INTEGRATED PEST MANAGEMENT PLAN
63d READINESS DIVISION

Prepared for:

63d Readiness Division Directorate of Public Works
Environmental Division
230 RT Jones Road
Mountain View,
California 94035

Prepared by:

1826 N Loop
1604 W,
Suite 337B
San Antonio,
TX 78248

Document Number
USAR63
0809-06-
0224

December 2020

INTEGRATED PEST MANAGEMENT PLAN
63d READINESS DIVISION
UPDATED BY:
LISA GONZALES CTR
63d RD Pest Management Coordinator Environmental Division
Office of the Directorate of Public Works (DPW)
December 2020

REVIEWED BY:

Digitally signed by NARANJO.MARTIN.JEFFREY.1155899855
Date: 2021.02.17 10:49:36 -08'00'

COL Martin J. Naranjo, PE
Regional Engineer and Directorate of Public Works
63d Readiness Division

QUINONES.CHARLES.RAYMOND.1176961798

Digitally signed by QUINONES.CHARLES.RAYMOND.1176961798
Date: 2021.02.17 10:43:25 -08'00'

Mr. Charles Quinones
Director Safety & Occupational Health
63d Readiness Division

Digitally signed by MCCLELLAND.GERRY.LEE.1174229283
Date: 2020.12.18 09:28:35 -08'00'

Mr. Gerry McClelland
Chief of Operations, Maintenance and Energy Division
63d Readiness Division

MAHAN.MILES.EDWIN.1132783019

Digitally signed by MAHAN.MILES.EDWIN.1132783019
Date: 2020.12.21 10:09:51 -08'00'

COL Miles E. Mahan
Command Surgeon
63d Readiness Division

FERRELL.JAMES.EDWIN.1087496089

Digitally signed by FERRELL.JAMES.EDWIN.1087496089
Date: 2020.12.22 08:45:09 -06'00'

Mr. Jef Ferrell
Services/Energy Programs Manager
Operations, Maintenance and Energy Division
63d Readiness Division

INTEGRATED PEST MANAGEMENT PLAN
63d READINESS DIVISION
UPDATED BY:
LISA GONZALES CTR
63d RD Pest Management Coordinator
Environmental Division
Office of the Directorate of Public Works (DPW)
December 2020

REVIEWED AND SUBMITTED BY:

CABALLERO.LAURA.MARLENE.1011219914

Digitally signed by CABALLERO.LAURA.MARLENE.1011219914
Date: 2021.01.04 06:33:13 -08'00'

Ms. Laura Caballero
Installation Pest Management Coordinator
Environmental Chief
DPW Environmental Division
63d Readiness Division

APPROVED BY:

ROSENDE.ALBERTO.CARLOS.1027991218

Digitally signed by ROSENDE.ALBERTO.CARLOS.1027991218
Date: 2021.03.26 16:53:56 -07'00'

Commanding General
MG Alberto C. Rosende
63d Readiness Division

EXECUTIVE SUMMARY

The U.S. Army Reserve (USAR) 63d Readiness Division (RD) Headquarters, located at Moffett Field in Northern California's Bay Area, provides Base Operations Support and related support for all Reserve personnel in the seven-state Southwest Region of the United States. This region includes Arizona, Arkansas, California, Nevada, New Mexico, Oklahoma, and Texas. Most of the facilities managed by the 63d RD are found in urban or suburban areas and consist of single buildings or a complex (rarely exceeding 10 buildings and structures). The configuration and construction of the facilities and the resources and geographical features of each site vary considerably.

This Integrated Pest Management Plan (IPMP or Plan) applies to all activities and individuals working, residing or otherwise doing business on USAR sites controlled by the 63d RD. Some 63d RD facilities are located on military installations belonging to other service branches such as the National Guard, U.S. Air Force, U.S. Army, U.S. Navy, or NASA. On these installations, the 63d RD is considered a tenant and is not primarily responsible for pest management on the facility or site.

While this Plan will be implemented to the maximum extent possible, at no time will pest management operations be performed in a manner which would cause harm to personnel or the environment. Pest management responsibility begins with those individuals occupying or maintaining buildings or open space on the installation. Non-chemical control efforts will be used to the maximum extent possible before chemical pesticides are used. This Plan provides a working document and will be continually updated to reflect actual pest management practices.

This Plan describes the Command's pest management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety and environmental requirements of the program. The program for the 63d RD relies on building occupants, Facility Coordinators and contract pest management technicians to control pests. Pests addressed in the IPMP include weeds and other unwanted vegetation, termites, mosquitoes, other insects (e.g., bees, wasps, ants, crickets, cockroaches), spiders, mice, and various vertebrate pests such as skunks, raccoons and ground squirrels. Without control, these pests could interfere with the military mission, damage real property, increase maintenance costs, and expose installation personnel to diseases. Recommended pest management procedures are found in the Integrated Pest Management Outlines in Appendix F.

TABLE OF CONTENTS

1.0 INTRODUCTION AND OBJECTIVES 1
1.1 Purpose 1
1.2 Authority 1
1.3 Program Objective 1
1.4 Integrated Pest Management 1
1.4.1 IPM Principles 1
1.4.2 IPM Outlines 3
1.5 Self-Help 3
1.6 Plan Maintenance 3
2.0 RESPONSIBILITIES 5
2.1 Commanding General, 63d RD 5
2.2 Regional Engineer/Director of DPW 5
2.3 Installation Pest Management Coordinator 5
2.4 USAR Center Site Coordinators 6
2.5 Building Occupants 6
2.6 Contracted Pest Management Personnel 7
2.7 Command Surgeon 7
2.8 Site Commanders/Unit Commanders 7
3.0 INSTALLATION DESCRIPTION 9
4.0 CONTRACTS AND AGREEMENTS 11
4.1 Contracts 11
4.2 Inter-Service Support Agreements 11
4.3 Government Purchase Cards 11
5.0 ADMINISTRATION 13
5.1 Reports and Records 13
5.2 Training 14
5.3 Quality Assurance/Quality Control 14
5.4 Design/Review of New Construction 14
5.5 Reviews 14
6.0 PRIORITY OF PEST MANAGEMENT 15
6.1 Disease Vectors and Medically Important Arthropods 15
6.1.1 Ticks 15
6.1.2 Mosquitoes 16
6.1.3 Spiders 16
6.1.4 Bees and wasps 17
6.1.5 Scorpions 17
6.1.6 Red Imported Fire Ants 17
6.1.7 Mice 17
6.2 Quarantine and Regulated Pests 17
6.3 Real Property Pests (Structural/Wood Destroying Pests) 18

6.4 Stored Products Pests 18
6.5 Ornamental Plant and Turf Pests 18
6.6 Invasive Vegetation 18
6.7 Other Animal Pests 18
6.8 Household and Nuisance Pests 18
7.0 SAFETY AND ENVIRONMENTAL CONSIDERATIONS 19
7.1 Sensitive Areas 19
7.2 Invasive Species Management 19
7.3 Endangered/Protected Species and Critical Habitats 19
7.4 Environmental Documentation 20
7.5 Pesticide Spills and Remediation 20
7.6 Pollution Prevention (P2) 21
7.7 Environmental Measures of Merit 21
7.8 Prohibited Activities 21
7.9 Hazard Communication 22
8.0 PEST MANAGEMENT REFERENCES 22

LIST OF APPENDICES

APPENDIX A. PEST MANAGEMENT RECORD 23
APPENDIX B. DEPARTMENT OF DEFENSE ARTHROPOD REPELLENT SYSTEM 27
APPENDIX C. PEST MANAGEMENT REFERENCES 31
APPENDIX D. ANNUAL PLAN UPDATE FORM 33
APPENDIX E. PEST MANAGEMENT COORDINATOR TRAINING CERTIFICATE 35
APPENDIX F. INTEGRATED PEST MANAGEMENT OUTLINES 39
APPENDIX G. STANDARD LIST OF PESTICIDES AVAILABLE TO DoD COMPONENTS AND AGENCIES 171
APPENDIX H. DoD CONTINGENCY PESTICIDES 195
APPENDIX I. AFPMB TECHNICAL GUIDE NO. 41 PROTECTION FROM RODENT-BORNE DISEASES WITH SPECIAL EMPHASIS ON OCCUPATIONAL EXPOSURE TO HANTAVIRUS 217
APPENDIX J. ENDANGERED, THREATENED, AND PROTECTED SPECIES AND SENSITIVE HABITATS 291

LIST OF ACRONYMS AND ABBREVIATIONS

AC	Acre
G9-ODR	Operations Division, Reserve
AEC	Army Environmental Command
AFOS	Area Facility Operations Specialist
AFPMB	Armed Forces Pest Management Board
AFRC	Armed Forces Reserve Center
AMEDDC&S	Army Medical Department Center and School
APUF	Annual Plan Update Form
AR	Army Regulation
BIRC	Bio-Integral Resource Center
BT	*Bacillus thuringiensis*
CDC	Center for Disease Control and Prevention
CF	Cubic Feet
CFR	Code of Federal Regulations
CONUS	Continental United States
COR	Contracting Officer's Representative
DA	Department of the Army
DoD	Department of Defense
DoDI	Department of Defense Instruction
DPMIAC	Defense Pest Management Information Analysis Center
DR	dry ounce
EO	Executive Order
EPA	Environmental Protection Agency
EPAS	Environmental Performance Assessment System
ESA	Endangered Species Act
ESPB	Endangered Species Protection Bulletin
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FL	fluid ounce
FY	Fiscal Year
GS	gallon
GPC	Government Purchase Card

HAZCOM	Hazard Communication
HEPA	High-Efficiency Particulate Air
HGE	Human Granulocytic Ehrlichiosis
HME	Human Monocytic Ehrlichiosis
HPS	Hantavirus Pulmonary Syndrome
IPM	Integrated Pest Management
IPMC	Installation Pest Management Coordinator
IPMP	Integrated Pest Management Plan
ISE	Installation Services Directorate
ISMP	Invasive Species Management Plan
JPA	Joint Powers Authority
KG	kilogram
LB	pound
LF	linear feet
LT	liter
MEDCOM	Medical Command
MH	Military Housing
ML	milliliter
MOM	Measures of Merit
MRE	Meals Ready to Eat
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NMFS	National Marine Fisheries Service
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PAI	Pounds Active Ingredient
PAPR	Powered Air Purifying Respirator
PEA	Programmatic Environmental Assessment
PM	Pest Management
PMR	Pest Management Record
POC	Point of Contact

POPS	Paperless Ordering Placement System
PPE	Personal Protective Equipment
PMQAE	Pest Management Quality Assurance Evaluator
PUL	Pesticide Use List
PUP	Pesticide Use Proposal
QAE	Quality Assurance Evaluator
RMSF	Rocky Mountain Spotted Fever
RD	Readiness Division
RTU	Ready-to-Use
SF	square feet
U.S.	United States
USAPHC	United States Army Public Health Center
USAEC	United States Army Environmental Command
USAR	United States Army Reserve
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WRBU	Walter Reed Biosystematics Unit

1.0 INTRODUCTION AND OBJECTIVES

1.1 Purpose

This Integrated Pest Management Plan (IPMP) (Plan) is a framework through which pest management is defined and accomplished at the 63d Readiness Division's (RD) United States Army Reserve (USAR) facilities and sites. The Plan addresses elements of the program including responsibilities, health and environmental safety, pest identification, and pest management, as well as pesticide storage, sales, use, and disposal. This Plan is to be used as a tool to reduce reliance on pesticides, enhance environmental protection, maximize the use of integrated pest management techniques, and minimize cost.

