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16 January 2004

UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: PEST MANAGEMENT FACILITIES

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UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: PEST MANAGEMENT FACILITIES

U.S. ARMY CORPS OF ENGINEERS

NAVAL FACILITIES ENGINEERING COMMAND (Preparing Activity)

AIR FORCE CIVIL ENGINEERING SUPPORT AGENCY

Record of Changes (changes indicated by **1**\ ... /**1**/)

Change No.	Date	Location

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD(AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA.) Therefore, the acquisition team must ensure compliance with the more stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Support Agency (AFCESA) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request (CCR). The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following source:

- Whole Building Design Guide web site http://dod.wbdg.org/.

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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CONTENTS

CHAPTER 1

INTRODUCTION

1-1 **PURPOSE AND SCOPE**. This UFC is comprised of two sections. Chapter 1 introduces this UFC and provides a listing of references to other Tri-Service documents closely related to the subject. Appendix A contains the full text copy of the previously released Military Handbook (MIL-HDBK) on this subject. This UFC serves as criteria until such time as the full text UFC is developed from the MIL-HDBK and other sources.

This UFC provides general criteria for the design of pest management facilities.

Note that this document does not constitute a detailed technical design, maintenance or operations manual, and is issued as a general guide to the considerations associated with the design of pest management facilities.

1-2 **APPLICABILITY**. This UFC applies to all DoD agencies and contractors preparing designs of pest management facilities.

1-2.1 **GENERAL BUILDING REQUIREMENTS**. All DoD facilities must comply with UFC 1-200-01, *Design: General Building Requirements*. If any conflict occurs between this UFC and UFC 1-200-01, the requirements of UFC 1-200-01 take precedence.

1-2.2 **SAFETY**. All DoD facilities must comply with DODINST 6055.1 and applicable Occupational Safety and Health Administration (OSHA) safety and health standards.

NOTE: All **NAVY** projects, must comply with OPNAVINST 5100.23 (series), *Navy Occupational Safety and Health Program Manual*. The most recent publication in this series can be accessed at the NAVFAC Safety web site: www.navfac.navy.mil/safety/pub.htm. If any conflict occurs between this UFC and OPNAVINST 5100.23, the requirements of OPNAVINST 5100.23 take precedence.

1-2.3 **FIRE PROTECTION**. All DoD facilities must comply with UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*. If any conflict occurs between this UFC and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

1-2.4 **ANTITERRORISM/FORCE PROTECTION**. All DoD facilities must comply with UFC 4-010-01, *Design: DoD Minimum Antiterrorism Standards for Buildings*. If any conflict occurs between this UFC and UFC 4-010-01, the requirements of UFC 4-010-01 take precedence.

APPENDIX A

MIL-HDBK 1028/8A
PEST MANAGEMENT FACILITIES

CCB Application Notes:

1. Character(s) preceded & followed by these symbols (. -) or (+ ,) are super- or subscripted, respectively.
   EXAMPLES: 42m.3- = 42 cubic meters
             CO+2, = carbon dioxide

2. All degree symbols have been replaced with the word deg.

3. All plus or minus symbols have been replaced with the symbol +/-.

4. All table note letters and numbers have been enclosed in square brackets in both the table and below the table.

5. Whenever possible, mathematical symbols have been replaced with their proper name and enclosed in square brackets.

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* INCH-POUND *
.)))))))))))))-
MIL-HDBK-1028/8A
1 NOVEMBER 1991
SUPERSEDING
MIL-HDBK-1028/8
31 OCTOBER 1984

MILITARY HANDBOOK

DESIGN OF PEST MANAGEMENT FACILITIES

AMSC N/A AREA FACR

ABSTRACT

This military handbook includes the Naval Facilities Engineering Command's (NAVFAC) basic criteria to plan and design military installation pest control facilities consistent with current pesticide regulatory guidance. Further, it contains some operational information to justify certain design features. For this reason, the service pest management consultants who provide guidance to installations for improving existing facilities are a part of the user community. This handbook also provides facility plates illustrating recommended floor plans and work flow patterns as well as certain safety features of installation facilities.

FOREWORD

This handbook provides the criteria and the best available technology for designing a military pest management facility or pest control shop. Where appropriate, the handbook provides some operational rationale to justify certain design features. Lastly, the handbook promotes compliance with measures for safety and environmental protection established by host state or country regulations even if the facility may be exempt from state or local mandates. Pesticide use is closely regulated under the Federal Insecticide, Fungicide and Rodenticide Act and several other federal laws. Users, in every case, should consider state or host country requirements in design of pest management facilities.

Do not deviate from this handbook without approval of NAVFACENGCOM Headquarters Code 1634; for Air Force, U. S. Air Force Engineering Services Center Code DEMM.

Recommendations for improvement are encouraged from any party and should be furnished on DD Form 1426 provided inside the back cover to Commander, Naval Facilities Engineering Command, Code 1634, 200 Stovall Street, Alexandria, VA 22332-2300; telephone commercial (703) 325-2486

THIS HANDBOOK SHALL NOT BE USED AS A REFERENCE DOCUMENT FOR PROCUREMENT OF FACILITIES CONSTRUCTION OR AS A CHECKLIST FOR INSPECTION OF EXISTING FACILITIES. IT IS TO BE USED IN THE PURCHASE OF FACILITIES ENGINEERING STUDIES AND DESIGN (FINAL PLANS, SPECIFICATIONS, AND COST ESTIMATES). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.

MAINTENANCE FACILITIES CRITERIA MANUALS

Criteria Manual	Title	PA
MIL-HDBK-1028/1A	Aircraft Maintenance Facilities	SOUTHDIV
MIL-HDBK-1028/3	Maintenance Facilities for Ammunition, Explosives and Toxics	NCEL
DM-28.04	General Maintenance Facilities	CHESDIV
MIL-HDBK-1028/5	Environmental Control - Design of Clean Rooms	NEESA
MIL-HDBK-1028/6	Aircraft Fixed Point Utility Systems	SOUTHDIV
MIL-HDBK-1028/8	Pest Management Facilities	HDQTRS

DESIGN OF PEST MANAGEMENT FACILITIES

CONTENTS

TABLES

FACILITY PLATES

SECTION 1: INTRODUCTION

1.1 Scope. This handbook contains basic criteria to design military installation pest management facilities and it includes some operational information to justify certain design features. A facility so designed will support operations and provide for safe storage of pesticides, safeguard the health and safety of employees, prevent environmental contamination, contain spillage and be secure against theft and vandalism.

1.2 Application. The requirements in this handbook are presented as essential (mandated by federal regulation, consensus standard or justified by good practice) and recommended (in the interests of safety and health, cost-effective operations, efficiency or unique operations). In this handbook, the terms "shall" and "should" equate to essential and recommended requirements, respectively. No deviation from essential criteria are permitted unless approved by NAVFACENGCOM Code 1634.

1.3 Operational Notes. Many operational procedures apply to pest management functions that influence the design of pest management facilities. These are identified in applicable sections as Operational Notes. Numerous other operational requirements, determined through practice, are identified and all information currently available on pest management facilities is provided or referenced in this publication.

1.4 Related Criteria

1.4.1 Facility Plates. Facility plates for pest management facilities are contained in this handbook. These include a functional relationship diagram, facility floor plans, door sill details, exhaust hood detail and utility requirements.

1.4.2 Criteria Manuals. See references listed at the end of this handbook for criteria related to pest management facilities, but appearing elsewhere in the Criteria manual series.

1.4.3 Planning Criteria. Planning criteria for pest management facilities covered by this handbook are contained in NAVFAC P-80, Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations, Navy Category Code and Title (219-10 Public Works Shop).

1.4.4 Pesticide Storage Criteria. References to Title 40 Code of Federal Regulations (CFR), Part 165 (40 CFR 165) are for background information unless otherwise stated. The 40 CFR 165 design-related criteria and procedures are primarily for pesticides and containers whose uncontrolled release into the environment would cause unreasonable adverse effects on the environment, and for those labelled with the signal words DANGER-POISON or WARNING. All CFR criteria and procedures may not apply; states cannot regulate DoD facilities

under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requirements but voluntary compliance with substantive regulations is strongly recommended. Deviations from these criteria shall be approved by a service pest management consultant; for Navy and Marine Corps this is the appropriate NAVFACENGCOM field division applied biologist.

1.4.5 Cancellation. This handbook, MIL-HDBK-1028/8A, dated 1 November 1991, cancels and supersedes MIL-HDBK-1028/8, dated 31 October 1984.

1.5 Air Force Construction. This handbook is applicable to Air Force Construction except that AFM 88-15, Criteria and Standards for Air Force Construction, and the references contained therein, shall be used for technical criteria. Planning and programming criteria are provided in AFM 86-2, Standard Facility Requirements, under category code 219-943, Base Engineer Pavement and Grounds Facility. Questions and requests for deviations to criteria should be addressed to HQ AFESC/DEMM, TYNDALL AFB, FL 32403-6001.

SECTION 2: PLANNING

2.1 Purpose. This handbook provides the best available technology for basic design guidance of pest management facilities on military installations. It is presented for use by experienced architects and engineers, and service consultants concerned with developing new pest management facilities or rehabilitating existing facilities. The contents include design data for storage and handling of pesticides and related pest control equipment. It is not intended for use as an inspection checklist of existing pest management facilities. It is provided for guidance only unless otherwise indicated.

2.2 Intended Users. The primary users of pest management facilities are the installation personnel responsible for pest management activities. Users of this document are design and planning personnel preparing construction guidance for installation pest management shops.

Operational Note. Generally, there is no need for non-pest management personnel to be in an area where pesticides are stored or handled. With the exception of emergency services personnel (fire department) for purposes of fire and safety inspections and pre-incident planning, only pest management personnel should be allowed in pest management facilities. In the Air Force, medical personnel (BioEnvironmental Engineering) monitor types and storage of pesticides at pest management facilities and visit them periodically.

2.3 Functional Considerations

2.3.1 Facility Size. Guidance on the actual size and components of pest management facilities is available from the service pest management consultants and from the pest management plan established for each installation. Facilities shall provide adequate space for personnel and equipment necessary to address installation pest problems. In general, a small facility serves one to three workers or pest controllers, a medium facility serves four to nine workers and a large facility serves 10 or more workers. For essential space, the initial criterion is 1,100 gross square feet (93 square meters) for a small facility with an additional 500 gross square feet (46 square meters) for each additional worker over three. The additional increment, however, diminishes as the number of controllers increases. A ten worker facility should require 3,000 gross square feet (279 square meters) or 300 gross square feet (28 square meters) for each worker. Table 1 lists the approximate size of facilities up to ten workers.

2.3.2 Multi-Purpose Facilities. If two pest control functions (e.g., public works and the golf course) require facilities, modify the design to include a common mixing room, separate storage areas, and possibly a shared office, laundry and toilet facilities. For a single-use golf course facility, the size should be no larger than 1000 square feet (93 square meters) to include pesticide storage and equipment areas, mixing area, and a deluge

shower and eyewash as a minimum. Depending on the distance from other facilities, a small office, toilet and laundry area may also be required. Include additional variations to plan for staffing and climatic differences and to comply with individual state or host country requirements for pesticide handling.

Table 1
Facility Size

Number of Personnel	Size (X gross 1,000 square feet (93 square meters))
1 to 3	1.1 (small facility)
4	1.8 (medium facility)
5	2.1 (medium facility)
6	2.3 (medium facility)
7	2.5 (medium facility)
8	2.6 (medium facility)
9	2.8 (medium facility)
10 or more	3.0 (large facility)

2.3.3 Facility Cost. Pest management facilities are expensive to construct and unless they are designed economically, funding through the military construction program will be required. This is attributable to the high square footage costs for utility connections, specialized ventilation and safety requirements. Small facilities do not cost proportionately less since the major difference is in storage space which is a less expensive consideration. It is essential that installations design and construct minimum sized facilities to meet their mission requirements. Consideration shall also be given to future use of a pest management facility.

2.3.4 Environmental Concerns. Pesticide use is closely regulated by the U. S. Environmental Protection Agency (EPA) and state regulatory agencies. Pest management facilities are subject to Occupational Safety and Health Administration regulations as well as the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), Department of Defense, and military service instructions and criteria. Facility planning shall include safety, public health and environmental protection issues. The storage and use of pesticides is regulated by Title 40 Code of Federal Regulations 165 (40 CFR 165) and often by state or local pollution abatement agencies. The use of water to extinguish fires in facilities may generate hazardous liquid wastes that can readily contaminate materials, soil and ground water. Another concern is for the proper disposal of wastes generated with normal operations. Pesticide spills and cleanup procedures are addressed separately in the Armed Forces

Pest Management Board (AFPMB) Technical Information Manual #15. Excess and waste pesticide concentrates and washing liquids may need special storage while awaiting disposal under Resource Conservation and Recovery Act (RCRA) hazardous waste requirements (40 CFR 260-26-5).

