review the survey, if conducted by others, to ensure the items listed above are included. If data is missing, notify the Technical Leader and request guidance.

6.3.2.2 Present all test data, clearly identifying where the samples were collected.

6.3.2.3 Identify the quantity of LBP to be abated, using suitable units of measure such as LF, SF, EA. Avoid lump sum items.

6.3.2.4 Edit the appropriate guide specification, usually Section 2090, to reflect the specific job requirements.

6.3.2.5 Ensure that adequate information is presented to allow the bidders to determine the amount of LBP present, the abatement methods that may be used, worker protection requirements, and disposal requirements.

6.4 **Polychlorinated Biphenyls (PCBs).** If electrical equipment is to be removed as part of the project, the installation will identify equipment that contains PCBs. On the demolition drawings, identify PCB-containing equipment to be removed and provide notes or specifications on how to handle, transport, and dispose of the equipment. If the PCB content of electrical equipment is not available, identify the equipment on the drawings and include a specification section for sampling and testing the oils for PCB before removal and disposal of the equipment.

Fluorescent lights manufactured before 1979 may have ballast containing PCB. In addition, the ballast for lights manufactured between 1979 and 1985 may have a wet capacitor that

contains hazardous solvents. Fluorescent lights usually also contain mercury. The designer should identify the quantity of existing fluorescent lights to be removed during the demolition phase of a project. Identify the number of lights to be removed, the number of lamps within each light, and the length of each. Also distinguish between F40 and F96 lamps. Include this data in the plans and specifications, and specify the handling, removal, recycling and/or disposal of the fixtures.

6.5 **HTRW other than ACM, LBP, and PCBs.** The designer shall notify the Technical Leader of any hazardous waste that might be generated during construction of the new facility or rehabilitation/
demolition of existing structures. The Technical Leader will determine how the issue is to be addressed by the designer. Mercury is often found in old electrical switches and fluorescent lamps and should be identified.

6.6 **Industrial Facilities.** Renovation and alteration of existing industrial facilities present varying problems of an environmental nature. The designer should evaluate current and past activities at the facility to determine if they may impact the proposed construction. Activities that might be of concern include, but are not limited to the following: storage of lead-acid batteries inside or outside of the facility; painting activities using lead, chromium, cadmium or mercury based paints; storage of materials that would be classified as hazardous or acutely hazardous wastes; rifle range bullet traps and deflectors; metal plating areas; and degreasing areas. A careful evaluation of industrial facilities should be made early in the design process to determine:

6.6.1 If any testing is needed to evaluate the presence, level, and extent of contamination.

6.6.2 If waste resulting from the construction activities requires special handling or disposal.

6.6.3 What types of worker protection are needed, if any.

6.6.4 What type of monitoring and/or sampling is needed to protect workers, nearby residents, and the environment.

6.7 **Installation Restoration Program (IRP) Sites.** Typically, new construction will not be placed where an environmental problem is known; however, IRP sites may be nearby. These sites

are either suspected or known to have a release of contaminants to the environment. Depending on the IRP site's proximity to the new facility, the type of contamination, and the media impacted, it may be necessary to screen the site to determine worker protection requirements and disposal options for the impacted media. The designer should request that any IRP sites near the proposed project be discussed during the pre-design meeting, so that required actions can be started early in the design process.

6.8 **Above ground and Underground Storage Tanks.** Although storage tanks do not all contain substances classified as waste, tanks are regulated under RCRA. Tanks and associated plumbing shall meet all Federal, State, and local requirements for spill/overflow prevention, double containment, monitoring, and vapor emissions. An underground storage tank (UST) contained in a water-tight, concrete vault is regulated as an aboveground storage tank (AST) and is the preferred design. A vaulted UST does not exempt the design from complying with requirements for buried fuel lines, particularly pressurized lines. If a direct-buried, double-walled tank with leak detection is to be used instead of a vaulted tank, coordinate with the installation to provide a monitoring system that is compatible with the installation's monitoring capabilities. Above ground storage tanks must have secondary containment facilities and meet criteria for fire safety and vehicle impact. Projects on Air Force installations shall comply with USAF Occupational Safety and Health Standards 127-40 and 127-43 and AFI 32-7044.

6.9 **Waste Storage Facilities.** Hazardous waste storage facilities shall be designed in accordance with 40 CFR 264 and 29 CFR 1910, as a minimum. Where state or local criteria are more stringent, they will prevail. Facilities shall provide a safe, adequate, and secure storage in austere, cost-effective facilities in accordance with ETL 1110-3-459.

6.10 **Health and Safety.** When hazards from asbestos, lead based paint, mercury, PCBs, organic contaminants, and inorganic contaminants are present, specific safety measures are required. If these hazards are present, the construction contract documents shall include requirements for safety, health, and emergency response and protection of occupational safety and health.

7. **FEDERAL, STATE, AND LOCAL PERMITS:**

All project features addressed in this chapter shall be designed in accordance with the Federal, State, and local permits necessary to construct and operate each feature. Designers are responsible for identifying these permits. If the permit is necessary to construct the facility, the designer shall complete the permit application and shall submit it to the Technical Leader for filing with the appropriate regulatory agency. Submission of the application to the Technical Leader shall occur with sufficient time to obtain the permit prior to advertisement of the project for construction. Any permit actions required by the Contractor during construction shall be included in the plans and specifications. For permits required to operate the facility, the designer's responsibility is limited to identifying the permit and ensuring the design complies with permit requirements.