1.2 Authority

- Department of Defense (DoD) Instruction (DoDI) 4150.07, DoD Pest Management Program, 29 May 2008.
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 1972
- AR 200-1, Environmental Protection and Enhancement

1.3 Program Objective

This Plan provides guidance for operating and maintaining an effective pest management program and emphasizes the practices and principles of integrated pest management. Adherence to the IPMP will ensure effective, economical and environmentally acceptable pest management practices and will maintain compliance with pertinent laws and regulations.

1.4 Integrated Pest Management

Integrated Pest Management (IPM) is the judicious use of both non-chemical and chemical control to suppress or prevent pests and invasive vegetation from exceeding an acceptable population or damage threshold. Emphasis is placed on minimizing environmental disruption and compliance with environmental regulations. IPM strategies depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts.

1.4.1 IPM Principles

The four basic principles described below are the heart of IPM, and are descriptive of the philosophy used to manage pests on the 63d RD facilities; IPM measures for specific pests can be found in the IPM Outlines in Appendix F.

> ***(1) Mechanical and Physical Control.*** This type of control alters the environment in which a pest lives, traps and removes pests where they are not wanted, or excludes pests. Examples of this type control include: harborage elimination through caulking or filling voids, mechanical traps or glue boards, and screens and other barriers to prevent entry into buildings. This type of control also includes the removal of invasive vegetation using mechanical means such as hand picking, tilling, mowing and prescribed burning.

***(2) Cultural Control*.** Strategies in this method involve manipulating environmental conditions to suppress or eliminate pests. Elimination of food and water for pests through good sanitary practices is the most important cultural control method employed under this Plan. General cleanliness in buildings, break rooms, and storage areas may prevent pest populations from becoming established or from increasing beyond a certain size. Also proper irrigation, fertilization and native landscape plants can reduce the need for pesticide applications.

***(3) Biological Control*.** In this control strategy, predators, parasites or disease organisms are used to control pest populations. Sterile flies may be released to lower reproduction. Viruses and bacteria that control growth or otherwise kill insects may be used. Parasitic wasps may be introduced to kill pests as eggs, larvae, or in other life stages. Biological control may be effective by itself, but is often used in conjunction with other types of control. Given the minimal pest problems known to occur at 63d RD facilities, biological control techniques are seldom employed.

***(4) Chemical Control*.** Pesticides kill living organisms, whether they are plants or animals. At one time, chemicals were considered to be the most effective control available, but pest resistance has rendered many pesticides ineffective. In recent years, the trend has been to use botanical pesticides, which have limited residual action. While this has reduced human exposure to chemicals and lessened environmental impact, the cost of botanical pesticide control has risen due to requirements for more frequent application. Since personal protection and special handling, storage and disposal requirements are necessary with the use of chemicals, the overall cost of using chemicals as a sole means of control can be quite high when compared with non-chemical control methods such as mechanical or cultural control. The limited chemical use in the 63d RD includes occasional treatment for weeds, ants, wasps, mice, and other undesirable pests and is typically performed in conjunction with mechanical or cultural control methods to ensure effective treatment.

While any one of these methods may solve a pest problem, often several methods are used concurrently, particularly if long-term control is needed. For example, screens may be used to prevent mosquitoes from entering buildings, breeding areas may be filled in or drained to eliminate larval habitat, and pesticides may be used to kill adult mosquitoes. Screens will protect people inside, but do little to keep people from being bitten outdoors. Larval control may eliminate mosquito breeding on the installation, but may not prevent adult insects from flying in from surrounding areas. Chemicals may kill most of the flying mosquitoes during a given time period, but may miss others. Although chemical control is an integral part of IPM, non-chemical control is stressed. Chemical control is generally an expensive, temporary fix, and in the long run, it is more expensive than non-chemical control methods designed to prevent infestations. Non-chemical controls, which initially may be more expensive than chemicals, will usually be more cost effective in the long run. Non-chemical controls also have the added advantage of being nontoxic, thereby reducing the potential risk to human health and the environment.

1.4.2 IPM Outlines

IPM Outlines are found in Appendix F. Each major pest or invasive vegetation species is addressed in separate outlines. New outlines will be added to Appendix F as new pests or species are encountered that require surveillance or control.

1.5 Self-Help

The self-help is designed to maximize the ability of staff to control pest at their facility. Self-help products are identified in the Armed Forces Pest Management Board Technical Guide No. 42, Self-Help Integrated Pest Management, 2016. o

1.6 Plan Maintenance

The 63d RD Installation Pest Management Coordinator (IPMC) maintains this Plan. Pen and ink changes are made to the Plan throughout the fiscal year (FY). It is reviewed and updated annually to reflect all the changes made in the pest management program during the FY. Annual updates of this Plan will be sent to the Assistant Chief of Staff for Installation Management, Operations Division, Reserve (G9-ODR) Pest Management Program Manager not later than 30 October of each year. The most recent Annual Plan Update Form (APUF) is found in Appendix D.

This Page Intentionally Left Blank

2.0 RESPONSIBILITIES

2.1 Commanding General, 63d RD

The 63d RD Commanding General is ultimately responsible for the success of the 63d's Pest Management Program. In this capacity, the Commander:

- Designates an IPMC for all pest management activities within the 63d RD;
- Approves and supports the IPMP;
- Ensures personnel performing quality assurance on pest control contracts receive adequate training in contract administration and achieve pest management accreditation as required; and
- Ensures all pest management operations (including contracted activities) are conducted safely and have minimal impact on the environment.

2.2 Regional Engineer/Director of DPW

- Determines the pest management requirements for the USAR Centers, training areas, and all other property managed by the 63d RD;
- Requests and monitors contract pest management operations;
- Ensures contracted pesticide applicators throughout the 63d RD's area of responsibility report pesticide treatments in accordance with this Plan;
- Maintains adequate records of pest management operations;
- Establishes and supports a Self-Help pest control program; and
- Initiates requests for aerial application of pesticides when necessary.

2.3 Installation Pest Management Coordinator

- Maintains pen and ink changes annually to the IPMP. Annual updates of this Plan will be sent to the G9-ODR Pest Management Program Manager no later than 30 October of each year. The most recent APUF is found in Appendix D;
- Coordinates with USAR Center Facility Coordinators and contracted pest controllers to ensure all applicable information is recorded and reported as required by this Plan;
- Ensures Facility Coordinators and contracted personnel are familiar with this Plan and its requirements;
- Monitors the type of pesticides ordered and used in the 63d RD Self-Help pest management program;

- Functions as a liaison between those individuals who store and apply pesticides (e.g. public works, pest control contractors, USAR Center Facility Coordinators) and activities or individuals who document or deal with pesticide use in their programs (e.g. Environmental Office, Safety Office, local fire department);

- Coordinates and monitors contracts dealing with pesticide application and keeps a copy of each contract on file;

- Ensures current certification of contracted pesticide applicators;

- Coordinates the quality assurance evaluator (QAE) effort for all contracted pest management personnel;

- Coordinates with local, state, and federal agencies, as necessary, to implement the 63d RD pest management program. See Appendix C, *Pest Management References*;

- Maintains effective communication with public works, environmental, and safety officials on installations where USAR facilities are located; and

- Provides answers to questions concerning pest management from Facility Coordinators and other 63d RD personnel.

2.4 USAR Center Site Coordinators

- Ensure all contracted pest management activities are recorded in accordance with this Plan. See Appendix A, *Pest Management Record (PMR)*, for the PMR Form;

- Apply good sanitary practices to prevent pest infestations;

- Use all non-chemical pest and invasive vegetation control techniques as recommended in the IPM Outlines (Appendix F) before requesting further assistance from the 63d RD Engineering Office (e.g., contracted pest control);

- Apply only those pesticides that are approved for Self-Help use and are recommended in the AFPMB Technical Guide 42 Self-Help Integrated Pest Management (2016); and

- Cooperate fully with pest management contractors in scheduling pest management operations, to include preparing the areas to be treated;

- Pesticides applied by certified applicators shall not be stored at any facilities. Self-help products can be stored at a facility, but only in minimal quantities needed to protect the health and safety of facility personnel.

2.5 Building Occupants

- Apply good sanitary practices to prevent pest infestations;

- Use all non-chemical and Self-Help chemical pest and invasive vegetation control techniques as instructed in the IPM Outlines before requesting further assistance from the 63d RD Engineering Office or local pest contractors; and

- Apply only those pesticides that are approved for Self-Help use (see Appendices G and H).

2.6 Contracted Pest Management Personnel

- Use integrated IPM techniques to the maximum extent possible;

- Must be state certified to apply pesticides in all categories of pest control as outlined in the contract;

- Control pests according to the provisions of this plan, and in accordance with DoD and Army regulations (DoDI 4150.07 and AR 200-1);

- Operate in a manner that minimizes risk of contamination to the environment and personnel; and

- Provide written records of pest surveillance and control efforts to the 63d RD Environmental Division on a monthly basis. See Appendix A, *Pest Management Record*, for the type of information required.

2.7 Command Surgeon

- Coordinates with local health officials to determine the prevalence of disease vectors and other public health pests in the area surrounding 63d RD facilities.

- Conducts surveillance for mosquitoes, ticks, cockroaches, and other pests that could adversely affect the health and welfare of installation personnel.

- Evaluates the health aspects of the pest management program.

- Maintains liaison with the various state Departments of Health or equivalent authority, local mosquito control districts, the Environmental Health Section at military installations providing support to the USAR Commands, and the U.S. Army Public Health Command (USAPHC).

2.8 Site Commanders/Unit Commanders

- Assure the proper use of the DoD repellent system and other personal protective measures while troops are exposed to potential disease vectors (see Appendix B, *DoD Arthropod Repellent System*).

- Appoint a field sanitation team for each company, troop, or battery size unit. Ensure that field sanitation teams are properly trained, supplied, and mission capable prior to deployment.