Operational Note: A pesticide spill kit (requires about 9 square feet (8400 square millimeters)), located in the storage and mixing area, is essential. The kit should be conspicuously identified and made readily available for emergency use. At least annually and after every use, the kit should be inventoried to check completeness and condition of all contents in 40 CFR 165.10(d)(2).

Hazardous materials containers shall be labelled with hazardous warning labels and have material safety data sheets for the materials, reference CFR 1910.1200(f)(5).

2.4 Location. Pest management facilities contain toxic pesticides and related chemicals and may be required in emergencies for interim storage of pesticides classified as hazardous materials. Isolated single-purpose structures are essential if construction of a new facility is planned. Pesticide storage and mixing facilities that are integral parts of multiple-occupied buildings present actual and potential problems. Unless the pest management facility is tightly sealed off, noxious vapors will permeate nearby spaces. Pest control materials are highly pilferable and expensive; thus creating a security problem. When locating a facility in a multiple-use building is the only alternative, it shall be located on the end of the structure separated from the other areas by secure vapor impervious partitions. Fire protection criteria also apply. This alternative is recommended only as an interim measure and construction of a separate structure should be the eventual goal.

Operational Note. If functional conversion to contract is anticipated, resources for a new facility should not be obligated until contractor needs for facilities are considered. A cost study shall be completed indicating retention of the function in-house before new construction or major rehabilitation of the pest management facilities is approved.

Excess pesticides and other chemicals are considered hazardous wastes if they possess certain physical characteristics or are listed under 40 CFR 261, the Resource Conservation and Recovery Act (RCRA). Storage of hazardous wastes brings a facility under additional and stringent requirements and the wastes must be properly contained and immediately shipped out to the appropriate holding or disposal facility. Normal pest management facilities are not equipped or qualified under RCRA to store hazardous wastes.

Compressed gasses (fumigants) must be stored separately in another area, NAVSUP Publication 529, Chap.13.5.5.

2.5 Collateral Equipment. Several items of collateral equipment are required; these are listed in the appropriate sections of this handbook. In the U. S. Air Force, computers are needed for pesticide use documentation, pesticide inventory and personnel certification management, and other reasons.

2.6 Energy Conservation. Energy conservation shall be a major consideration in the design of building envelopes, mechanical systems, and electrical systems for pest management facilities. See Heating, Ventilating, Air Conditioning and Dehumidifying Systems, NAVFAC DM-3.03 and Energy Budgets for New Facilities, NAVFACINST 4101.1. Each building envelope shall be insulated to provide the minimum heat transmission ("U") factors practical to meet energy budgets.

2.7 Building Protection. The vehicle entrance to the pesticide area shall be protected from damage by vehicles and moving loads by the installation of concrete filled pipe guards, bumpers, railings, corner guards, or similar protective features.

2.8 Safety/Security. Because of the hazardous nature of various pesticides, e.g., insecticides, acaricides, herbicides, rodenticides, fungicides, wood preservatives, avicides, nematocides, and molluscicides stored and mixed in pest management facilities, it is essential that such materials are secured and available only to qualified individuals. Security fencing and security gates and other measures are essential. A climb resistant fence shall enclose the entire facility. If other security measures are taken such as security devices on the windows, fencing shall enclose the vehicle storage area and outside mixing areas. Design review shall include installation security requirements.

SECTION 3: DESIGN CRITERIA

3.1 Architectural

3.1.1 Style (Character). Design the pest management facilities in accordance with NAVFAC DM-1.01, Basic Architectural Requirements and Design Considerations. The style of pest management facilities shall be in accordance with each installation's architectural compatibility guidelines.

3.1.2 Size. Obtain guidance on the actual size and components of pest management facilities from the cognizant service pest management consultant. Facility Plate Sheets 1, 4, and 6 illustrate floor plans for small, medium and large facilities, respectively. Additional plans of Air Force facilities are illustrated on Sheets 3 and 8. Modify these plates for local requirements. Consider also the number of pest control functions required; even small shops may be providing the full range of operations involving three items of trailer mounted equipment, two vehicles, and an inventory of 40 or more pesticides and related chemicals. See Table 1 for additional data on facility size.

3.1.3 Functional. Arrangement of spaces and corridors shall allow workers to arrive in a clean area, dress for hazardous exposure in the change area, leave through a pesticide area doorway, and retrace that path at the end of the workday. It is essential that there be no direct access between the office and the pesticide area and that doorways are arranged so that no pesticide need ever be carried through clean areas. It is essential that the mixing room be located adjacent to the storage area and the equipment storage area (if indoors) and be accessible through the corridor to the shower and locker rooms and the exterior. Functional relationship diagrams are provided as Facility Plate Sheets 2, 5 and 7, respectively. Divide the facility into the three areas - clean, transitional and pesticide, as follows:

3.1.3.1 Clean Areas. Clean areas include an office, vestibule and airlock, and mechanical and electrical spaces.

3.1.3.1.1 Vestibule and Airlock. Provide a vestibule and airlock for the facility, where appropriate due to weather conditions, to conserve energy.

3.1.3.1.2 Office Space. Provide a space to perform office work. A telephone is essential for safety. Heating, ventilation and air conditioning is recommended for effective workplace habitability.

> Operational Note. Employees shall not eat in areas where pesticides are mixed, stored, or handled. Use of tobacco products or chewing gum is likewise prohibited for safety reasons. Food storage areas, e.g., in coffee areas or where lunches are stored, shall be physically separated from toxic materials. Waste containers must be provided for the disposal of all waste food. Such containers must be equipped with covers and, in accordance with OSHA standards, must be emptied daily

(Ref: 29 CFR 1-910.141). It is essential that there be no direct access between office and pesticide storage and mixing areas. Optionally, delete the office space from secondary shops, usually at remote locations, if there is a primary pest management facility under the same command on the installation. Installations with separate facilities for the golf course pest management operations, however, should have an office space for administration and record keeping.

3.1.3.1.3 Equipment Storage/Cabinet/Locker. Provide a separate storage space in the clean area to store personal protective gear (new gloves, respirator cartridges, etc.) away from pesticides.

3.1.3.1.4 Mechanical/Electrical Room. Provide a room to contain a water heater and mechanical and electrical equipment.

3.1.3.1.5 General Storage. Provide a storage closet for uniforms and other items not contaminated with pesticides.

3.1.3.1.6 General Purpose Room. For remote sites where meeting space is not available, provide an area for personnel training, conferences and break room in medium and large facilities.

3.1.4 Pesticide Handling Areas. The pesticide handling area includes pesticide storage and mixing rooms. Here, also, is the area of greatest exposure and hazard to applicator personnel from toxic materials.

3.1.4.1 Storage

3.1.4.1.1 General. Pesticide storage areas are essential to safely protect and store pesticides and related chemicals in various sizes of glass, metal, plastic and fiber containers. Storage areas shall be secured from unauthorized entry (essential). Minimum storage is approximately 600 square feet (55 square meters) with an additional 50 square feet (5 square meters) per worker, diminishing as the number of personnel increases. Storage space may also be combined with, or accommodated in the vehicle and equipment space.

3.1.4.1.2 Indoor Storage. Pesticides shall be stored in an area sealed or separated from clean areas, with direct access to the exterior. All pesticides stored indoors shall be off the floor so that all labels are visible, with lanes to provide effective access and inspection, and stored no more than eight feet (2.44 m) high. Pesticides shall be stored in a dry room or building where temperatures above 50 degrees Fahrenheit (12 degrees Celsius) and below 100 degrees Fahrenheit (38 degrees Celsius) are maintained. Pesticide storage shall be separated from mixing areas, shower and locker room, offices, or any area where personnel work for prolonged periods (essential). Pesticide concentrates shall not be stored in rooms containing a floor drain of any type; containment by curbing or sloped floors is required in the pesticide mixing and storage areas. Provide open nonabsorptive

shelving for pesticides. Metal cabinets within the storage area are recommended for non-pesticide contaminated equipment storage, i.e., bait, traps, drills, fumgation equipment and other tools. Mechanisms for off-loading and tipping drums and mounting sprayers on vehicles in the vehicle and equipment or storage area is suggested for medium or large pest management facilities. A workbench made of nonabsorptive material for equipment maintenance in the storage area and another in the mixing room is recommended. Provide a remotely located exit from these areas.

Operational Note: In normal practice, insecticides shall be separated from herbicides due to the potential for contamination of the insecticides with herbicides (not the reverse). Where separate air supplies are not feasible, the pesticides shall be arranged so that clean air flows continuously from the insecticides past the herbicides and out of the facility (essential). Good practice also dictates that liquid materials be stored below dry materials to prevent contamination if leaks or spills occur; and that rodent bait materials be protected from odors that might destroy the taste. Ammonium nitrate fertilizers shall not be stored in the same structure as pesticides for fire safety purposes, ref. Ch. 2, Pt. 5, NFPA 43D, Code for Storage of Pesticides in Portable Containers. Essential practices for storage areas include:

- A clear, 3-foot (914 mm) aisle or passageway.
- Pesticides shall not be stored within 10 feet (3048 mm) of an opening.
- Flammable or combustible liquids should be ordered in small containers, i.e., one to five gallon and stored in Underwriters Laboratories (UL) listed flammable liquid storage cabinets.
- Dispensing shall be by pump or by self-closing faucet devices bearing UL listings.
- All storage rooms and cabinets shall be locked when not in use.
- Suitable fire control devices, such as proper types and sizes of portable fire extinguishers, shall be available and adequately maintained.
- Leakage and spillage shall be cleaned up immediately.
- Drip trays containing absorbent material shall be placed under pesticide containers if spigots are used. (Actually positive displacement pumps inserted in concentrate containers are preferred and closed transfer systems which use returnable containers are most desirable.)
- Adequate precautions shall be taken against igniting flammable vapor and through contact with hot surfaces, frictional heat, or mechanical sparks.

3.1.4.1.3 Vehicle and Equipment Storage. Provide space for storage of one vehicle and one trailer-mounted equipment item in small facilities. In larger facilities additional space, as required, shall be provided for parking vehicles and storing trailer-mounted application equipment. Motor vehicles

shall not be stored in the same area as pesticides. Wherever possible, motor vehicles shall be located outside or in a separate building from the pesticide storage or handling area. Where motor vehicles are located under the same roof as the pesticide area, they shall be separated from the pesticide area by a minimum of two-hour fire rated construction.

3.1.4.1.4 Outdoor Storage. If space is provided for pesticide storage outdoors, space shall be secured and under cover and protected from radiant heating, freezing temperatures and moisture. All liquid fumigants shall be stored outside of occupied buildings in hazardous chemical lockers.

3.1.4.2 Pesticide Mixing Room. Provide a room with a work area to mix concentrated pesticides into ready-to-use formulations. Mixing rooms shall have electricity and hot and cold water. Open nonabsorptive shelves should be situated near the pesticide storage racks, drum stands, exterior personnel door and in the mixing areas. Metal or plastic pallets to hold pesticides off the floor are essential, plastic is preferred. Steel stands to keep drums off the floor are recommended. The work area shall contain a pesticide-resistant sink with a closeable drain, a contiguous self-draining drip-proof counter top at least 5 feet (1524 mm) long, sideboards, splash panel on back, and an adjacent shelf for holding measuring devices and concentrates. An additional unhooded deep sink for washing small equipment, gloves, etc., is recommended for medium and large facilities. Galvanized metal fixtures are acceptable. Extra nonabsorbent shelving, 12 inches (305 mm) deep is recommended to store mixing equipment items.

Operational Note: Do not use wood pallets as they absorb pesticides and may become an additional source of worker exposure.

3.1.4.3 Transitional Areas. Provide a dressing area for changing clothes, men's shower and lockers, toilet, laundry and cleaning gear room and women's shower and lockers (alternate).

Operational Note: Separate sexes may be accommodated by scheduling use of shower and locker facilities at different times. Doors for toilet facilities should be fitted with a lock to allow use by both males and females. Contaminated clothing shall be stored in the laundry area or the "pesticide" side of the locker facilities.

3.1.4.3.1 Shower and Locker Room. Accommodations may be required for male and female employees if installation requires more than one pest controller. The room serves as a transition area between clean and pesticide handling areas. It contains lockers for street clothing on one side, storage for work clothing (shoes, coveralls, caps, etc.) on the other side and a third area for protective equipment (respirators, etc.). The room shall be accessible to the showers and lockers, toilet and laundry and cleaning gear areas. Personnel

locker space is essential. Provide a hot water shower for personal decontamination at the end of the day. Additional shower stalls may be recommended for medium and large shops.

Operational Note: Items of protective clothing and protective equipment shall be stored separately from pesticides. Personnel shall have at least three sets of clothing per person, two pairs of gloves, and one respirator with additional respirator cartridges. An extra set of clean clothing should be maintained in the pest management facility for each employee. It is essential that each individual have two lockers: one for street clothing and another for work clothing to preclude contamination of street clothing by work clothing or protective gear. Normal work flow is for workers to drop off contaminated or soiled work clothing in the laundry room as they pass from the pesticide area of the shop to the "clean" side of the locker area.

3.1.4.3.2 Alternate Plan for Women's Shower and Locker Room. Convert storage room into a women's shower and locker room if at least one female is employed. See Facility Plate Sheets 1, 3, 4, 6 and 8.

3.1.4.3.3 Toilet. Provide at least one toilet for 1 to 15 employees (male and female). Toilet may be used by male or female and should be locked from the inside. Provide a sign to remind employees to "WASH HANDS BEFORE USING TOILET." Provide at least one lavatory with hot and cold water, water closet and urinal, and these should be located in the transitional area. See also Table 1 and Facility Plate Sheets 1, 3, 4, 6 and 8. These facilities are essential unless suitable toilet facilities are convenient, for example, in an adjacent building.

Operational Note: Individual paper towels shall be provided in proper receptacles. Provide a sanitary means maintained for the disposal of used towels. Common-use towels are prohibited. Hot air hand driers are an option to consider and have the benefit of eliminating waste products.

3.1.4.3.4 Laundry and Cleaning Gear Room. Provide a room adjacent to or near the shower and locker rooms.

3.1.5 Construction Materials

3.1.5.1 Foundations, Floor Slabs, and Floor Finishes. Foundations shall be slab-on-grade with flat (flushed) door sills at interior and exterior doors. Do not install floor drains in the interior pesticide areas. Where pesticides are handled or stored, slope (3/100) floor from sills to the center of interior pesticide areas to collect spilled materials. If a sloped floor is not installed, provide a 4-inch (102-mm) concrete curb to contain spills and facilitate spill management in the pesticide areas only. For exterior slabs,

slope to sump with closeable drain (see para. 3.4.8) located not more than 6 feet (1829 mm) from outer margin of washstand as illustrated in Facility Plate Sheets 1, 4, 6, and 11. Slope exterior ramps downward from exterior flat (flushed) door sills as illustrated in Facility Plate Sheet 9. The sloped floor or curb are essential to contain spills and facilitate cleanup operations. The intent is to provide secondary containment for at least 110 percent of the capacity of the largest bulk liquid pesticide container anticipated for the facility.

> Operational Note. Liquid pesticide storage quantities range from 25 to 500 gallons (94.63 to 1892.55 L) but the largest container is rarely larger than 55 gallons (208 L). Since rupture of more than one container is unlikely, allow for 60 gallons (225.1 L) in small shop and 125 gallons (471.12 L) in all others. Most storage and mixing rooms with 4-inch (102-mm) curbs or sloped floor (3/100) will easily contain the required volume.

See Facility Plates Sheets 1 through 8 for suggested layouts and details. The thickness of the slab shall be designed to accept live loads equal to the weight of a 55 gallon (208 L) drum (500 lb (227 kg)) in the interior storage area. For other areas existing standards suffice. The installation of utility, heating or ventilation ducting is prohibited in or below slabs. Concrete floors shall be finished with a nonabsorbent nonskid finish. Refer to NAVFAC NFGS-03300, Cast-in-Place Concrete, for detailed criteria. The floors in both the storage and mixing areas shall be covered with nonskid epoxy sealant or otherwise made impermeable to absorption. Pesticide concentrates and finished (formulated) materials shall be prevented from entering the sanitary or storm sewer systems. The change room and office floors may be tiled.

3.1.5.2 Exterior Walls. Exterior walls shall be constructed of either metal, concrete, or masonry materials. Porous surface finishes shall not be used in pesticide areas. Interior surface of exterior walls and partitions shall be constructed of either metal, or coated concrete or masonry materials.

3.1.5.3 Doors and Windows.

3.1.5.3.1 Doors. Exterior doors shall be self-locking and self-closing with weather stripping. Provide doors with locks to prevent unauthorized entry. Provide flat (flush) sill to all doors between the mixing and storage areas.

3.1.5.3.2 Overhead Garage Door. Provide a 9 foot (2.74 m) high by 9 foot (2.74 m) wide door with weather stripping. Higher doors may be required to accommodate high mast equipment. Provide a flat (flushed) sill for the garage doorway if the garage is separate from the pesticide mixing and storage areas. If not, provide a ramp to a 4-inch (104-mm) high sill. Provide slope away from exterior of door to prevent rain water from entering facility.

3.1.5.3.3 Windows. Provide non-porous framed windows, double glaze, where appropriate, with a thermal barrier feature. Equip windows with interior security mesh if the facility is not enclosed (surrounded) by a climb-resistance chain link (security) fence and security gates. As an alternative, do not provide windows.

3.1.5.4 Interior Partitions and Ceilings. For clean areas, partitions shall be masonry or gypsum board on metal studs extending to the underside of a gypsum board ceiling and all joints shall be sealed. Drop ceilings shall not be used in pesticide areas.

3.1.5.5 Roofing. For general roofing criteria, refer to MIL-HDBK-1001/5, Roofing and Waterproofing. Only include roofing systems as contractor's options that will be compatible with the pesticides that may be discharged from the exhaust hood onto the roof.

3.2. Structural. Construct facility in accordance with MIL-HDBK-1002/1, Structural Engineering - General Requirements.

3.3. Interior Design. Coat floors, interior partitions and interior surface of exterior walls, and ceilings with nonabsorbent finish in the pesticide areas only. In the clean areas, collateral equipment should include a desk, bookcase, file cabinet, telephone (essential), a small table with one chair per worker (recommended), and benches (essential). Install metal shelving to store pesticides (essential).

3.4. Site

Operational Note. Pest management facilities shall not be used for hazardous waste storage unless specifically designed to accommodate hazardous waste materials since other federal regulations apply to hazardous waste facilities. The facility supervisor must be aware of this distinction and establish the practice of sending all hazardous wastes to an established hazardous waste facility without delay.

3.4.1 General. Isolate pest management facilities from congested areas for reasons of health and safety, fire protection, environmental protection, and security. This is based on the similarity of requirements for the isolation of storage facilities for pesticides, flammable or explosive materials (hazards), and sewage treatment plants (vapors and odors). Pest management facilities contain toxic pesticides and in special circumstances, usually emergencies, may be required to provide interim storage for pesticides classified as hazardous wastes in accordance with 40 CFR 165.10 and 40 CFR 261. The most compelling reason for isolation of pest management facilities is fire safety. If a fire occurs in a facility within a building complex, extensive decontamination of nearby areas from drift of toxic vapors, smoke, liquids, and particulates is required. This condition is confined to one structure when the facility is isolated. Isolated single purpose structures

are essential for new construction. Complete fire protection information is in MIL-HDBK-1008A, Fire Protection for Facilities Engineering, Design and Construction, Section 4, Special Occupancies.

Operational Note. It is a general misconception that a "let it burn" strategy minimizes environmental consequences by avoiding suppression with water and generating toxic liquid wastes as runoff. It is always better to extinguish a small fire and clean up the mess than allow it to develop into a fully involved structural fire. The "let it burn" decision can only be made by the fire chief and the environmental official on the scene of the emergency, as it is based on many factors unique to each situation. If possible, fires involving petroleum based liquids should be extinguished quickly using appropriate extinguishing agents. A fire not directly involving pesticides should be extinguished rather than let the fire spread to the pesticides. This decision is made by the initial responding engine company. The high temperatures resulting from unsuppressed incineration may reduce the toxic vapors and smoke resulting from pesticides but also put firemen and other unprotected personnel at risk and may necessitate a major evacuation downwind. Uncontrolled fires do not necessarily result in high temperatures throughout and may not thermally degrade toxic materials. Clean or oxygen-rich fires are unusual.

3.4.2 Siting. Site pest management facilities a minimum of 200 feet (61 m) from surface water, existing wells and cisterns, or 100 year flood plains. Site pest management facilities downhill from the sensitive areas noted above, or provide diking (essential) where space is limited. Consideration must be given to prevailing wind conditions and the location of populated areas. Facilities shall not be located uphill from potable water sources or continuously occupied structures. Facilities should not be sited over aquifers (subsurface potable water supplies) unless the aquifer is adequately protected through containment measures. Facilities shall be sited at least 100 feet (30.4 m) from other structures. Siting shall be approved by an industrial hygienist, a sanitary engineer, and by a fire protection engineer. Utility connection costs, access, security and subsurface conditions should be considered in siting. Funding limitations will not support excessive utility runs, long access roads or extensive site preparation costs. Select a site that, based on previous experience or soil tests, allows slab-on-grade construction. Provide a soil analysis for hazardous chemical background levels.

3.4.3 Accessibility. Provide access to pest management facilities by vehicles carrying supplies or pulling trailer-mounted dispersal equipment. The facility must be accessible to vehicles and pedestrians on at least two sides.

3.4.4 Grading. Runoff from fire-fighting must not reach ponds, lakes, streams or rivers. Diking, if provided, is recommended for large pest management facilities only.

3.4.5 Parking. Provide adequate space to park all pesticide dispersal equipment inside the pest management area, under cover. That part of the compound to be used for travel and vehicle parking shall be covered with gravel or paved. Employee parking, if provided, shall be outside of the security fence or perimeter.

3.4.6 Security Fencing and Gates. Provide a climb-resistant chain link fence to prevent unauthorized entry. The fence shall be a minimum of 7 feet (2.13 m) high, without top rail. Also, the fence fabric shall be twisted and barbed at the top and bottom. Refer to NFGS-02831, Fence, Chain Link, for detailed criteria. Security gates to the fence shall be kept locked. The fence may be omitted if other security measures are taken. In such situations, bars or heavy gauge wire mesh over the windows are required (see paragraph 3.1.5.3) for security of windows). Provide signs on the fence as indicated in paragraph 3.8.

3.4.7 Outdoor Pesticide Mixing Areas. Provide outdoor areas for medium and large pest management facilities consistent with provisions for the safe filling, and mixing of vehicular and trailer-mounted equipment. See also paragraphs 3.4.9 and 3.5.2.

3.4.8 Hardstand Area. Provide an outdoor hardstand and parking apron for vehicles and equipment consisting of a concrete pad sufficiently large to park a truck and trailer (minimum 15 feet by 25 feet) (4.57 m by 7.62 m)). Slope (3/100) hardstand pad to a sump fitted with a removable grate cover suitable for anticipated vehicular traffic load. Size sump for a minimum of 110 percent of the capacity of the largest bulk liquid pesticide container anticipated to be use at the facility. Provide a curb (minimum 4 inches (102 mm) at the low edge of the pad to direct liquid (spills and rain) into the sump. Provide a 3-inch (75-mm) sump drain to the industrial sewer if available; otherwise, provide a small section of removable grate to accommodate a hose for pumping out (recovering) sump contents. When connected to an industrial sewer, provide a normally closed, manually opened, ball valve in the sump drain to control discharge. Locate valve in a pit with grate cover adjacent to the sump (see paragraph 3.5.2.4). Facility Plate Sheet 11 illustrates a hardstand layout. Provide an elevated hose bib (fill pipe) (1-1/2 to 2 inches (38 to 51 mm) in diameter) if application equipment with 50 gallon (189.8 L) or larger tanks will be used at the facility. Provide an emergency eye wash and deluge shower (30 gallon per minute (2 L/s) shower head) (Federal Specification WW-P-541/7C, Plumbing Fixtures (Shower Bath and Emergency Eye and Face Wash Outfits) with manually-operated, delayed-closing valves located adjacent to the mixing site unless devices inside the facility are accessible within 10 seconds from the outdoor mixing site. Safety showers should be capable of operating for at least 30 minutes. A canopy roof over

the hardstand area may be provided to protect parked vehicles and equipment and to minimize accumulation of water.

Operational Note: Hardstands are recommended for use during cleaning and for filling truck/trailer mounted dispersal equipment. Spills, although uncommon, can be contained and the material recovered if the apron is curbed or the pavement is sloped (3/100). Hardstand sump shall be fitted with a valve and deadman mechanism so that the valve is closed to flow at all times unless manually opened. Hardstand drains shall be connected to the industrial waste treatment system. For filling equipment tanks, garden hoses are too small (slow). Spigots, hose bibs, fill pipes and other pressurized water sources shall be fitted with backflow prevention devices. Deluge shower and eyewash fountain must be accessible within 10 seconds from mixing (filling) sites.

3.5 Mechanical

3.5.1 General. Provide plumbing, heating, and ventilation systems for the facility for effective workplace habitability. Provide air conditioning (cooling), if required, for the office, and for the pesticide storage area to maintain temperature below 100 degrees Fahrenheit (47.1 degrees Celsius). A separate HVAC system shall be provided for the clean areas to establish a positive pressure to prevent odor and chemical infiltration.

3.5.2 Plumbing. Refer to NAVFAC DM-3.01, Plumbing Systems.

3.5.2.1 Disposal of Pesticides. No concentrated pesticides shall be discarded to the sanitary sewer or storm drain. The disposal of pesticide wastes shall be regulated by local water quality regulations. Where stringent regulations apply, the term "dilute" pesticide may include wash water generated from (a) the laundry of contaminated work clothing, (b) washing of personal protective equipment, (c) washing the exterior of dispersal equipment, (d) emergency deluge showers and (e) eye washes.