This Page Intentionally Left Blank

3.0 INSTALLATION DESCRIPTION

The 63d RD is comprised of approximately 150 USAR sites in Arizona, Arkansas, California, Nevada, New Mexico, Oklahoma, and Texas. The sites vary considerably in size and configuration. The number of USAR facilities change as new facilities are constructed and old facilities are closed. Approximately 80 facilities are managed by the 63d RD and are found in urban or suburban areas and consist of single buildings or a complex (rarely exceeding 10 buildings and structures). Approximately 40 facilities are located on military installations belonging to the National Guard, United States (U.S.) Air Force, U.S. Army, U.S. Navy, or NASA. On these installations, the 63d RD is considered a tenant and is not primarily responsible for installation pest management. The remainder of the sites are not occupied by Soldiers. For information concerning inventory of land use and layout of facilities, contact the Point of Contact (POC) for the site(s) in question.

This Page Intentionally Left Blank

4.0 CONTRACTS AND AGREEMENTS

4.1 Contracts

- Pest control at 63d RD facilities is usually performed under a contract. Facility Coordinators request services through the 63d RD Area Facility Operations Specialist (AFOS) for their facility. The AFOS Following then obtains pest control services from a local company. This procedure is usually followed for control of insects and rodents in and around buildings.

- Control of weeds and other invasive vegetation is usually performed as part of a grounds maintenance contract. These contracts may be procured by individual facilities or may be part of a contract procured by the 63d RD Operations, Maintenance, and Energy Division.

- The 63d RD Operations, Maintenance, and Energy Division will follow all requirements in the Armed Forces Pest Management Board's Technical Information Memorandum No. 39, Guidelines for Preparing DoD Pest Control Contracts Using Integrated Pest Management.

- The 63d RD Operations, Maintenance, and Energy Division will include Integrated Pest Management Services Performance Based Contract (PBC) Generic Performance Work Statements in all new Pest Management contracts. This includes, but is not limited to; Quality Assurance Surveillance Plan, Integrated Pest Management Plan, Contractor's Work Plan, Pest Management Record Form DD-1532 or the 63d RD Pest Management Record Form.

- A copy of each contract dealing with pest control will be forwarded to the 63d RD IPMC. Certain information is required from the contractors applying pesticides. Appendix A contains a Pest Management Record Form that is provided to the contractors to record and report their operations.

- A current Pesticide Use List (PUL) that contains a list of pesticides approved by the AEC is also provided to the contractors. The type of pesticides to be used at USAR facilities is limited to those on PUL, unless approved by the IPMC.

4.2 Inter-Service Support Agreements

Some 63d RD facilities may obtain pest management services through inter-service support agreements with military installations on which they are tenants or which are located in the vicinity.

4.3 Government Purchase Cards

Pest management services obtained via Government Purchase Cards (GPC) or similar contract mechanisms will meet all requirements of DoDI 4150.07 and the most current U.S. Army Contracting Agency's Government Purchase Card Operating Procedures. Any purchases conducted shall be done in accordance with this plan. G9G9

This Page Intentionally Left Blank

5.0 ADMINISTRATION

5.1 Reports and Records

- The IPMC/QAE is responsible for maintaining copies (electronic or paper) of all in-house and contracted pest management operations (pesticide use, surveillance, etc.). See the Pest Management Record Form in Appendix A.

- Pest surveillance and control operations will be recorded on the Pest Management Record Form. A copy of this record will be sent to the 63d Environmental Division on a monthly basis and will become a permanent record of pest management activities.

- Records of pesticides used at 63d RD facilities will be compiled at the end of each FY for compliance with the DoD Measures of Merit (MOM) from DoDI 4150.07 (See Section 7.7 and Table 2 for the DoD Pest Management Measures of Merit). All pesticides used must be reported in pounds of active ingredient. In order to calculate the amount of pesticides being applied by contractors, certain information should be obtained from the contractor. The type of information needed, as well as other information needed to fill out the Pest Management Record Form, can be found in Appendix A. The AFOS or Facility Coordinator will request this information from the contractor whenever pesticides are applied at their facilities. The contractor shall submit the PMRs to the 63d on a monthly basis.

5.2 Training

The 63d RD IPMC will receive training in the elements of the DoD pest management program pertinent to the 63d RD. In addition, Hazard Communication (HAZCOM) training is also appropriate since exposure to pesticides may occur during the course of the job. Training certificates awarded to the above listed personnel are provided in Appendix E.

Table 1: 63d RD personnel have received DoD Pest Management Training:

Trained	Date Trained	Accreditation Number	Expiration Date
Lisa Gonzales	29 JUL 2016	IPMC-105-16	31 JUL 2019

- USAR Center Facility Coordinators must be familiar with their quality assurance responsibilities and with the requirements outlined in this Plan. Ideally, Facility Coordinators receive basic pest management training (coordinated by the IPMC) from DoD, state, or local personnel in order to enhance their ability to conduct surveillance and manage the pest management program at their facilities. All Facility Coordinators should review the 63d RD's training tutorial on "Self-Help Pest Control".

- Contracted pest controllers will be state-certified in the appropriate Department of Pesticide Regulations (DPR) pesticide applicator categories.

5.3 Quality Assurance/Quality Control

The IPMC is responsible for implementing the IPMP and for ensuring the quality of all pest management activities performed or contracted by the Facility Coordinators. Work performed by contracted pest management personnel will be evaluated based on the adherence to: 1) the contract scope of work statement negotiated through the 63d RD Regional Engineer, 2) the requirements outlined in this Plan, and 3) the pest management operational procedures.

5.4 Design/Review of New Construction

While primary engineering may be accomplished by USACE, construction projects within the 63d RD and its supported facilities are reviewed with pest prevention and control in mind. The IPMC and USACE Engineer Office personnel review the design of new buildings or other structures to ensure that insect and rodent entry points and potential harborage have been eliminated. Assistance can be provided by USAPHC personnel on request.

5.5 Reviews

Periodic oversight and review by qualified personnel of the Pest Management Program is performed to ensure that Commanders and program managers at all levels of Command receive timely and accurate information for proper management decisions.

- **Internal Reviews.** As part of the Environmental Performance Assessment System (EPAS) program, the 63d RD Environmental Division will conduct Installation reviews 2 out of every 3 years. These reviews are performed to monitor regulatory compliance.

- **External Reviews.** External reviews will be conducted every 3 years either by sponsored compliance-based program reviewers, sponsored consultants, or by non-DoD government agencies.

- **On-Site Reviews.** As part of the EPAS program, on-site reviews will be conducted every 3 years and will address compliance problems with government regulations or Army Pest Management Program objectives, or during pest management emergencies.

- **Findings.** The Facility Coordinator or IPMC will notify appropriate personnel of findings from on-site visits that may involve pest quarantine or pest management related environmental or health and safety issues.

6.0 PRIORITY OF PEST MANAGEMENT

Pest management requirements at each 63d RD USAR facility vary considerably. This section lists the major pest categories of possible concern at the USAR Centers. The priority will vary according to specific sites. See Appendix F for surveillance and control methods for each pest.

6.1 DISEASE VECTORS AND MEDICALLY IMPORTANT ARTHROPODS

6.1.1 Ticks

The tick populations in the 63d RD region are of concern both as a nuisance and disease threat. Troops can be exposed to ticks during training. Edge habitats, such as areas where grassy fields meet stands of trees, bushes, and shrubs are favorite places for deer to forage and mice to burrow or nest and are likely to be infested with ticks waiting for a passing host.
Personnel conducting outdoor activities can minimize tick exposure by wearing appropriate clothing, applying tick repellent, and performing personal hygiene inspections upon return to camp (see Appendix B, *DoD Arthropod Repellent System*).

There are several tick-borne diseases in the region of the 63d RD: Lyme disease, Colorado tick fever, ehrlichiosis, tick-borne relapsing fever, Rocky Mountain Spotted Fever (RMSF), and tularemia. The vectors of these diseases include the western black legged tick (*Ixodes pacificus*), the blacklegged tick (*Ixodes scapularis*), the lone star tick (*Amblyomma americanum*), the American dog tick (*dermacentor variabilis*), the Rocky Mountain wood tick (*dermacentor andersoni*), the Pacific Coast tick (*dermacentor occidentalis*), and soft ticks (*ornithodoros spp*.); all are found in various areas where the 63d RD maintains facilities or uses other land for training.

- The **western blacklegged tick and black legged tick** are the primary vectors of the Lyme disease spirochete, *Borellia burgdorferi*, as well as the rickettsia responsible for human granulocytic ehrlichiosis (HGE) and human monocytic ehrlichiosis (HME). The adult black-legged tick is roughly half the size of a dog tick and approximately the size of a period on a printed page in its nymphal stage. Lyme disease is usually transmitted by the nymphs, which are primarily active in late spring and early summer. The blacklegged tick can be found in Arkansas, California, New Mexico, Oklahoma, Texas and in isolated higher elevation areas in Arizona.

- The **lone star tick** is the suspected vector of *Ehrlichia chaffeensis*, the causative agent of HME. These ticks are common in the southern states but decrease in prevalence further north. The distribution of ehrlichiosis is unclear. Current information indicates that the disease is more common in southern states.

- The **American dog tick and the Rocky Mountain wood tick** are vectors of RMSF. These two species are similar in appearance and are reddish-brown with white or yellow markings. The male tick is about 1/8 inch long, and the female is slightly larger. The American dog tick, Rocky Mountain wood tick, and the **Pacific Coast tick** are vectors of tularemia. The Pacific Coast tick differs from the American dog tick in appearance by having some gray on their bodies. The American dog tick and the Pacific Coast tick are

found throughout the 63d region, except Nevada and Arizona. The Rocky Mountain wood tick is found throughout the 63d RD region.

- **Soft ticks** are also found within the 63d RD region. Their appearance varies depending on species from sandy brown to reddish brown to dark brown. Soft ticks differ from the hard ticks in that their body shape is oval and the head and mouthparts are hidden underneath the body. Soft ticks are also more flesh-like in appearance and do not have the hard, flattened exterior of ticks such as the brown dog tick, American dog tick, and similar species.

Tick populations will vary considerably from site to site within the region. The relative risk of contracting any of the tick-borne diseases will also vary according to areas within the region. Site-specific information can be obtained by surveillance or through local health authorities. In general, chemical control of tick populations is not recommended. Stress should be placed on the use of personal protective measures followed by avoidance of tick habitat and habitat modification. Surveillance is necessary to determine the relative risk of exposure to tick-borne diseases. Ticks found on personnel, pets, or during tick drags can be sent to USAPHC for identification and disease testing. Information can be found at the following website: https://phc.amedd.army.mil/topics/envirohealth/epm/Pages/HumanTickTestKitProgram.aspx

6.1.2 Mosquitoes

Mosquitoes are not considered a major pest in most of the 63d RD region. However, in some areas, encephalitis and West Nile virus can be transmitted to humans by mosquitoes. In Southern California, malaria may be transmitted by Anopheles mosquitoes that pick up the parasite after feeding on individuals usually coming north from Mexico or other parts of Central America. A listing of mosquito species, with their vector potential, can usually be obtained from local, county or state health departments in the area where the USAR facilities are located. In addition to the health threat, mosquito populations may reach nuisance levels at which normal work and recreational activities may be negatively impacted.