Operational Note: NAVFAC P-20.E, Shop Guide for Pesticide Disposal, provides guidance on reducing pesticide disposal requirements but must be used with caution as disposal regulations change frequently, usually becoming more restrictive, and vary from site to site. Pressure rinsing devices are strongly recommended, especially those that allow drainage directly into application equipment or recovery of the rinse water. These devices are quick and easy to use, cost less than $40, make use of all the pesticide concentrate, and aid in disposal by converting pesticide containers to non-hazardous waste. In addition, more and more pesticide manufacturers and suppliers are providing pesticides in transportable returnable containers (closed systems) that virtually eliminate exposure to the pesticide during the mixing process. Use of closed system returnable containers, where available, is strongly recommended.

3.5.2.2 Spills and Contaminated Water. Design storage and mixing areas only with no drains to contain spills and water. See paragraph 3.1.5.1. Pesticide spills and cleanup procedures are addressed in AFPMB Technical Information Manual #15.

Operational Note. A spill kit, equal to that described in AFPMB TIM #15, shall be available to use for pesticide spills. Spill kits shall be available in the pest management facility and on each service vehicle(s).

3.5.2.3 Holding Tanks. Do not design drainage to a holding tank. Holding tanks are prohibited in new construction.

Operational Note: Use of a holding tank for storage of any pesticide could bring the installation under additional regulation and could result in considerable unnecessary expense. Procedures are available that preclude the need for holding tanks. These include but are not limited to: (1) the practice of washing outdoor dispersal equipment at the application site and applying the wash water to the area treated, (2) using water from rinsing concentrate containers to make up finish sprays, (3) saving wash water throughout the work day to be used in the next days' operations, and (4) substituting the more hazardous or toxic pesticides with safer, less persistent, biodegradable materials. Prudent use of pesticides can materially reduce disposal requirements. Never pour rinse liquids contaminated with pesticides on the ground or into a sink or drain leading to a storm sewer system. Local water quality regulations must be observed.

3.5.2.4 Hardstand Sump Drain. Provide a 3-inch (76-mm) 1/4 turn ball valve fitted with a waterproof spring close/fail close (deadman) mechanism so that the valve is closed to flow unless manually held open allowing drainage to the industrial waste system to remove accumulated water. The valve shall be protected with a steel grating with an opening to accommodate a removable extension handle. The spring close mechanism shall be operated with a handle that extends 30 inches (762 mm) above the grate. Facility Plate Sheet 11 illustrates a hardstand with sump, drain, and valve. A sign shall be provided near the sump drain valve stating "RECOVER PESTICIDE SPILLS. USE VALVE TO DRAIN WASH WATER AND RAIN."

Operational Note: Drains are maintained in a closed position and opened only to drain off accumulated precipitation to prevent accidental environmental contamination by spilled pesticides. Conduct maintenance inspection of drain system monthly. Ground water contamination and other adverse environmental effects can be avoided by using wash water as the diluent for soil treatment for subterranean termites (if permitted by the pesticide label) or dispersing the wash water over the same outdoor area where the initial pesticide was applied according to

the label. Wash water containing herbicide residues should be used only on the site listed on the pesticide label.

3.5.2.5 Wash Water. Provide spill containment for indoor pesticide mixing and storage facility only. Provide liquid spill collection system for outdoor mixing facility (hardstand) connected to the industrial waste system only. Do not connect drains from pesticide mixing areas, indoor or outdoor, to septic systems, sanitary sewer, or storm water system.

3.5.2.6 Sanitary Sewer System and Drains. Consult local water quality control regulations. Connect toilet, showers, and laundry plumbing fixtures to a sanitary sewer system. Ensure that only rain or snow-melt water from the roof is routed to storm drains. Pesticide wastes are generated routinely from equipment washdown, laundry of work clothing, and personal decontamination. Disposal of these wastes through the industrial waste system may be required as determined by the installation. Other wastes may occur from actual pesticide spills. Pesticide spills are addressed in para. 3.5.2.2, Spills and Contaminated Water.

Operational Note: Water resulting from washing the exterior of dispersal equipment and vehicles may not be drained into the sanitary sewer. Consult local water quality control regulations.

3.5.2.7 Sink. Provide a deep sink to fill and wash small equipment items 24 inches (610 mm) high and standard 5 gallon (19 L) cans. Install the hot and cold water faucets so that an air gap of at least two diameters (minimum of 2-inches (51 mm)) of discharge opening exists between the outlet of the faucets and the top rim of the sink. The sink should be connected to the industrial waste system. Swing-type spigots are recommended. Provide a slotted hood or ventilator to each sink in the mixing area designed to enclose the mixing operation as much as possible and to exhaust the vapors and dusts away from personnel as illustrated in Facility Plate Sheet 10. Provide at least 2 linear feet (610 mm) of counter top next to the sink (2 linear feet (610 mm) of counter top on each side for double compartment sinks).

Operational Note: Where water quality regulations are especially stringent and discharge to the sanitary or industrial waste system is not an option, the sink should be drained to five gallon (19 L) containers resting in a pit in the floor. In such a case, drainage from the sink is severely limited and appropriate disposal procedures for the container contents is required.

3.5.2.8 Water Heater. Provide a water heater if a source of hot water is not available.

3.5.2.9 Washer and Dryer. Provide all plumbing connections and floor drain for washer and dryer.

Operational Note: It is essential that work clothing be laundered separately from uncontaminated clothing. If the installation laundry facility is used, work clothing slightly contaminated with pesticides can be bagged, tagged as pesticide clothing and washed at the installation laundry separately from other items. Oily flight line garments and soiled hospital clothing are similarly laundered. The results are clean, pressed, professional looking uniforms and coveralls.

3.5.2.10 Back-Flow Prevention. Install reduced pressure backflow prevention device in accordance with American Water Works Association (AWWA) Standard C506-78, Backflow Prevention Devices. Plumbing which provides a source of water for filling pesticide dispersal equipment tanks must be provided with a back-flow prevention device so that a water hose attached to a faucet can be used to fill the spray tank. For installations that purchase water from municipal sources, install the device in conformance with local codes. Some communities may prohibit such devices.

3.5.2.11 Hose Bib. Provide permanent hose bib (overhead filling pipe) (frost-free) fitted with a 1-1/2 to 2 inch (38 to 51 mm) discharge hose and an approved backflow preventer for the outdoor washdown area for medium and large facilities. Discharge hose should come to within 4 feet (1232 mm) of the ground.

3.5.2.12 Emergency Eye Wash, Deluge Shower and Drain. Provide an emergency eye wash and deluge shower (30 gallon per minute (2 L/s) shower head) (Federal Specification WW-P-541/7C, Plumbing Fixtures (Shower Bath and Emergency Eye and Face Wash Outfits) with manually-operated, delayed-closing valves located adjacent to the mixing counter. Site eye wash and deluge shower(s) so as to be accessible within 10 seconds from indoor and outdoor mixing areas. An eye wash and deluge shower is essential for emergency washing of individuals accidentally contaminated with pesticides, Reference 40 CFR 165.10(c)(4). If the eye wash and deluge shower are located in the outdoor mixing area, protect from freezing.

3.5.2.13 Rough-In Plumbing. Provide rough-in plumbing (shower drain, shower fixtures for hot and cold water) for the small storage area. Also, provide rough-in plumbing (shower drain, shower fixtures for hot and cold water) for showers and lockers. If a washer and dryer are not included as a bid item seal off all stubbed-in plumbing.

3.5.2.14 Floor Drains. Do not provide floor drains in interior pesticide areas to preclude the potential for environmental contamination from accidentally spilled concentrated or diluted pesticides. Provide floor drains in shower rooms.

3.5.3 Heating and Cooling. Refer to NAVFAC DM-3.03, Heating, Ventilating, Air Conditioning and Dehumidifying Systems. Outdoor design temperatures shall be in accordance with NAVFAC P-89, Engineering Weather Data.

3.5.3.1 Clean Areas. Indoor winter and summer design temperatures shall be 68 degrees and 78 degrees Fahrenheit (20 degrees and 26 degrees Celsius), respectively. Recirculation of air is not permitted if a central air system is provided.

3.5.3.2 Pesticide Mixing and Storage Areas. Winter design temperature for the mixing area shall be 55 degrees Fahrenheit (13 degrees Celsius); for the storage area, 50 degrees Fahrenheit (10 degrees Celsius). Maximum temperature for the storage area is 100 degrees Fahrenheit (38 degrees Celsius).

3.5.4 Ventilation. Refer to NAVFAC DM-3.03 and MIL-HDBK-1003/17, Industrial Ventilation Systems.

3.5.4.1 Clean Areas. Outdoor air provided for ventilation shall be exhausted through the toilets and pesticide mixing and storage areas to control migration of odor, dust, and vapor. Vent the dryer to the outdoors.

3.5.4.2 Mixing and Storage Areas. Provide a separate ventilation system for the mixing and storage areas. System shall be provided with roof mounted, centrifugal fan selected for six air changes per hour (minimum). Fans shall discharge vertically. Replacement air shall be heated to 55 degrees Fahrenheit (13 degrees Celsius). Design the system to maintain a negative pressure in the mixing and storage areas relative to the clean areas by supplying approximately 95 percent of the air exhausted, with the remainder being from infiltration of ventilation air supplied to the clean areas. Locate the exhaust stack and supply air intakes far enough apart to prevent recirculation of contaminated air; do not rely on prevailing winds to prevent recirculation. Position supply and exhaust register to provide good mixing to ensure proper dilution (refer to Industrial Ventilation, A Manual of Recommended Practice by the American Conference of Governmental Industrial Hygienists (ACGIH), Chapter 2, for general principles of dilution ventilation). Provide a motorized damper at the air intake louver and at the exhaust fan discharge. Damper shall close when the ventilation system is turned off. Provide a ventilation system control switch with light to indicate "ON" at the entrance to the pesticide handling areas, and a sign at the switch which reads, "VENTILATION SYSTEM SHOULD OPERATE CONTINUOUSLY. DO NOT ENTER UNLESS VENTILATION SYSTEM HAS OPERATED FOR AT LEAST TEN MINUTES."

Operational note: The ventilation system should operate continuously to minimize exposure to air borne pesticide dust and vapors and to avoid inadvertent contamination of the clean areas. If the ventilation system is shut down for an extended period, i.e., over a weekend or from an outage, it should be turned on at least 10 minutes (one air change)

prior to entry into the mixing and storage areas. Extended shut down of the system is not recommended except for maintenance and repair. Entry into an pesticide storage area after extended shut down of the ventilation system would result in exposure to maximum vapor concentration.

3.5.4.3 Mixing Sink Exhaust System. Provide a slotted hood, local exhaust system for the mixing sink as shown on Facility Plate 10. The exhaust hood shall provide an air velocity of 150 linear feet per minute (fpm) (0.76 m/s) at face of the hood (29 CFR 1910.106). Baffles or plenums should be used to maintain a uniform face velocity. If multiple stacked slots are used, the upper slots will have a higher air volume (cfm) unless provisions are made to ensure that the lower slots provide 150 fpm (0.76 m/s) capture velocity at the outer edge of the counter or sink top. Sink and exhaust hood shall be stainless steel. Specify either stainless steel or fiberglass reinforced plastic (FRP) ductwork and a centrifugal FRP exhaust fan with backward inclined blades. The fan shall be roof mounted and have a vertical "no loss" discharge stack (see ACGIH Industrial Ventilation manual). Top of stack shall be 30 percent higher than the roof elevation. The replacement air system shall provide approximately 95 percent of the air exhausted through the hood to maintain a negative pressure in the mixing room relative to the clean areas. Replacement air shall be heated to 55 degrees Fahrenheit (13 degrees Celsius). Exhaust fan and replacement air fan shall be activated by the same switch. It is critical that replacement air is introduced into the room at low velocity to minimize turbulence around the exhaust hood (refer to MIL-HDBK-1003/17, Industrial Ventilation Systems, for design of the replacement air system). Provide a motorized damper at the air intake louver and at the exhaust fan discharge. Damper shall close when the ventilation system is turned off.

Operational Note: For upgrading existing facilities, exposure hazards from toxic vapors shall be engineered out with the installation of an exhaust fan or duct directly opposite the mixing surface from the worker. Stainless steel hoods are recommended because they last longer in a corrosive environment. Personal protective equipment (respirator, face mask or shield, gloves, apron and work clothing) may be used to provide interim protection during mixing operations, but proper engineering controls to correct such deficiencies in plumbing or ventilation systems described above should addressed immediately or placed on an abatement program for correction.

3.6 Electrical. Design shall be in accordance with the National Electrical Code (NFPA) 70 and MIL-HDBK-1004/1, Preliminary Design Considerations, MIL-HDBK-1004/2, Power Distribution Systems, MIL-HDBK-1004/3, Switchgear and Relaying, MIL-HDBK-1004/4, Electrical Utilization Systems, MIL-HDBK-1004/6, Lightning Protection, and MIL-HDBK-1004/7, Wire Communication and Signal Systems.

3.6.1 Explosion Proofing. Pesticide concentrates ordinarily used in structural pest control work have flash points above 140 degrees Fahrenheit (60 degrees Celsius), Reference 40 CFR 1900.106. They may be combustible (flash point above 100 degrees Fahrenheit or 38 degrees Celsius) but are not flammable (flash point below 100 degrees Fahrenheit or 38 degrees Celsius). A hazardous area classification is not applicable if flammable pesticides (flash point below 100 degrees Fahrenheit or 38 degrees Celsius) are not stored or used.

Operational Note: Service pest management consultants should recommend pesticides with flash points above 140 degree Fahrenheit (60 degrees Celsius) to avoid the need for explosion proof features. The excessive cost of explosion proof motors and switches can be avoided by storing or using pesticides with flash points greater than 100 degrees Fahrenheit (38 degree Celsius). If flammable pesticides are required for use in the installation pest management program, as determined by the service pest management consultant, the pesticides must be stored in a separate flammable liquid storage cabinet outside of the facility. Additional details on these lockers is given in paragraph 3.7.1.

3.6.2 Lighting

3.6.2.1 Indoor. Switching for the exhaust hood shall be located adjacent to counter. Lighting shall be 50 foot-candles (538 lux) in the office and mixing rooms and pesticide storage areas, and 20 foot-candles (215 lux) in the washroom (Illuminating Engineering Society (IES) Lighting Handbook).

3.6.2.2 Outdoor. Provide outdoor lighting when dawn or dusk operations such as mosquito fogging are performed.

3.6.2.3 Security. Outside security lighting should be considered. This may be a bid item.

3.6.3 Corrosion Resistance. Use of corrosion resistant fixtures (raceways, receptacles, sinks, drain boards, vapor collection hood, etc.) is recommended due to the effects of pesticides.

Operational Note: Certain formulations of propoxur (Baygon) are known to deteriorate fiberglas surfaces. Dibrom (Naled) is extremely corrosive to metal surfaces.

3.6.4 Appliances. Provide clothes washer and dryer. This may be a bid item.

Operational Note: Appliances commonly found in offices such as electric heaters, microwave ovens, and coffee makers, are the responsibility of the Government, regardless of ownership, and shall comply with OSHA standards.

3.7 Fire Protection. Provide fire protection in accordance with MIL-HDBK-1008A, Fire Protection for Facilities Engineering, Design and Construction, Section 4, Special Occupancies.

Operational Note: Accepted practice is to develop a prefire plan for fire department operations. Accordingly, an inventory of the contents of the facility shall be provided at least annually to the fire department serving the installation.

3.7.1 Fire Extinguisher. Provide a fire extinguisher by the door between the storage and mixing areas in accordance with 29 CFR 1910.106 and NFPA 10.

Operational Note: It is more practical and economical to eliminate the few flammable pesticides in use (substitutes are available) than to provide expensive fixed fire-fighting systems and explosion-proof equipment and fixtures. This is required through the pest management plan process and is monitored by a service pest management consultant in accordance with the appropriate service directive; OPNAVINST 6250.4A (Navy), AFR 91-21 (Air Force), AR 420-76 (Army). After construction of a pest management facility, subsequent operating procedures, detailed in the installation pest management plan, must identify pesticides suitable for the level of fire protection provided in the facility. Storage of combustible and flammable liquids, of which many may be pesticides) is regulated by NFPA 30. Depending on the amount of liquids stored and their flash points, special handling and storage are necessary. Not more than 120 gallons (554 L) of Class I, Class II and Class IIIA liquids may be stored in a flammable liquid storage cabinet. Of this total, not more than 60 gallons (277 L) may be of Class I and Class II liquids and not more than 3 such cabinets may be located in a single fire area. Only UL approved metal cabinets may be used. If no more than 60 gallons (277 L) of flammable or 120 gallons (554 L) of combustible liquids are stored, a storage cabinet of metal, as described in the regulation, will be adequate. If larger quantities are to be stored, a separate room, outside metal shed, or warehouse meeting the required fire resistant rating of the material shall be provided. In these situations, it would be advisable to seek additional guidance on fire protection (reference 29 CFR 1910.106). The storage cabinets may be bid items.

3.8 Signs. Provide identification signs such as "DANGER," "POISON," and "PESTICIDE STORAGE AREA" in appropriate rooms and on buildings, and fences to advise personnel of the contents and warn of their hazardous nature. Install a sign to read "NO SMOKING" in the pesticide areas. Install a sign over the sink that reads "DO NOT DISCHARGE PESTICIDES INTO THE SINK." Provide a sign at the entrance(s) to the toilet to read "WASH HANDS BEFORE USING TOILET." Provide warning signs on the exterior of the building at each entrance except the utility room. Provide a sign to read "CLOSE DRAIN WHILE HANDLING PESTICIDES ON HARDSTAND." Provide a sign to read "FLAMMABLE

PESTICIDES" if flammable liquid storage cabinet is included in design. A sign shall be provided near the pit valve stating "RECOVER PESTICIDES SPILLS. USE VALVE TO DRAIN WASH WATER AND RAIN." Consider posting signs in languages for non-English speaking employees (recommended). Provide building identification information on the outside of the structure visible from 100 feet (30.48 m). Provide a 3 foot (914 mm) by 4 foot (1219 mm) notice board in the office or hallway near the office for emergency instructions and notices.

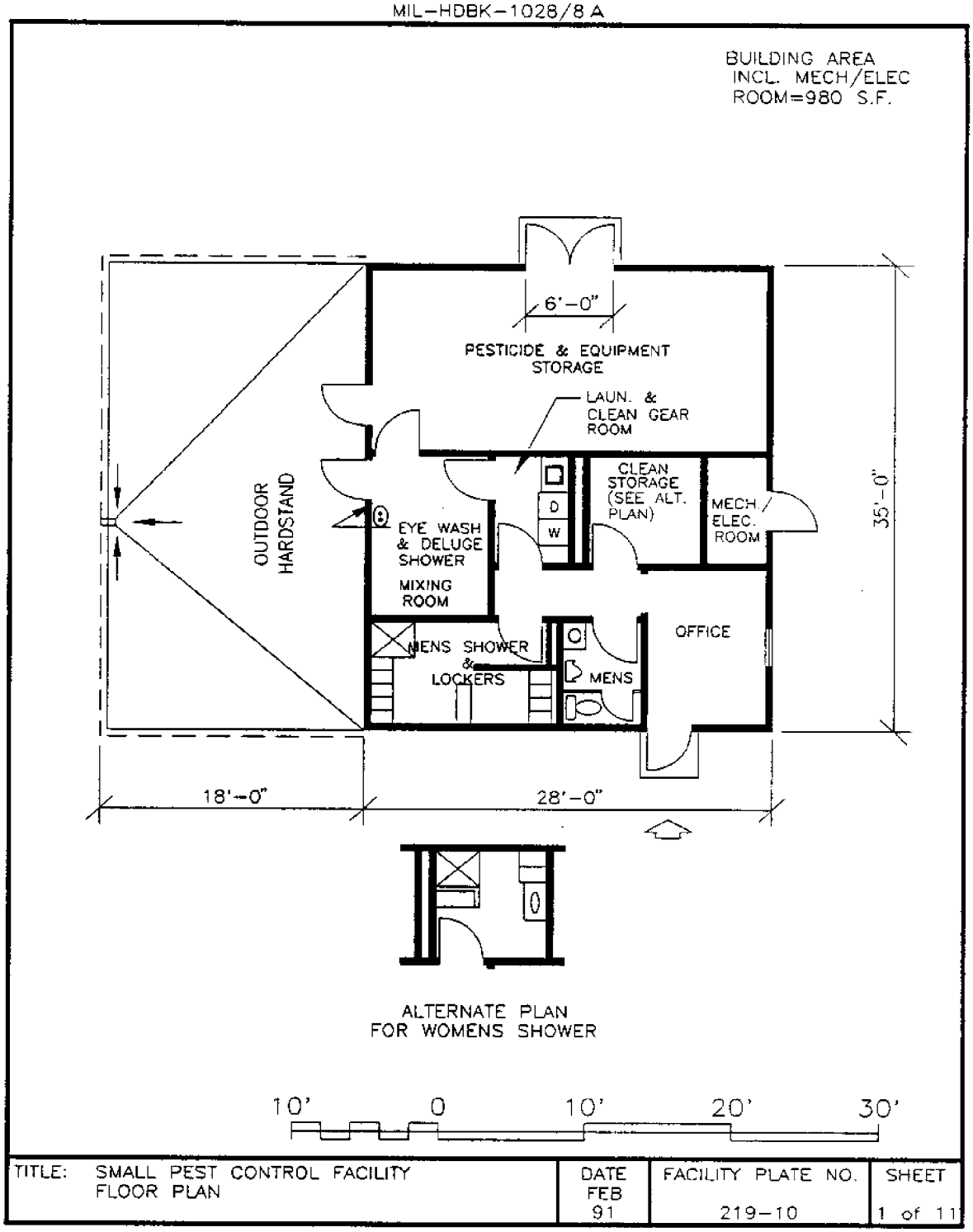
Operational Note. A list of the types of materials stored shall be posted on the outside of the storage area and a copy should be given to the installation on-scene hazardous waste coordinator and the fire department serving the installation. The list shall include "chemical names and formulations" rather than generic "brand" names. Moveable equipment used for handling pesticides should be dedicated to the pest management facility and not used elsewhere or for other purposes, forklifts excluded. A sign shall be posted at the actual mixing area requiring the use of protective gloves, aprons and boots, protective eye wear or face shields, coveralls, and an approved pesticide respirator. Increased ventilation only reduces the need for a respirator. All pesticide containers shall be labeled.

3.9 Architectural. For guidance in the selection of small, medium, or large facility sizes see paragraph 2.3.1. Provide exterior design that is compatible with other existing structures and siting to suit project requirements and architectural guidelines for each installation.