Aedes spp. mosquitoes are vectors of arboviruses such as Zika virus, which is transmitted by *Aedes aegypti* and possibly *Aedes albopicus*. Currently, several countries in the Americas are reporting locally transmitted cases, including Mexico. To date, there have been no locally transmitted cases in the continental United States (CONUS), but locally transmitted cases have been reported in the Commonwealth of Puerto Rico. A number of imported travel-related cases of Zika have been reported in the CONUS with recent outbreaks, the number of cases among travelers visiting in or returning to the CONUS will increase. The AFPMB Technical Guide No. 47, *Aedes* Mosquito Vector Control can be found at this website: https://www.acq.osd.mil/eie/afpmb/docs/techguides/tg47.pdf

6.1.3 Spiders

Black widow spiders (*Latrodectus mactans* and *Latrodectus spp*.) are often found in undisturbed places in warehouses, storage areas, and in and around buildings. Although these spiders are poisonous, few, if any, problems are encountered. Brown spiders (*Loxosceles recluse and*

Loxosceles spp.) are often found in undisturbed habitats in attics, cellars, and lofts of buildings. The most common brown spider is the brown recluse (*L. reclusa*). It is known to enter homes and buildings and inhabit shoes and other articles of clothing. All species are venomous to varying degrees and their bite often results in scarring due to the necrotic nature of their venom.

6.1.4 Bees and wasps

Bees and wasps (including yellow jackets and hornets) are occasionally found in and around buildings and other structures. The stings can be painful and cause allergic reactions in some individuals.

6.1.5 Scorpions

Scorpions often invade buildings located in arid desert areas, particularly in Arizona. The stings are not usually lethal, but can be very painful.

6.1.6 Red Imported Fire Ants

Red imported fire ants (*Solenopsis invicta*) are common in Texas and Arkansas. Stings from this ant can result in the formation of pustules, which may become infected and could result in scarring. Susceptible individuals may experience anaphylactic reactions following stings from this type of ant.

6.1.7 Mice

Mice occasionally invade buildings and cause damage to food and other products. In addition, mice present a potential human health threat of Hantavirus pulmonary syndrome (HPS). This disease results from the inhalation of the aerosolized virus found in the feces and urine of rodents, particularly deer mice (Peromyscus maniculatus) and white-footed mice (Peromyscus leucopus). Although this disease is relatively rare, the high fatality rate (50-percent) emphasizes the importance of awareness and prevention. The majority of HPS cases occur in the southern states. Personnel who handle mice and other small mammals should refer to the AFPMB Technical Guide No. 41 Protection from Rodent-Borne Diseases with Special Emphasis on Occupational Exposure to Hantavirus (Appendix I).

6.2 Quarantine and Regulated Pests

The IPMC will coordinate with the local U. S. Department of Agriculture (USDA) inspector to determine requirements regarding inspection of cargo for the presence of eggs, larvae, or adult insects, which the USDA has prohibited from entering certain geographic areas. Any retrograde cargo that is received will be inspected inside the common carrier (e.g., truck, aircraft) used for transport. If any signs of live pests or plant/soil material are present, then the shipping container will be sealed and impounded to prevent discharge of the contents. The local USDA inspector will be notified, and further disposition of the materiel will be made following a joint inspection. Ballast water carrying regulated pests from outside the San Francisco Bay area needs to be dumped outside the Golden Gate Bridge prior to entrance (481st Transportation Company at Mare Island USAR Center).

6.3 Real Property Pests (Structural/Wood Destroying Pests)

Feral Pigs cause damage to real property and native habitat and may pose a physical threat to people. They are not native to the Americas and they lack natural predators. They cause damage by rooting or direct consumption of plants and animals. As a result, they destroy habitat creating erosion, and alter water chemistry. As the populations grow, they are pushed onto occupied property damaging landscaping and irrigation. The population is growing rapidly in the US and the number in Texas is approximately one-third of the total US population. Feral pigs are present at TX213 Bryan ARC and damage to real property has occurred. There is potential for this to occur at other rural facilities as well. Feral pigs should be kept from 63d facilities where they are causing damage using fencing as a first line of defense, and as necessary, implement trapping and removing.

Subterranean termites cause damage to wooden buildings and other structures. Formosan subterranean termites are native to Central America and the Far East, but have been introduced in the United States. They have been documented in Texas and are considered the most aggressive and economically devastating termites in the country. Carpenter ants occasionally invade wooden structures, particularly where wet conditions exist. Damage is kept to a minimum by early detection of termite presence during annual surveys of wooden structures. Facility Coordinators, building occupants, and contracted pest controllers conduct these surveys.

6.4 Stored Products Pests

Stored food items may become infested by stored products pests. Very few food items are stored in the USAR facilities. Meals ready to eat (MREs) are occasionally stored in some of the 63d RD warehouses. Sanitation and inspection of incoming food items minimizes stored product pest infestations. Insecticide treatments are used as a last resort to eliminate these pests. Common stored product pests include saw-toothed grain beetles, red flour beetles, moths, carpet beetles, and other dermestids. Stored food pests are usually not a problem within the RD facilities.

6.5 Ornamental Plant and Turf Pests

Various insect pests can infest trees and shrubs, resulting in damage or destruction to the plants. Tent caterpillars can occasionally cause problems. Other pests in this category may also require occasional control.

6.6 Invasive Vegetation

Weeds along fence lines, on road shoulders, paved surfaces, and around buildings require control using appropriate herbicides. Some control of invasive vegetation is done mechanically (e.g., mowing and trimming). Noxious weeds found in the 63d RD region are controlled in accordance with federal and state noxious weed laws. When noxious weeds are encountered, care is taken to ensure that nearby non-target plants are not adversely affected. See Section 7.7 for additional information regarding invasive vegetation management.

6.7 Other Animal Pests

Wide varieties of vertebrates occasionally invade buildings and/or destroy property. Animals such as gophers, skunks, raccoons, squirrels, snakes, and feral dogs and cats periodically require control. In some parts of southern California, Roof and Norway (brown, wharf, or sewer) rats may be a problem in warehouses, particularly where food is stored. Wharf rats at Mare Island are a problem on and off board ships.

6.8 Household and Nuisance Pests

Crawling insects (e.g., ants, cockroaches, crickets, beetles) and spiders may require control in food service facilities, warehouses, offices and other administrative buildings. The remainder of the pests in this category constitutes minor pest problems. Proper sanitation and housekeeping will do much to discourage these pests.

7.0 SAFETY AND ENVIRONMENTAL CONSIDERATIONS

7.1 Sensitive Areas

- Sensitive areas listed on pesticide labels are considered before pest control operations are conducted. No pesticides are applied directly to wetlands or water areas (e.g., lakes, rivers) unless use in such sites is specifically approved on the label.

- There are no child development centers, medical treatment facilities, or family housing on the USAR Centers in the 63d RD. Special precautions are taken if pesticides are applied in kitchens or dining facilities.

7.2 Invasive Species Management

The 63d RD developed an Invasive Species Management Plan (ISMP) in June 2006 for the states that were under the command of the former 63d Regional Readiness Command, which included Arizona, California, and Nevada. The ISMP represents the efforts of the 63d RD Environmental Division to address the overarching goal of implementing a coordinated approach to minimizing the ecological, fiscal, and training-related impacts of invasive species on DoD lands within the Command. The ISMP also serves as the Command response to its invasive species management requirements as set forth in *EO 13112 of February 3, 1999 - Invasive Species* (EO 13112) and subsequent Federal and DoD regulations. The ISMP is available for review at the 63d RD Environmental Office.

7.3 Endangered/Protected Species and Critical Habitats

The 63d RD IPMC will periodically evaluate ongoing pest control operations and evaluate all new pest control operations to assure compliance with the Endangered Species Act (ESA). Pest management operations that are likely to have a negative impact on endangered or protected species or their habitats are not conducted without the appropriate level of consideration required under the ESA and AR 200-1 by the 63d RD Environmental Division and without prior approval from the G9-ODR Pest Management Program Manager. Appendix J contains a list of facilities where protected species and/or critical habitat have the potential to occur, along with any special instructions for those facilities containing sensitive environmental or natural resources. Protected migratory birds (which pose a threat or nuisance concern) periodically occur in the 63d RD region. These species cannot be controlled without first coordinating proposed actions with the U.S. Fish and Wildlife Service and obtaining applicable permits, if required. See Appendix J for more information.

As outlined in Federal Register Notice 70FR66392, Number 66392 of 2 November 2005, geographically specific use limitations are necessary for protection of endangered species and to ensure that pesticide registrations comply with the ESA as well as the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Those use limitations are identified for pesticide users through Endangered Species Protection Bulletins (ESPBs) referenced on the labels of the pesticide product.

7.4 Environmental Documentation

- A Programmatic Environmental Assessment (PEA), which specifically addresses the pest management program on Army Reserve installations and facilities, was signed into effect on 23 March 2003. This Plan is referenced in the assessment as documentation of pesticide use. The PEA is maintained on file in the 63d RD Environmental Office.

- Pests and pesticides have the potential to cause harm to the environment. The 63d RD is committed to supporting pest management within the Command. The establishment of the IPMP is part of that commitment. Spill contingency plans are maintained at each USAR Center with a copy maintained at the 63d RD Environmental Division. Pesticides used on property belonging to the 63d RD are treated as hazardous materials in these plans. Pesticide use on property where the 63d RD is a tenant is addressed in the host installation's spill contingency plans. All chemicals are handled and/or disposed in compliance with local, state and federal regulations.

7.5 Pesticide Spills and Remediation

- Contracted pesticide applicators are required to maintain a portable spill kit in any vehicle used during pesticide application on government property. Pesticide spill cleanup procedures, notification procedures, and a list of components of the spill kit can be found in the Armed Forces Pest Management Board's Technical Information Memorandum 15.

- Spill contingency plans have been prepared within the 63d RD. The type of pesticides used at the USAR Centers and other facilities are all in the EPA General Use category and are limited to Self-Help type products or commercially applied herbicides, rodenticides, and insecticides. Other than Self-Help type items, there are no pesticides stored in any 63d RD facilities. The impact on the environment from spills or accidents involving Self-Help pesticides is negligible.

7.6 Pollution Prevention (P2)

The pest management program, as outlined in this Plan complies with, whenever possible, EO 12856 dated 3 August 1993, *Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements.* The control of pests with pesticides is considered only after non-chemical control methods have been exhausted. Integrated pest management strategies, which emphasize non-chemical control, provide the basic framework of the pest management program.

7.7 Environmental Measures of Merit

In 1994, the Army approved three MOMs that defined the course of Pest Management programs. The MOMs were revised in July 2004 and again in 2019. These measures continue to mandate a current pest management plan, DoD applicators certified within two years of employment, contract applicators certified when the contract is awarded, and a new mandate to maintain or reduce the amount of pesticides with a numerical value of 420,000 PAI collectively per year. The 63d RD fully supports these goals and continues to strive to meet the objectives of these three MOMs.

Table 2. DoD Pest Management Measures of Merit

Measures of Merit	IPM goals
IPM Planning	All DoD installations will maintain IPM plans that are reviewed and approved by a DOD-certified PMC and annually updated by the IPMC.
Pesticide Use	The DoD will maintain or reduce total pesticide use on DoD installations to a level no greater than 425,000 pounds (average usage of the fiscal years 2007 and 2009 usage) of active ingredient per year.
Pesticide Applicator Certification	All DoD pesticide applicators will be certified. Direct-hire employees, certified in accordance with Volumes 1 and 2 of DoDM 4150.07, have up to 2 years to become certified after initial employment. Contracted employees must have appropriate State or HN certification in the appropriate categories at the time the contract is awarded.
Pesticide Reporting and Archiving	By the end of Fiscal Year 2020, all pesticide application on all DoD installations, or in support of a DoD operation, will be reported. Reports will be entered into a searchable DoD database and permanently archived.

7.8 Prohibited Activities

- At no time will a pesticide be used in any manner that is inconsistent with its label.
- No pesticide will be applied if the product's registration has been suspended or canceled by the EPA for the state in which it is to be used.
- Contractors will not store pesticides on government property.
- Contractors will use a backflow preventer to mix pesticides on government property when a closed water distribution system is used.
- Contractors shall remove all used pesticides and pesticide containers from government property and properly dispose of them.

7.9 Hazard Communication

The IPMC is required to have hazard communication training. The MSDS for Self-Help pesticides and other toxic substances used in the pest management program can be found in the 63d RD Environmental Division. Additionally, MSDS are kept in each facility where pesticides are stored or handled. This includes the storage closets for Self-Help chemicals at the USAR Centers.

8.0 PEST MANAGEMENT REFERENCES

A complete listing of pest management references can be found in Appendix C.

APPENDIX A. PEST MANGEMENT RECORDS

PEST MANAGEMENT RECORDS

Reports and Records

1. Records of all contractor performed pest management operations are maintained by the 63d RD IPMC, and a copy is retained by the Facility Coordinator.

2. Contracted pest management personnel record and submit pesticide application and surveillance reports to the Facility Manager/IPMC using the 63d RD Pest Management Record (PMR) Form. These report forms are completed and submitted monthly to the IPMC through the Facility Coordinators.

3. The IPMC maintains the PMR Form on file. These forms provide a permanent historical record of pest management operations for each building, structure, or outdoor site on every facility under the 63d RD's control. An annual summary report generated by the Army's Pest Management Excel spreadsheet is submitted to the Assistant Chief of Staff for Installation Management, G9-ODR Pest Management Program Manager at the end of each fiscal year.

4. See the attached 63d RD PMR Form.

This Page Intentionally Left Blank

63d Readiness Division
Contracted Pest Management Record

- Email **COMPLETED** copy to: 63d RD, Environmental Division:
  usarmy.usarc.63-rsc.mbx.integrated-pest-management@mail.mil
- A **separate form** MUST be filled out for EACH TYPE of pesticide applied.

1. Date of Application: _____
2. Location (choose **ONE**): ☐ Outside ☐ Inside Building #(s):_____
3. Type of Pest Control (choose **ONE**):
   - ☐ Baiting
   - ☐ Manual Application
   - ☐ Surveillance
   - ☐ Set/Service Traps
   - ☐ Power Pesticide Application
   - ☐ Other: _____
4. Site Description (choose **ONE**):
   - ☐ Family Housing
   - ☐ Industrial Facilities
   - ☐ Lawns
   - ☐ Office/Administration Areas
   - ☐ Unimproved Grounds
   - ☐ Warehouse (non-food storage)
   - ☐ Other: _____
5. Target Pest (Do Not Write "General"):_____
6. Total Area Treated:
   _____Acres _____Square Feet _____Each (total # of bait stations/traps)
7. Applicator Name (printed):_____
8. Pesticide Name (**REQUIRED**): _____
9. Percent Active Ingredient % (Per label):_____
10. EPA Registration (**REQUIRED**) #: _____
11. Formulation:
    ☐ Aerosol ☐ Solution ☐ Dust/Granule ☐ Emulsion ☐ Bait ☐ Suspension
12. Total Quantity Applied (**REQUIRED**):
    _____Fluid Ounces _____Gallons _____Pounds _____Dry Ounces _____Grams
13. Final Concentration % (**REQUIRED**):_____
14. Facility Name and Facility ID Number: _____
15. Applicator Signature: _____
    Applicator License #:_____ Expiration Date:_____
16. Company: _____ Phone: _____
    Address: _____
17. 63d RD Approval Signature: _____Date:_____
    Printed Name: _____

01OCT2020

APPENDIX B. DEPARTMENT OF DEFENSE ARTHROPOD REPELLENT SYSTEM

DEPARTMENT OF DEFENSE ARTHROPOD REPELLENT SYSTEM

The best strategy for defense against insects and other disease-bearing arthropods is the DoD Arthropod Repellent System. This system includes the application of extended-duration DEET lotion to exposed skin, coupled with the application of permethrin to the field uniform. When used with a properly-worn uniform the DoD Arthropod Repellent System will provide nearly complete protection form arthropod-borne diseases.

How do Soldiers protect themselves using the **DOD REPELLENT SYSTEM?**

MAXIMUM PROTECTION

STEP 1	+	***STEP 2***	+	***STEP 3***
Apply permethrin repellent to uniform.		Apply DEET cream on all exposed skin.		Wear uniform properly: Pants tucked into boots, sleeves down, undershirt tucked into pants.

REMEMBER THAT PERMETHRIN IS ONLY FOR USE ON CLOTHING, NEVER ON SKIN. ALWAYS READ AND FOLLOW THE REPELLENT LABEL DIRECTIONS.

Detailed information is available in Armed Forces Pest Management Board (AFPMB), Technical Guide Number 36, Personal Protective Measures against Insects and Other Arthropods of Military Significance, updated November 2015. This guide is found on the AFPMB web site at https://www.acq.osd.mil/eie/afpmb/docs/techguides/tg36.pdf. A diagram demonstrating the proper way to apply repellents is attached.

This Page Intentionally Left Blank

DoD INSECT REPELLENT SYSTEM

PERMETHRIN-TREATED UNIFORM

DEET OR PICARADIN APPLIED TO SKIN

PROPERLY WORN UNIFORM

PERMETHRIN-TREATED BED NET

Use ALL elements for maximum protection!

This Page Intentionally Left Blank

APPENDIX C. PEST MANAGEMENT REFERENCES

PEST MANAGEMENT REFERENCES

The following is a list of federal and state laws, Army regulations, technical manuals, and other references that should be of value in the 63d RD Pest Management Program.

Federal and State Laws

- The Federal Insecticide, Fungicide and Rodenticide Act (thru PL 100-460, 100-464 to 100-526, and 100-532).
- Title 29, Code of Federal Regulations, 1995 (or current) revision, Section 1910, Occupational Safety and Health Standards.

DoD Instructions

- DoDI 4150.07, DoD Pest Management Program, 29 May 2008, as amended December 26, 2019.

AFPMB Pesticide List and Technical Guides

- Armed Forces Pest Management Board (AFPMB). 2020. Armed Forces Pest Management Board Standard List of Pesticides Available to DoD Components and Agencies. Online at: https://extranet.acq.osd.mil/eie/afpmb/cac/standardlists/DOD_PESTICIDES_LIST.pdf

- Armed Forces Pest Management Board (AFPMB). 2008. Armed Forces Pest Management Board Technical Guide No. 24: Contingency Pest Management Guide 2012 Edition. Online at: https://extranet.acq.osd.mil/eie/afpmb/cac/techguides/tg24.pdf

- Armed Forces Pest Management Board (AFPMB). 2018. Armed Forces Pest Management Board Technical Guide No. 29: Integrated Pest Management (IPM) in and Around Buildings. Online at: https://www.acq.osd.mil/eie/afpmb/docs/techguides/tg29.pdf

Hantavirus Information

- California Department of Public Health (CDPH). 2020. Hantavirus Cardiopulmonary Syndrome. [Online] August 21, 2020. https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/HantavirusPulmonarySyndrome.aspx

- Centers for Disease Control and Prevention (CDC). 2020. Hantavirus Pulmonary Syndrome (HPS). [Online] 2020. [Cited January 31, 2019]. http://www.cdc.gov/ncidod/diseases/hanta/hps/.

- New Mexico Department of Health (NMDH). 2020. Hantavirus Pulmonary Syndrome [Online] August 21, 2020. https://www.nmhealth.org/about/erd/ideb/zdp/hps/

Invasive Plants

- Cudney, D.W., C.L. Elmore, and C.E. Bell. 2007. Bermudagrass, Integrated Pest Management for Home Gardeners and Landscape Professionals. Pest Notes Publication 7453. University of California Integrated Pest Management Program, Davis, California. Online at: http://www.ipm.ucdavis.edu/PDF/PESTNOTES/pnbermudagrass.pdf

- Lauriault, L.M., D.C. Thompson, J.B. Pierce, G.J. Michels, and W.V. Hamilton. 2004. Managing *Aceria malherbae* Gall Mites for Control of Field Bindweed. New Mexico State Cooperative Extension Services Circular 600, Las Cruces, New Mexico.

APPENDIX D. ANNUAL PLAN UPDATE FORM

FY 19 Plan Update Form (PUF) Submission Date _____

1. **INSTALLATION:** The following information describes your installation

Installation Name	State/Country	IMCOM Region

List information for all installations when more than one installation is included in the IPMP. If more room is needed, submit additional copies of this form as necessary.

2. **INTEGRATED PEST MANAGEMENT PLAN (IPMP)**

a. **IPMP Status:**

Date the Integrated Pest Management Plan (IPMP) was approved (signed) by the Garrison Commander/Manager (Para 5-4a, AR 200-1).	
Date Plan was reviewed and approved by an AEC DoD-certified Pest Management Consultant (PMC).	
IIPMP is required to be updated 5 years from date of signature (approval) by the Garrison Commander/Manager.	

b. **Plan maintenance:** Attach a copy of any changes to the IPMP that have not been submitted to or coordinated with AEC IPM Consultant. Major plan revisions require re-submittal of the entire updated plan.

c. **Pesticide Use List (PUL):** Attach a copy of the PUL for the upcoming FY.

3. STAFFING: This section identifies the Installation Pest Management Coordinator (IPMC) and Pest Management Quality Assurance Evaluators (PM QAEs) as well as all Certified Applicators (DoD-Certified or Contract State-Certified).

Title	Name	E-Mail Address	Telephone Number	Accreditation Certificate Number
IPMC				
PM QAE				
PM QAE				
PM QAE				

Please provide the following information about the pesticide applicators (either in-house or contracted.)
NOTE: Also include any U.S. Army employees who are in training for certification.