FACILITY PLATES FOR

PEST MANAGEMENT FACILITIES

MIL-HDBK-1028/8A



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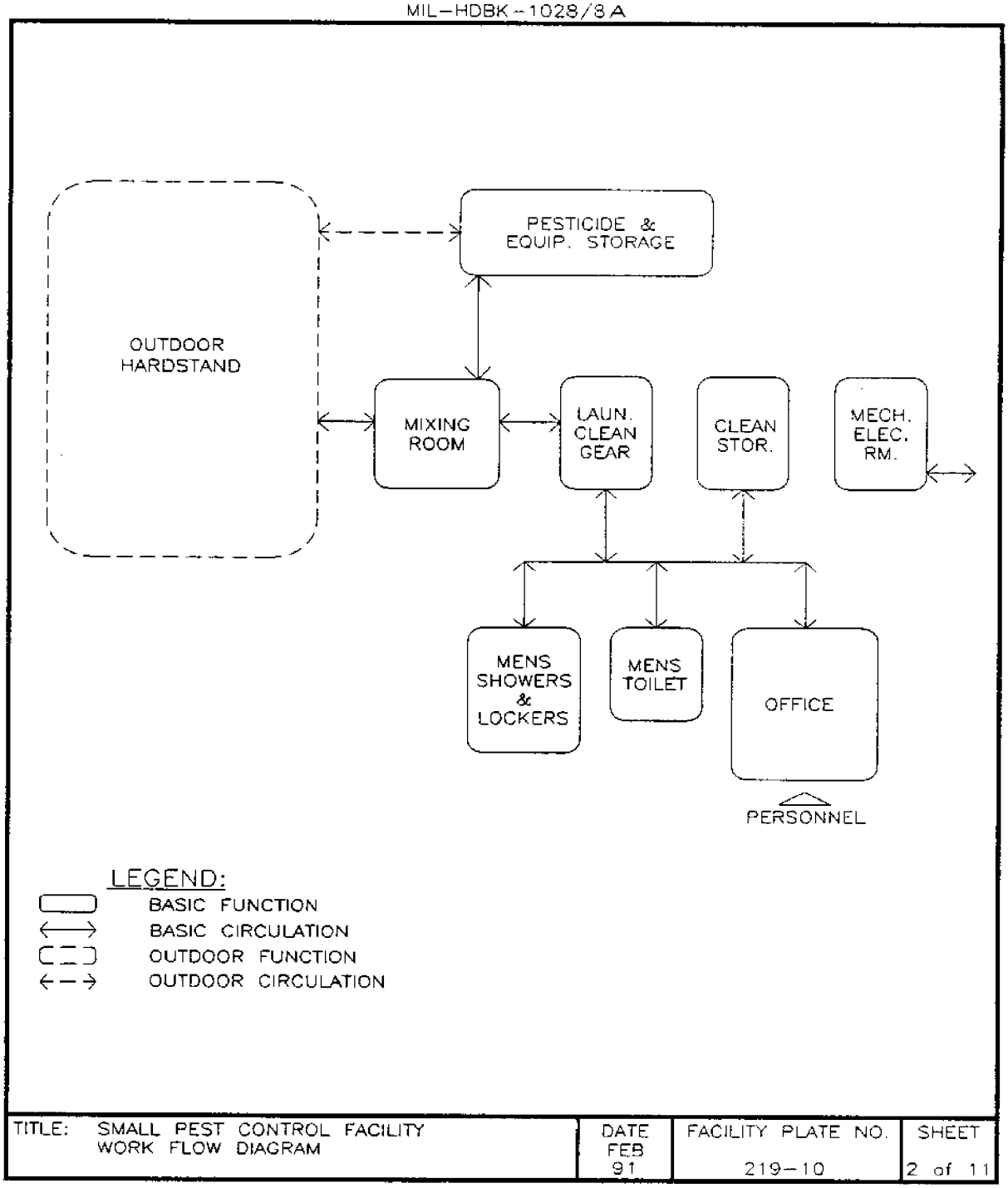
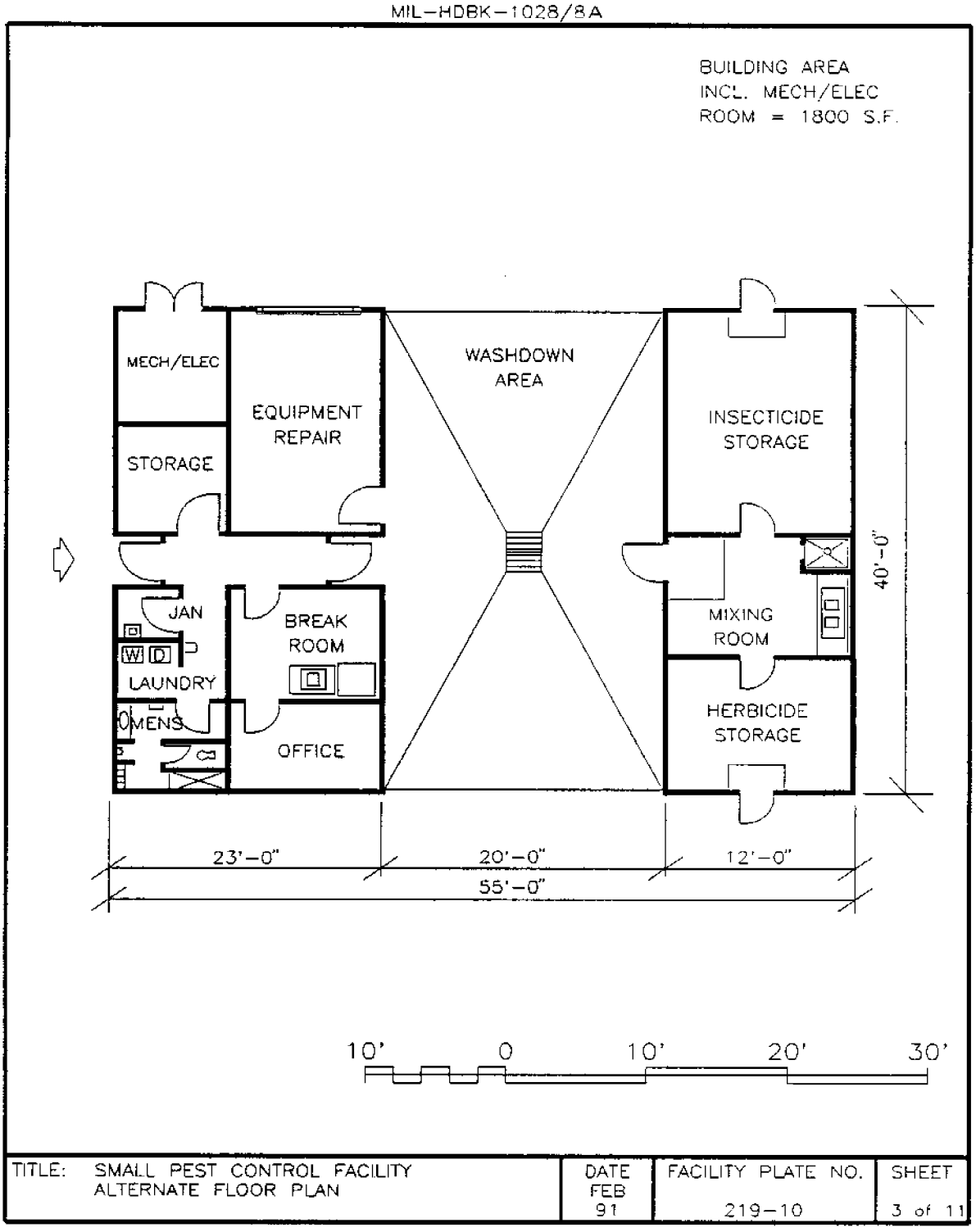


TITLE: SMALL PEST CONTROL FACILITY WORK FLOW DIAGRAM	DATE FEB 91	FACILITY PLATE NO. 219-10	SHEET 2 of 11

MIL-HDBK-1028/8A



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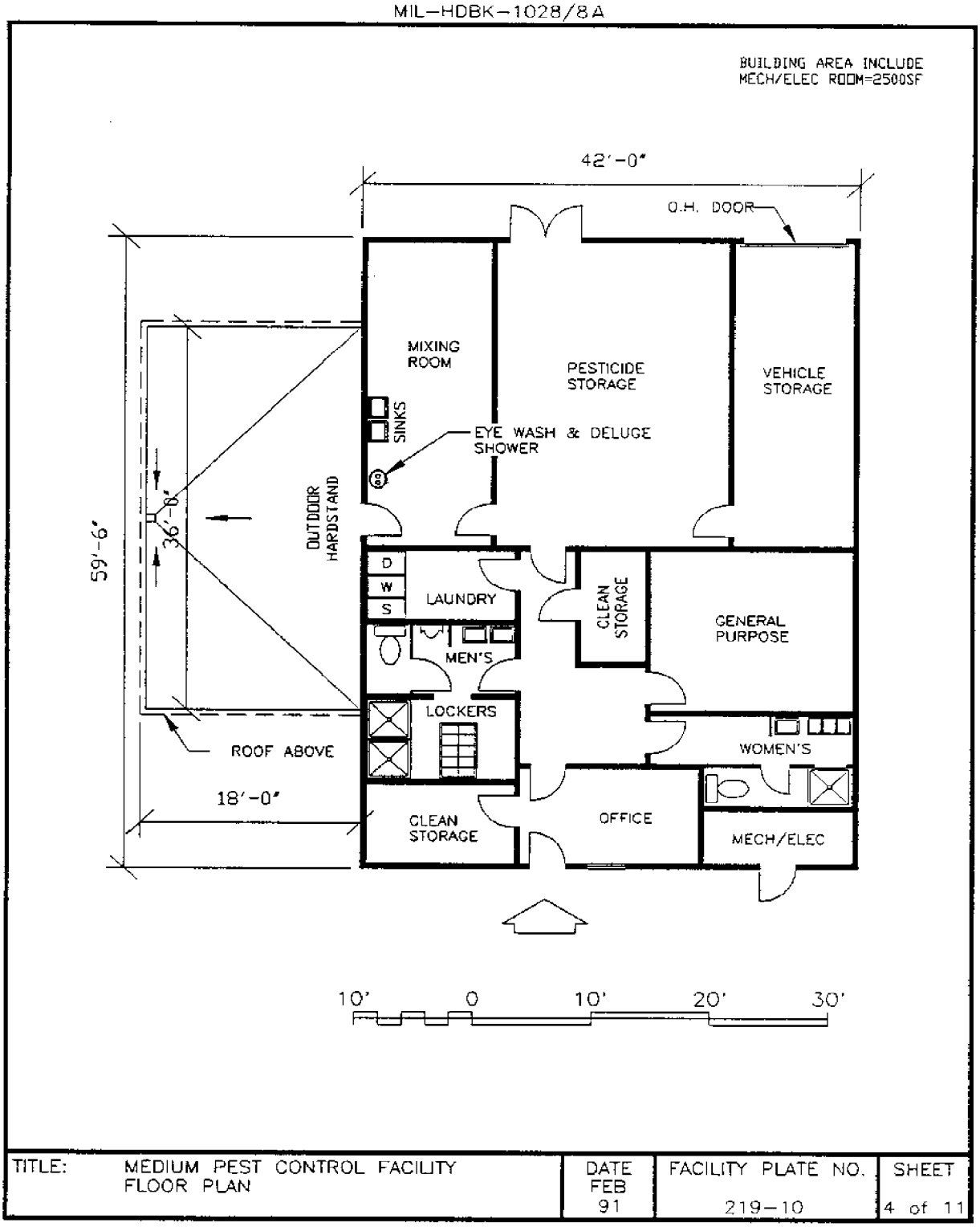
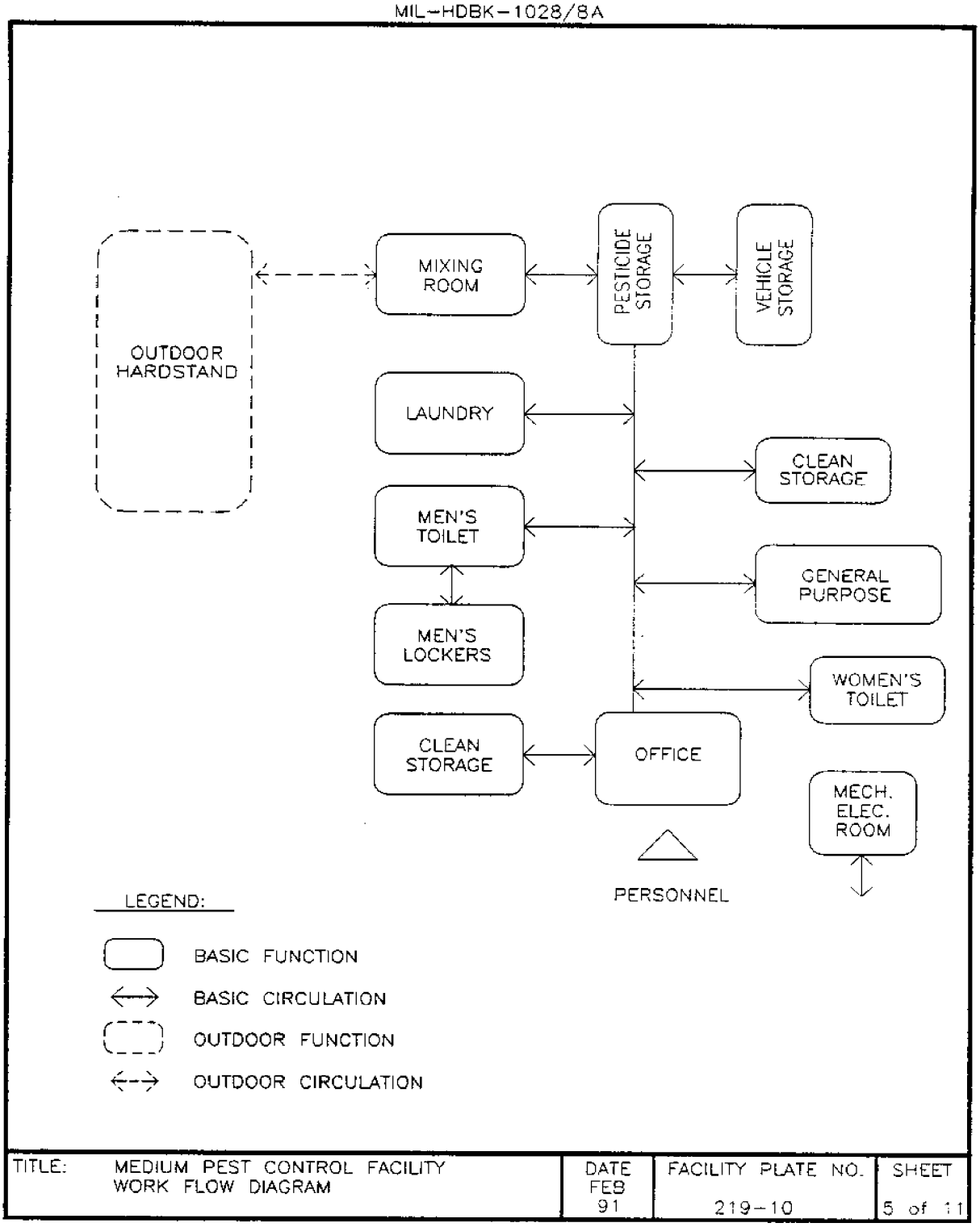
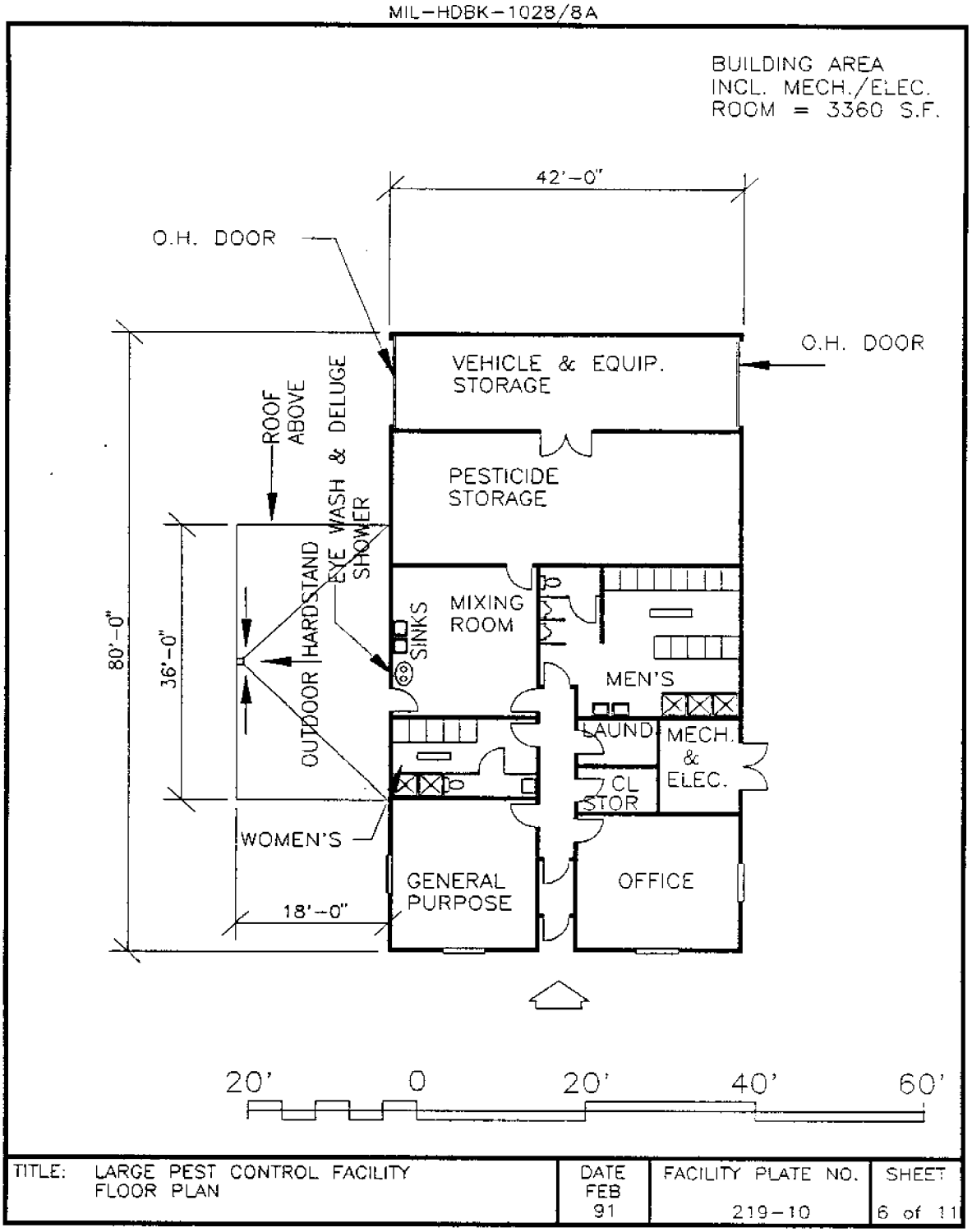