Name	Organization	DoD/State Cert. Number	Category/Subcategory Number(s) or Letter(s)

4. ON-SITE HELP? Please identify what on-site assistance AEC IPM Consultants can provide your installation. Be specific, describe the purposes and objectives for the on-site visit to include issues/problems require resolution, impacts to the mission, health concerns, environmental issues, etc. and desired outcome from the visit.

5. Pesticide General Permitting-National Pollutant Discharge Elimination System (NPDES) permitting (This is a US/CONUS Requirement ONLY):

a. What is the name and contact information of your installation's NPDES Permit Holder?

Name	E-mail	Telephone Number

b. Do you require or anticipate requiring a discharge permit for your installation's pest management program?

YES ☐ **NO** ☐

6. Is an Aerial Application of Pesticides planned or anticipated during the upcoming FY? If yes, please explain.

APPENDIX E. PEST MANAGEMENT TRAINING CERTIFICATE

This Page Intentionally Left Blank

IPMC-105-16
IPMC Accreditation No.

31 July 2019
Expiration Date

DEPARTMENT OF DEFENSE

Armed Forces Pest Management Board

Accreditation of Competency

Is Awarded to

Lisa Gonzales

in Recognition of the Completion of Requirements
for Pest Management Training as Prescribed by
the Department of Defense Standard.
This Accreditation Authorizes the Recipient to Execute
Administrative Duties as the

Integrated Pest Management Coordinator

Wm B Miller

Dr. William B. Miller, Ph.D.
PEST MANAGEMENT CONSULTANT
US ARMY ENVIRONMENTAL COMMAND

29 July 2016
Date

DD Form 2491, NOV 2002

APPENDIX F. INTEGRATED PEST MANAGEMENT OUTLINES

INTEGRATED PEST MANAGEMENT OUTLINES

1. German Cockroaches
2. American, Asian, and Smoky Brown Cockroaches
3. Filth Flies
4. Stored Products Insect Pests
5. Mosquitoes
6. Mosquitos – Container Breeding *Aedes*
7. Household Ants
8. Carpenter Ants
9. Fire Ants
10. Bees, Wasps, Hornets, and Yellow Jackets
11. Medically Important Ectoparasites
12. Spiders
13. Crickets, Earwigs, Scorpions, and Other Nuisance Arthropods
14. Mole Crickets
15. Termites
16. Gypsy Moth Larvae
17. Turf and Ornamental Pests
18. Mice and Rats
19. Bats
20. Birds
21. Miscellaneous Vertebrate Pests
22. Snakes
23. Moles, Gophers, and Pocket Gophers
24. Ground Squirrels
25. Broadleaf Weeds
26. All Vegetation

27. Bermudagrass
28. Bird’s-foot Trefoil
29. Black Mustard
30. Bull Thistle
31. Common Sunflower
32. Field Bindweed
33. Redroot Amaranth
34. Johnsongrass
35. Field Sowthistle
36. Puncturevine
37. Russian Thistle
38. Queen Anne’s Lace
39. Salt Cedar
40. Yellow Sweetclover
41. Yellow Nutsedge
42. Yellow and Maltese Star-Thistle
43. Alkali Mallow
44. Fountain Grass and Kikuyugrass
45. French and Spanish Broom
46. Sweet Fennel
47. Ice Plant
48. Pampas Grass
49. Aquatic Weed

Outline # 1	Installation: 63d RD	Date: January 2010

PEST: GERMAN COCKROACHES	SITE: Food service facilities, offices and other administrative buildings

Surveillance

Responsible organization: Building occupants and the facility manager(s).
Methods: Sticky traps and inspections (preferably at night). Occasionally, a compressed air is applied directly into harborage sites to flush roaches.
Frequency: As necessary when a minor infestation of cockroaches occur.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Occupants - sticky traps and caulking materials can be obtained through local purchase. Preventive Maintenance may also eliminate cockroach harborage when work is done between occupancy or during renovation.	Use sticky traps in kitchens, bathrooms, break areas, or other areas where food and water are available. Eliminate cockroach harborage by caulking (or filling with other materials) minor cracks, crevices, holes in walls and floors, or other areas where the structure has provided small openings which could be used by cockroaches.
Mechanical Control	Pest management technicians.	Vacuum cockroaches and egg capsules.
Cultural Control	Building occupants and the facility manager(s).	Clean up spilled food and place stored food items in closed containers. Keep break areas clean, and clean up spilled food immediately. Rinse food containers (e.g., soda cans, coffee cups, etc.) to reduce food. Keep papers, bags, boxes and other items off the floors in the kitchen and bathroom to eliminate harborage areas. Be sure not to overlook items such as recycle materials, pet food, etc.
Biological Control	NONE	

Chemical Techniques

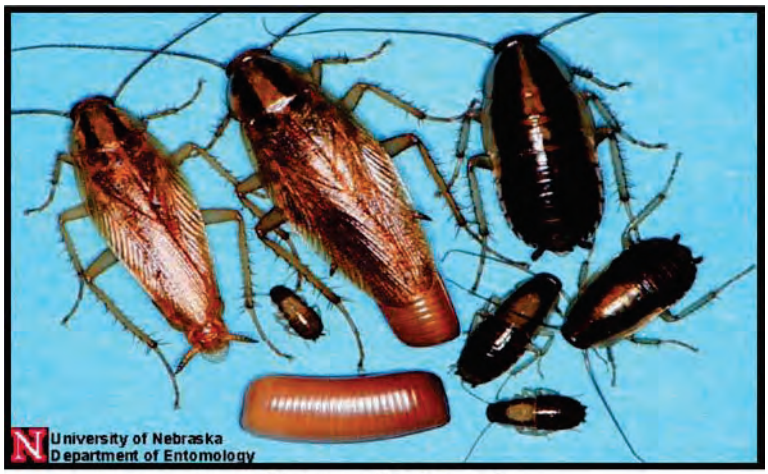
Basis for treatment: The presence of cockroaches will initiate contracted pest control. Two or more cockroaches/trap/day may indicate the need for a professional treatment.
Responsible organization: Primarily contracted Pest Management Technician services are used in locations where there is more than 2-cockroaches/sticky trap/day.
Control standards: Continue sticky trap monitoring. If cockroaches are still found, then call the contracted pest controller for assistance. Bait stations should be removed when empty or after 60 days, whichever is shorter, to prevent the empty containers from providing cockroach harborage.

Approved Pesticide	User and Source
Bait stations containing Friponil (i.e. Combat®, EPA Reg. No. 64240-33) for small cockroaches.	Applied by certified Pest Management Technician. Insecticide product must be Environmental Protection Agency (EPA)-
Residual crack and crevice insecticide containing beta-Cyfluthrin (i.e. Tempo® SC Ultra, EPA Reg. No. 432-1363).	Applied by certified Pest Management Technician. Insecticide product must be Environmental Protection Agency (EPA)-registered for the application site.

Remarks

Sensitive areas: Do not apply to areas where aquariums are present. Do not apply cholinesterase inhibiting insecticides in areas where young children are present.
Prohibited practices: Do not apply to food, utensils, or on preparation surfaces. Do not let unauthorized personnel in treatment areas until insecticides dry and odors subside.
Environmental concerns: See material label for concerns.

Additional comments: Good sanitation is a fundamental to cockroach elimination. Pesticides should be considered the last option in controlling cockroaches. As long as poor sanitation or harborage exists, the effectiveness of chemicals to control cockroaches may be limited.



German Cockroach

Outline # 2	Installation: 63d RD	Date: January 2010

PEST: AMERICAN, ASIAN, AND SMOKY BROWN COCKROACHES	SITE: Sewers, structures, yard areas and crawl spaces

Surveillance

Responsible organization: Building occupants, facility manager(s), or contracted pest controllers. Building occupants may incidentally observe cockroaches in their work areas.
Methods: Sticky traps and inspections. Occasionally, a compressed air is applied directly into harborage sites to flush roaches.
Frequency: Daily incidental findings by building occupants. Pest management technicians should inspect in response to service order complaints **or** as programmed inspections. Pest Management technicians inspect to validate complaints or as part of their quality assurance surveillance plan. To determine if an insecticide application has been effective, use sticky traps 1 to 2 weeks after application. The presence of cockroaches may indicate an inadequate application. A flushing agent (compressed air) is only used when immediate population levels need to be determined.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance personnel or pest management technicians.	Eliminate moisture in basements and other below-ground areas that could support cockroaches. Ventilate wet or damp areas under buildings. In buildings that experience frequent invasion of American cockroaches, drains, particularly those in the basements or on ground level, should have grates or screens over the openings with a mesh size less than 1/8-inch. Utility doors should fit tightly, and pipe chases and other entry points should be sealed. Shrubs adjacent to building exteriors should be trimmed to maintain air circulation next to buildings.

Type	Responsible Organization	Method
		Sticky traps may be used to help control minor infestations. Seal around plumbing that penetrates walls and floors with caulking. Outside, limit spaces where cockroaches can harbor. Such areas are bark chips, wooden planks, railroad ties, woodpile and trash. These areas are especially attractive for Smoky Browns and Asian cockroaches.
Mechanical Control	Pest management technicians	Vacuum cockroaches and egg capsules during evenings when cockroach activity is the greatest and facilities are typically closed.
Cultural Control	Food service personnel clean areas. Maintenance personnel make plumbing repairs.	Place food items in sealed containers. Keep break areas clean and wash food containers (e.g., soda cans, coffee cups, etc.) promptly. Remove papers, bags, boxes, etc. from areas where food is present to eliminate harborage areas. Repair water leaks promptly. Rinse mops after use and hang to dry.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Cockroach presence and/or a sticky trap index of one or greater should initiate control methods. A threshold of no cockroaches is the control standard to achieve in food service/warehouse facilities within 4 months after pest control service is initiated. Re-application of bait stations may be required after initial bait supply is depleted.
Responsible organization: Primarily a building maintenance responsibility. Pest management technicians treat if surveillance indicates a need for professional treatment.
Control standards: Continue bait station use for 30-60 days. If cockroaches are still found, then call the contracted pest controller for assistance. Bait stations should be removed when empty or after 60 days, whichever is shorter, to prevent the empty containers from providing cockroach harborage.

Approved Pesticide	User and Source
Bait stations containing Friponil (i.e. Combat®, EPA Reg. No. 64240-34) for large cockroaches	Self-Help users refer to Self-Help material listing in Appendix H.
Residual crack and crevice insecticide containing beta-Cyfluthrin (i.e. Tempo® SC Ultra, EPA Reg. No. 432-1363).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not treat sewers if precipitation is anticipated within 12 hours.
Prohibited practices: Do not apply to food, utensils, or on preparation surfaces. Do not let unauthorized personnel in treatment areas until insecticides dry and odors subside.
Environmental concerns: See insecticide label for concerns.