TITLE: MEDIUM PEST CONTROL FACILITY FLOOR PLAN	DATE FEB 91	FACILITY PLATE NO. 219-10	SHEET 4 of 11



TITLE: MEDIUM PEST CONTROL FACILITY WORK FLOW DIAGRAM	DATE FEB 91	FACILITY PLATE NO. 219-10	SHEET 5 of 11

MIL-HDBK-1028/8A



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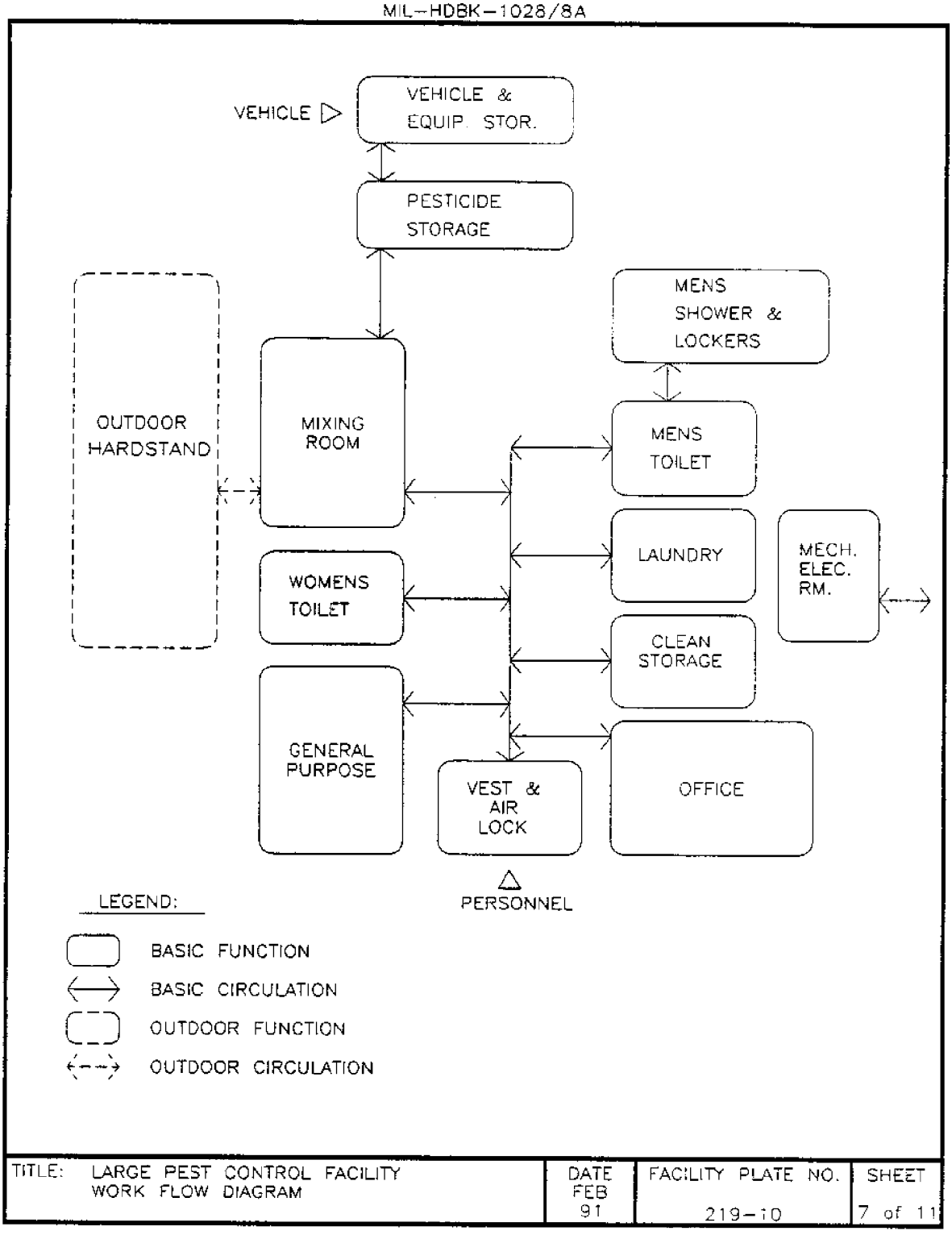
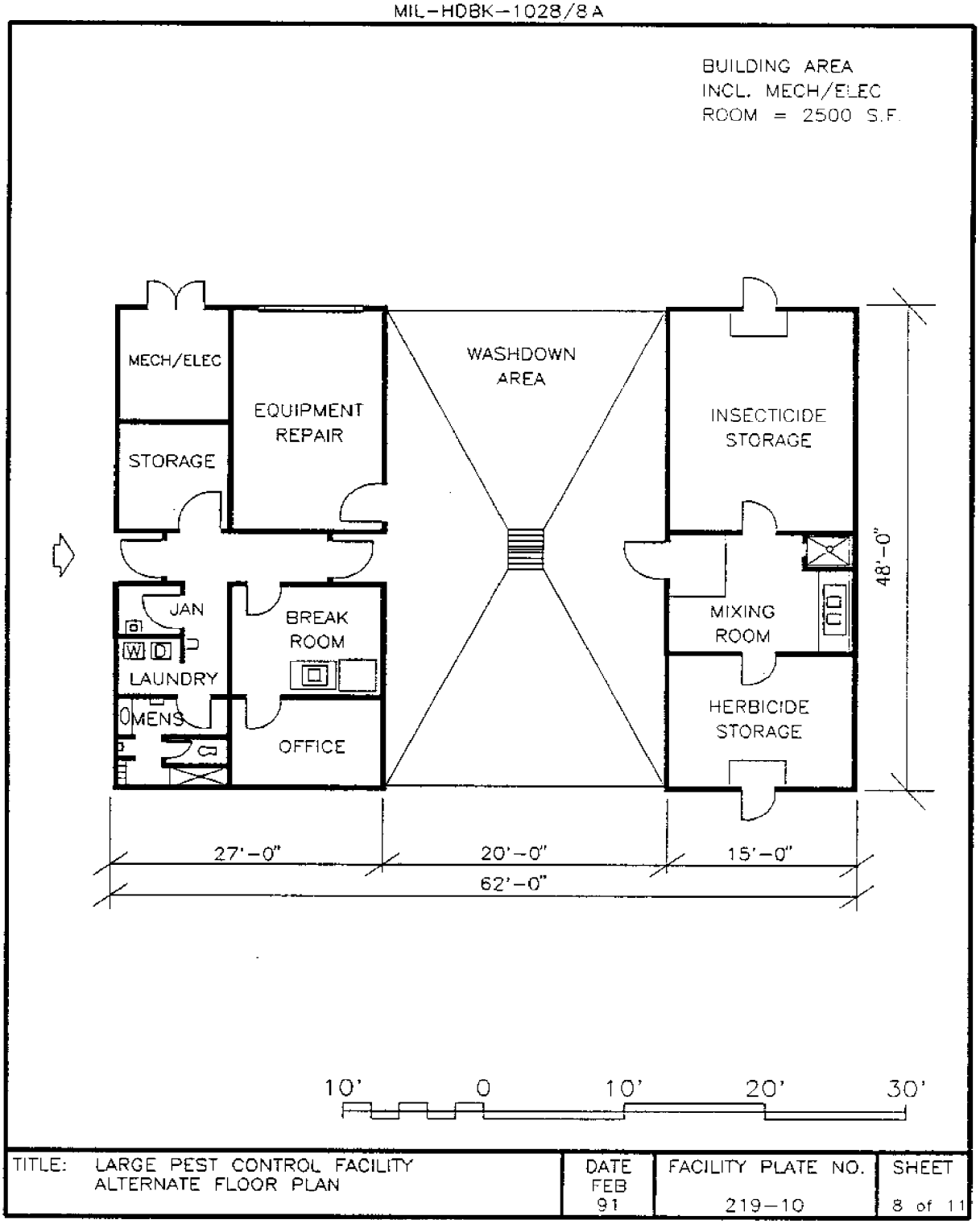