Additional comments: American cockroaches are not a problem as long as they stay in the sewer system. However, at times the cockroaches invade buildings on the facility (e.g., break in the sewer line). Treatment should proceed from the place where cockroaches cause problems in buildings back to their harborage sites in the sewers or other underground places. If this is not done, then treatment in underground cockroach harborage sites may drive additional insects into buildings not previously experiencing problems. Smoky brown cockroaches are typically found in drier sites such as attics, storage areas, and utility closets. Asian cockroaches feed on decaying organic matter. Remove leaf litter from around building. Insecticide rotation for these larger cockroaches is not normally necessary.

American Cockroach

Outline # 3	Installation: 63d RD	Date: January 2010

PEST: FILTH FLIES	**SITE**: Inside buildings, primarily food service facilities

Surveillance

Responsible organization: Food service personnel, building occupants, and facility manager(s).
Methods: Observations of adult flies at flytraps or breeding habitats are the most common survey methods. Pest management technicians or maintenance personnel may use sticky fly tape. Do not place fly tapes directly over stored food or over food preparation surfaces.
Frequency: Daily inspections are conducted by building occupants during routine facility use.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Building occupants may use sticky flypaper. Keeping doors closed when not in use is the responsibility of building occupants. Pest management technicians may use flytraps.	Sticky flypaper may be used to control minor infestations in areas that are not directly over food or food preparation surfaces. Use of flytraps (funnel type, etc.) with an attractant may also be used outdoors. Use screens to prevent fly entry when doors and windows are left open. Automatic self-closing devices should be placed on outer doors to reduce fly entry.
Mechanical Control	Contractors may be used to install or service electric flytrap devices. Building maintenance personnel install, repair, and replace screens, doors, and door closing devices, air curtains, and electric fly grids.	Electric fly grids may be used in kitchen and eating areas. Avoid using those fly grids that are designed to electrocute flies that cause them to explode and fragment. Air curtains may also be used at entry points, but must be installed and maintained correctly to blow flies away from entrances covering entire door widths. Use fly swatters when necessary, avoiding contaminating food, utensils, and food preparation surfaces.

Type	Responsible Organization	Method
Cultural Control	Building occupants are responsible for sanitation in and around the immediate vicinity of the work place. Dumpsters are emptied and cleaned by facility maintenance staff or contractors.	Clean spilled food and water from work surfaces, walls and floors. Wash dirty dishes and cooking containers and do not leave exposed food in the facility overnight. Place garbage in sealed bags and place them in containers with tight-fitting lids keeping them closed. Do not place dumpsters within 50 feet of facilities. Empty and clean dumpsters biweekly during the fly breeding season.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: In very rare cases, professional treatment is used based on survey findings by medical, veterinary, or other pest management personnel. Additional professional treatment may be required if control standards are not achieved.
Responsible organization: Building occupants are responsible for sanitation and keeping doors closed. Pest management technicians apply insecticides only in rare cases.
Control standards: Flies are killed on contact. Fewer than 5 living flies observed after treatment indoors for a period of 24 hours.

Approved Pesticide	User and Source
Pyrethrin aerosol (i.e. Prescription Treatment 565 Plus XLO®, EPA Reg. No. 499-290).	Applied by certified Pest Management Technician.
Fly Swatter-exempt	NSN-3740-00-252-3383 Building tenant
Indoor Fly Catcher Traps-exempt	NSN-3740-01-412-9363 Building tenant
Insect Fly Catcher-exempt	NSN-3740-01-412-9371 Building tenant

Remarks

Sensitive areas: Unauthorized personnel are not allowed in areas that receive space treatment. See insecticide label for precautions.
Prohibited practices: Do not apply insecticide on food items, utensils, or on food preparation surfaces.
Environmental concerns: See insecticide label for concerns.

Additional comments: Good sanitation measures should eliminate fly problems at most building sites. A pyrethrin product may also be used if it complies with usage standards described on product label. If flies are coming into the facility from a nearby source (e.g., kennels, stables, refuse collection site, etc.), then pest management technicians may be requested for assistance.

Outline # 4	Installation: 63d RD	Date: January 2010

PEST: STORED PRODUCTS INSECT PESTS	**SITE:** Inside buildings, primarily food facilities

Surveillance

Responsible organization: Building occupants, veterinary services personnel and pest control contractor.
Methods: Visual observations for insects and/or conditions that could favor insect infestations in stored food products. Practice proper food storage and stock rotation is to minimize infestation. Particular attention should be given to rodent bait stations when they are in use since most bait is subject to insect infestation. Augment visual observations with pheromone and sticky traps.
Frequency: Building occupants conduct daily inspections during routine facility use, veterinary food inspectors conduct inspections during daily or monthly sanitary inspections and the pest control contractor conducts surveys as part of their scheduled services.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Food facility personnel	Clean up spilled food materials that may attract and provide a food source for insects. Vacuuming works better than sweeping in particle-filled cracks and crevices.
Cultural Control	Food facility personnel	Damaged goods should be kept in tightly closed containers. Infested products are removed immediately upon discovery. Rotate stock.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Treatment is initiated based on survey findings by building occupants, veterinary, or pest control contractor personnel.
Responsible organization: Pest control personnel.
Control standards: No evidence of insects for 30 days following treatment.

Approved Pesticide	User and Source
Residual aerosol insecticide contain pyrethrins 3% (i.e. ULD® BP 300, EPA Reg. No. 499-450) and labeled for space treatments. Indian Meal Moth Lure Sticky Trap NSN 3740-01-414-8118, can be set by anyone.	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Approved Pesticide	User and Source
Residual insecticide labeled for treatment around pallets, floor/wall interfaces, and other areas where insects are present (i.e. Tempo® Ultra SC, EPA Reg. No. 432-1363).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Unauthorized personnel are not allowed in areas that receive space treatment. See insecticide label for precautions.
Prohibited practices: Do not apply insecticide on food items or packages/outer wrapping of food.
Environmental concerns: See insecticide label for concerns.

Additional comments: Good sanitation measures of cleaning up spilled food materials that may attract and provide a food source for insects is very important in controlling stored products pest problems. Proper storage and stock rotation usually eliminates the problem. If possible, keep products in the refrigerator. Keeping the product temperature below levels at which insect eggs hatch will eliminate the need for pesticide control.

Outline # 5	Installation: 63d RD	Date: January 2010

PEST: MOSQUITOES	**SITE:** Throughout the 63d RD

Surveillance

Responsible organization: Facility personnel and local mosquito control personnel, if necessary.
Methods: Personnel complaints and visual observations of mosquito populations. If mosquito populations reach nuisance or medically important levels, the facility manager will request assistance from the local mosquito control district. Surveys for larvae in standing water that has existed for 5 or more days. Landing/biting count surveys are used in areas where day-biting mosquitoes are a problem. Light traps can be used to survey for nocturnally active mosquitoes.
Frequency: Ongoing from April through the end of October. Larval surveys are done during other duties. Larval and adult mosquito surveys are also performed when complaints from personnel or area residences are received. If a mosquito-borne disease is identified in an area, use light traps several nights per week to monitor populations.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance personnel	Screens should be placed in windows to exclude mosquitoes. Temporary standing water sites that hold water should be graded or filled to eliminate breeding sites. Precautions must be taken to prevent damage to wetlands. Eliminate artificial breeding sites, such as tires.
Mechanical Control	Facility maintenance personnel	Mow and remove grasses and brush to reduce resting sites.
Cultural Control	Building and landscaping maintenance personnel	Remove items that can hold water such as bottles, cans, and discarded tires to reduce potential breeding sites. Clean gutters to reduce standing water. Personnel should empty (weekly) or eliminate containers that hold water that may provide mosquito breeding sites. Use yellow incandescent light bulbs and high pressure sodium lights to reduce attracting mosquitoes.
Biological Control	Pest Management Technicians.	Place *B.t.i.* Briquetes in water impoundment areas.

Chemical Techniques

Basis for treatment: Presence of mosquito larvae, when adult mosquito biting curtails outdoor activity of personnel, or if there is a high potential or an outbreak for mosquito-borne diseases. Mosquito trap counts exceed 25 females/trap/24 hour period.
Responsible organization: Pest management technicians.
Control standards: Larval mosquitoes eradicated before emerging. For adult mosquitoes, control has been achieved when mosquito numbers in light traps are less than 25 female mosquitoes/trap/night level and/or incidence of mosquito-borne disease in humans has discontinued. Materials should be applied to all target sites per label directions.

Approved Pesticide	User and Source
Standard issue DEET repellent (i.e. Cutter®, EPA Reg. No. 121-59).	Used by all on-site personnel. Refer to Arthropod Repellent Program instructions.
Mosquito larvacides containing methoprene (i.e. Altocid®, EPA Reg. No. 2724-421) or *Bacillus thuringiensis* (i.e. Summit® *B.t.i.* Briquetes™, EPA Reg. No. 6218-47).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
ULV applied mosquito adulticides containing malathion (i.e. Fyfanon®, EPA Reg. No. 67760-34) or resmethrin (i.e. Scourge®, EPA Reg. No. 432-716).	Applied by certified Pest Management Technician Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply aerosols when wind speeds exceed 5 miles per hour. Refer to a local list of insecticide sensitive individuals before applying ULV aerosols.
Prohibited practices: Do not apply larvicides before heavy precipitation that may wash away insecticides. Read insecticide labels for additional prohibited practices.
Environmental concerns: These insecticides can harm honeybees. Do not damage or eliminate wetland ecosystems or use insecticide in the habitat of an endangered or threatened species. For determining locations of wetland ecosystems refer to any natural resource or conservancy programs. See insecticide label for other concerns.

Additional comments: A good mosquito control program places heavy emphasis on habitat reduction and the use of repellents. Chemical control is directed primarily at mosquito larvae. If a mosquito-borne disease is detected in an area (found in mosquito populations or reported human cases) coordination for surveillance and control should be made with the USAPHC and other federal (e.g.,CDC), state, or local health agencies. Mosquito control requires coordination with state and local mosquito control resources.