TITLE: LARGE PEST CONTROL FACILITY WORK FLOW DIAGRAM	DATE FEB 91	FACILITY PLATE NO. 219-10	SHEET 7 of 11

MIL-HDBK-1028/8A



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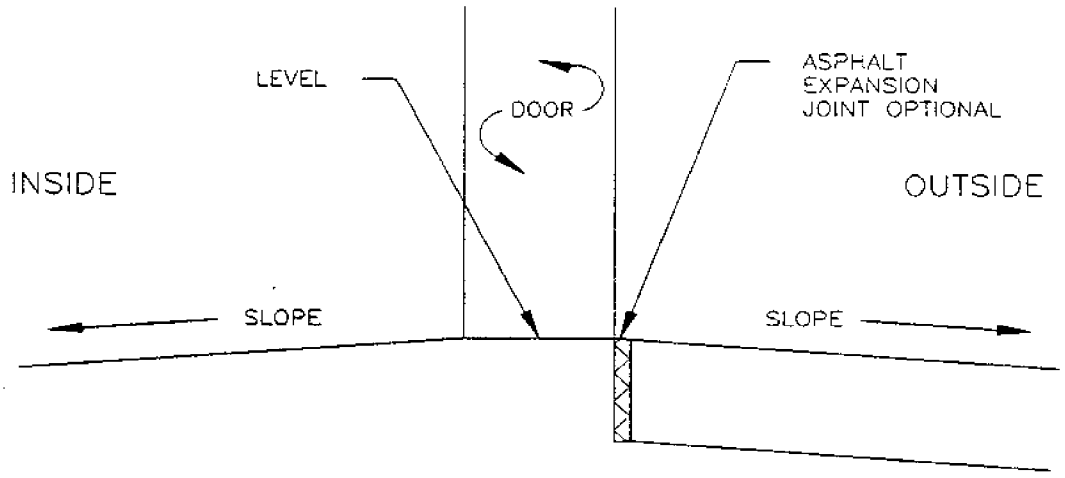
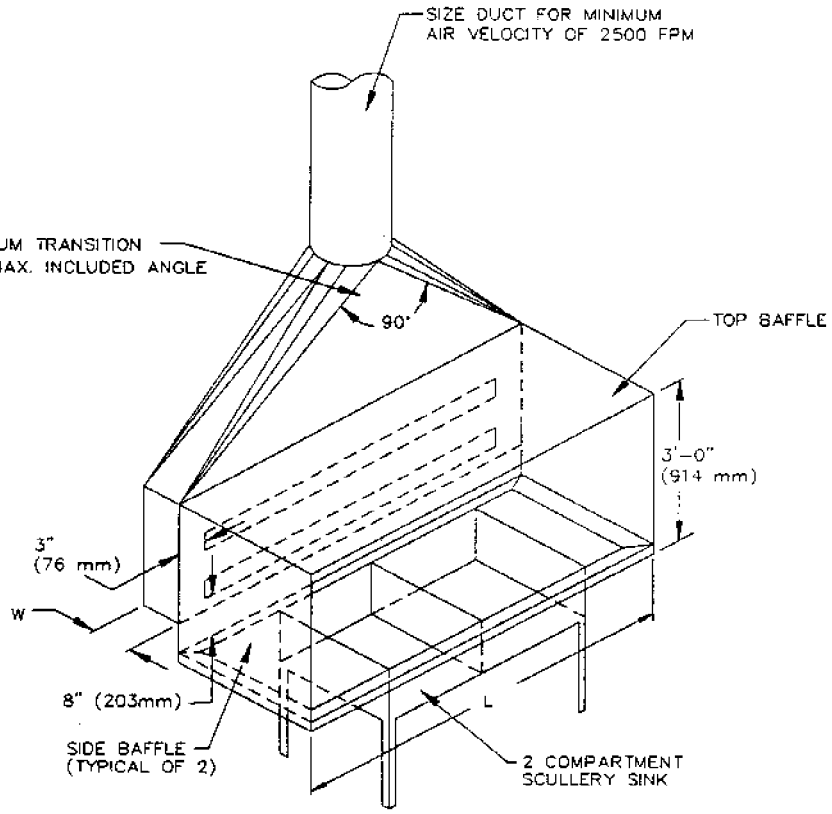


NOT TO SCALE

NOTE: MINIMUM SLOPE = 3/8 INCH (9 mm) PER FOOT

TITLE: PEST CONTROL FACILITY DOOR SILL DETAIL	DATE FEB 91	FACILITY PLATE NO. 219-10	SHEET 9 of 11

MIL-HDBK-1028/8A



SLOTTED EXHAUST HOOD VENTILATOR DETAIL

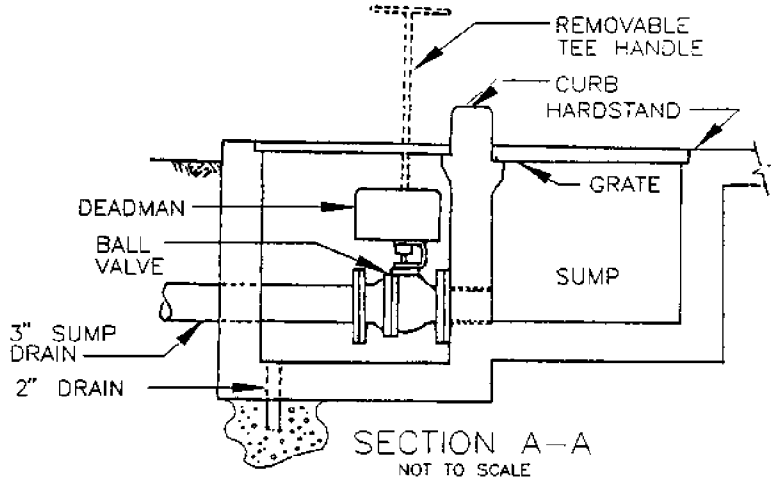
NOT TO SCALE

NOTE:

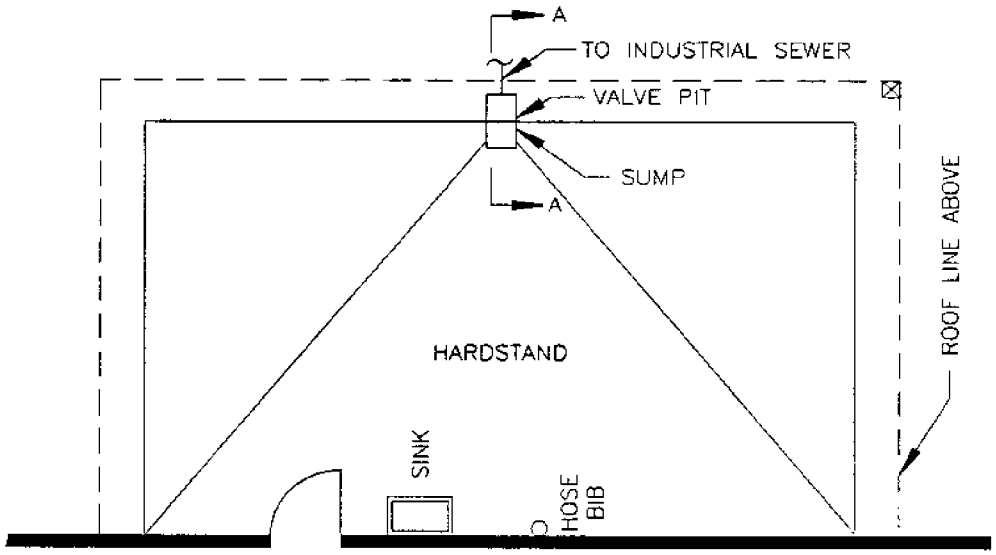
1. PROVIDE AT LEAST 2 LINEAR FEET (610 mm) OF COUNTER TOP EACH SIDE OF SINK.
2. EXHAUST TAKEOFF MAY SERVE NO MORE THAN 8' (2.438 m) OF TABLE LENGTH. (IF TABLE LENGTH (L) EXCEEDS 8' (2.438 m) THEN USE ADDITIONAL TAKEOFFS).
3. DESIGN HOOD EXHAUST FLOW RATE FOR: Q(cfm) = 150 x L(ft) x 3(ft).
4. DESIGN HOOD PLENUM WIDTH FOR: W(ft) = Q(cfm) / (L(ft) x 1000).
5. VERTICAL DISTANCE BETWEEN SLOTS = 8" (203 mm).
6. USE PERFORATED METAL PLATE (3/8" dia., INDENTED HOLES, APPROX. 50% OPEN AREA) TO COVER SLOTS.
7. SIZE SLOTS FOR AIR VELOCITY OF 2000 fpm (10.16 m/sec) THROUGH HOLES IN PERFORATED PLATE.
8. IF DESIRED, PROVIDE LIGHT FIXTURE ON TOP BAFFLE THAT IS CORROSION RESISTANT, VENTED, AND FLUSH MOUNTED.

TITLE: LARGE PEST CONTROL FACILITY SLOTTED EXHAUST HOOD VENTILATOR DETAIL	DATE FEB 91	FACILITY PLATE NO. 219-10	SHEET 10 of 11

MIL-HDBK-1028/8A



SECTION A–A
NOT TO SCALE



MIXING ROOM

TITLE: PEST CONTROL FACILITY HARDSTAND AND SUMP DRAIN DETAILS	DATE FEB 91	FACILITY PLATE NO. 219–10	SHEET 11 of 11

REFERENCES

NOTE: THE FOLLOWING REFERENCED DOCUMENTS FORM A PART OF THIS HANDBOOK TO THE EXTENT SPECIFIED HEREIN. USERS OF THIS HANDBOOK SHOULD REFER TO THE LATEST REVISIONS OF CITED DOCUMENTS UNLESS OTHERWISE DIRECTED.

FEDERAL/MILITARY SPECIFICATIONS, STANDARDS, BULLETINS, HANDBOOKS, AND NAVFAC GUIDE SPECIFICATIONS:

Unless otherwise indicated, copies are available from the Naval Publishing and Printing Service Office (NPPSO), Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

FEDERAL SPECIFICATIONS

WW-P-541/7A	Plumbing fixtures (Sinks, Kitchen and Service and Laundry Tub, Land Use) (detail specification)
WW-P-541/7C	Plumbing Fixtures (Shower Bath and Emergency Eye and Face Wash Outfits)

MILITARY HANDBOOKS

MIL-HDBK-1001/5	Roofing and Waterproofing
MIL-HDBK-1002/1	Structural Engineering - General Requirements
MIL-HDBK-1004/1	Preliminary Design Considerations
MIL-HDBK-1004/2	Power Distribution Systems
MIL-HDBK-1004/3	Switchgear and Relaying
MIL-HDBK-1004/4	Electrical Utilization Systems
MIL-HDBK-1004/6	Lightning Protection
MIL-HDBK-1004/7	Wire Communication and Signal Systems
MIL-HDBK-1008A	Fire Protection for Facilities Engineering, Design and Construction
MIL-HDBK-1003/17	Industrial Ventilation Systems

GUIDE SPECIFICATIONS

NFGS-02831	Fence, Chain Link
NFGS-03300	Cast-in-Place Concrete

NAVFAC DESIGN MANUALS, P-PUBLICATIONS AND INSTRUCTIONS:

Unless otherwise indicated, copies are available from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099. Government activities must use the Military Standard Requisitioning and Issue Procedure (MILSTRIP), using stock number obtained from NAVSUP Publications 2002. Commercial organizations may obtain copies from the Commanding Officer, Naval Publications and Forms Center, Attention Cash Sales, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

DESIGN MANUALS

DM-1.01	Basic Architectural Requirements and Design Considerations
DM-3.01	Plumbing Systems
DM-3.03	Heating, Ventilating, Air Conditioning, and Dehumidifying Systems

P-PUBLICATIONS

P-20.E	Shop Guide for Pesticide Disposal
P-80	Facility Planning Criteria for Navy and Marine Corps Shore Installations
P-89	Engineering Weather Data

INSTRUCTIONS

OPNAVINST 6250.4A	Pest Management Program
NAVFACINST 4101.1	Energy Budgets for New Facilities
NAVSUP S29	Warehouse Modernization and Layout Planning Guide, March 1985 (Stock No. 0530-LP-529-0000)

FEDERAL LAW/CODE OF FEDERAL REGULATIONS:

Unless otherwise indicated, available from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

FEDERAL LAWS

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

Resource Conservation and Recovery Act (RCRA)

CODE OF FEDERAL REGULATIONS

29 CFR 1910 Subpart L	Fire Protection
29 CFR 1910.106	Flammable and Combustible Liquids
29 CFR 1910.141	Sanitation
40 CFR 165	Regulations for the Acceptance of Certain Pesticides and Recommended Procedures for the Disposal and Storage of Pesticides and Pesticide Containers
40 CFR 165.8	Disposal of Pesticide Wastes
40 CFR 165.10	Recommended Procedures and Criteria for Storage of Pesticides and Pesticide Containers
40 CFR 260	Hazardous Waste Management System
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

OTHER GOVERNMENT PUBLICATIONS:

ARMY

Armed Forces Pest Management Board Technical Information, Manual #15 Pesticide Spill Prevention and Management
U. S. Army Regulation 420-76

Available from Armed Forces Pest Management Board, Defense Pest Management Information Analysis Center, Forest Glen Station, WRAMC, Washington, DC 20307-5001.

AIR FORCE

Air Force Manual AFM 86-2, Standard Facility Requirements.

Air Force Manual AFM 88-15, Criteria and Standards for Air Force Construction.

Air Force Regulation AFR 91-21, Pest Management Program.

Available from the Publications Distribution Office (PDO) on each Air Force Base.

NON-GOVERNMENT PUBLICATIONS:

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH), 6500 Glen Way Avenue, Cincinnati, OH 45211.

Industrial Ventilation - A Manual of Recommended Practices

AMERICAN WATER WORKS ASSOCIATION (AWWA), 6666 W. Quincy Avenue, Denver, CO 80235.

AWWA Standard C506-69/78, Back Flow Prevention Devices

ILLUMINATING ENGINEERING SOCIETY (IES), 345 East 47th Street, New York, NY 10017

IES Lighting Handbook

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), Batterymarch Park, Quincy, MA 02269.

NFPA 10	Portable Fire Extinguishers
NFPA 30	Storage of Flammable Liquids
NFPA 43	Storage of Pesticides in Portable Containers
NFPA 70	National Electrical Code
NFPA 101	Life Safety Code
NFPA 231	General Indoor Storage

NATIONAL PEST CONTROL ASSOCIATION (NPCA), 8100 Oak Street, Dunn Loring, VA 22027.

NPCA Manual	Profit Through Safety

CUSTODIANS:
NAVY - YD
AIR FORCE - 04

PREPARING ACTIVITY:
NAVY - YD

PROJECT NO.
FACR 0900