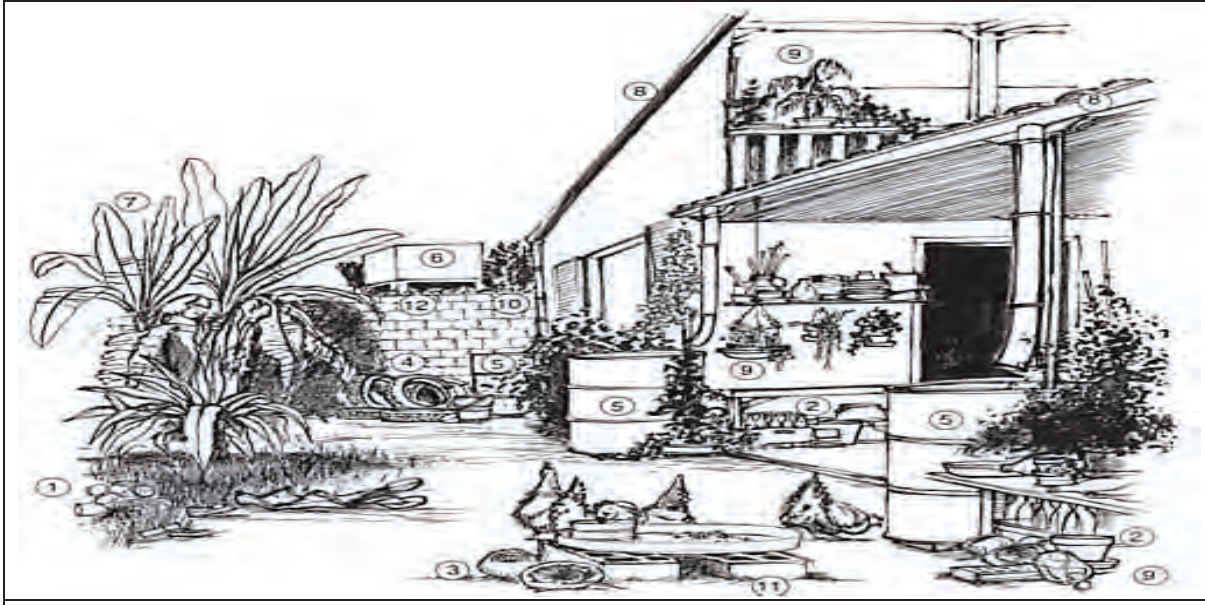
Mosquito

Outline # 6	Installation 63d RD	Date: April 2016

Pest: **Mosquitoes- Container Breeding *Aedes***	Site: **Cantonment Area and Training Areas**

1. Purpose: To control Container-Breeding *Aedes* mosquitoes thereby reducing human annoyance and the risk of disease

Aedes aegypti (left) and *Aedes albopictus* (right) mosquitoes can be distinguished from each other by the presence of a white stripe on the thorax of *Aedes albopictus*.



Examples of outdoor breeding sites of *Aedes* spp. (1) discarded cans/plastic containers, (2) bottles, (3) coconut husks, (4) tires, (5) barrels, (6) water storage tanks, (7) bromeliads and axils of banana trees, (8) obstructed roof gutters, (9) plant pot saucers, (10) broken bottles fixed on walls to deter burglars, (11) holes in unused construction blocks, and (12) the upper edge of block walls. From Rozendaal, 1997.

2. Surveillance of Container-Breeding *Aedes*

2.1 Conducted By: Installation Preventative Medicine. Special requests for surveillance support for a specific health threat can be obtained from your supporting PHC Entomological Sciences Branch.

2.2 Methods and Frequency: Installation personnel detect and report biting mosquitoes. Inspect water-containing objects (rain buckets, cemetery flower urns, rain gutters, discarded tires or other water-containing objects). Seasonal conditions (typically April/May – Oct/Nov) and breeding habitat are inspected on an ongoing basis.

2.3 Specific Surveillance Measures:

2.3.1. The BG-Sentinel Trap (Preventive Medicine)

The BG-Sentinel™ trap is specifically designed to collect daytime-feeding mosquitoes, and has been found to collect *Ae. aegypti* and *Ae. albopictus* more effectively than the standard CDC light trap. The BG-Sentinel™ trap requires a lure for effective trapping. Product manuals detail specific setup procedures and instructions for use of each piece of surveillance equipment. Take care when handling the BG-Sentinel™ trap, as some components have durability limitations.

Equipment	**NSN**
BG Sentinel™ Trap	3740-01-628-9326
BG-Lure® for BG Sentinel™ Trap (Note: trap will not work without lure)	3740-01-628-9325
Catch Bag for BG Sentinel™ Trap	3740-01-628-9327
Wall charger for BG Sentinel™ Trap	3740-01-628-9324

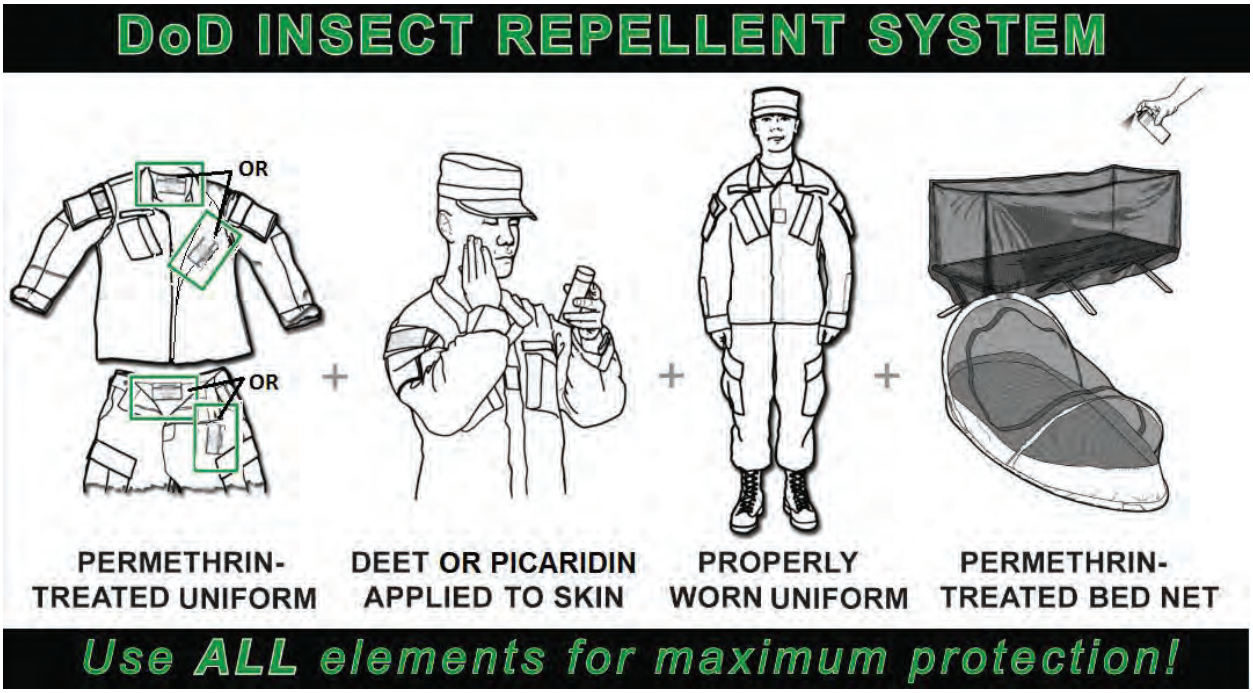
2.3.2 Black Cup for Egg Collection:
A manufactured ovitrap is available in the DoD stock system (Mosquito Trap-and-Kill, NSN 6840-01-628-4751), and ovitraps can also be constructed with any dark-colored container. Simply partially fill the container with water and place a wooden tongue depressor or paper towels along the inside of the cup. Check the tongue depressor and paper towels regularly for the presence of eggs. Only *Aedes* spp. mosquitoes will lay eggs on the tongue depressor or paper towel.

3. Integrated Control of Container-Breeding *Aedes*

3.1 Mechanical and Physical Control

3.2 Method and Location: Ensure windows are screen on buildings to exclude adult mosquitoes. Temporary standing water sites (e.g., tire ruts) should be graded or filled to eliminate mosquito breeding. Precautions must be taken not to damage wetlands. Eliminate artificial container (e.g., tires, wrinkled tarps, refuse, neglected equipment, and neglected toys) breeding sites.
Conducted By: Installation Maintenance Personnel

3.3 Method and Location: Wear clothing properly to prevent mosquito bites. Wear long pants and long sleeves with sleeves rolled down.



Conducted By: All Personnel

See AFPMB Tech Guide 36: Personal Protective Measures against Insects and other Arthropods of Military Significance

4. Type: Cultural

4.1 Method and Location: Remove and discard any refuse or materials capable of holding water such as tires and broken equipment. Potential for breeding exists particularly at vehicle storage yards where waste tires may accumulate.

Larval Habitats	Empty/Clean Regularly	Store Under Roof	Fill with Sand	Throw away/recycle
Buckets	Yes	Yes		Yes
Discarded Containers				Yes
Flower Pot Saucers	Yes		Yes	
Roof Gutters	Yes			
Tires		Yes		Yes
Tree Holes			Yes	

Table indicating appropriate cultural management practices for various water-containing objects on the installation.

4.2 Examples of outdoor breeding sites of *Aedes* spp. (1) discarded cans/plastic containers, (2) bottles, (3) coconut husks, (4) tires, (5) barrels, (6) water storage tanks, (7) bromeliads and axils of

banana trees, (8) obstructed roof gutters, (9) plant pot saucers, (10) broken bottles fixed on walls to deter burglars, (11) holes in unused construction blocks, and (12) the upper edge of block walls. From Rozendaal, 1997.
Conducted By: Installation Personnel

5. Personal Protection for Biting Mosquitos

5.1 Basis for Treatment: Mosquitoes (and other biting arthropods) in the area.

5.2 Method & Location: Installation personnel (treatment of uniforms with permethrin and use of DEET on skin only).

Insect Repellent, personal application, Ultrathon
EPA Reg # 58007-1; NSN 6840-01-284-3982

Insect Repellent, personal application & sunscreen, 20% DEET/SPF15 (Sunsect)
EPA Reg # 66306-1; NSN 6840-01-288-2188

Insect Repellent, personal application, 30% DEET (SP532-Ultra30/LippoDEET)
EPA Reg # 82810-1-58188; NSN 6840-01-584-8393

Insect Repellent, personal application, 25% DEET , pump spray bottles(Cutter Backwoods DEET Insect Repellent) EPA Reg # 305-61-121; NSN 6840-01-584-8598

Insect Repellent, personal application, 20% Picaridin, pump spray bottle (NATRAPEL Insect Repellent) EPA Reg # 39967-53-56575; NSN 6840-01-619-4795

Insect Repellent, clothing application, permethrin (IDA) (**FOR MILITARY USE ONLY**)
EPA Reg # 63120-3; NSN 6840-01-345-0237

Insect Repellent, clothing application, aerosol (Permethrin Arthropod Repellent)
EPA Reg # 50404-6-58188; NSN 6840-01-278-1336

6. Chemical Pest Management Techniques for Container Breeding *Aedes* (Before applying/using any chemical treatment, consult your Command IPM consultant first. Verify the product is registered for use in the US State or IAW with the Final Governing Standard for the Host Nation.)

6.1 Basis for Treatment: Confirmed mosquito presence in area. Confirmed mosquito-borne disease, as determined by the Preventive Medicine Environmental Health office and local health department officials.

6.2 Method and Location: Treatment of breeding sites that cannot be addressed in a non-chemical manner. Conducted By: Pest Management Technicians. Preventive Medicine Environmental Health personnel.

Altosid EPA Reg # 2724-421; NSN 6840-01-424-2495

Summit Bactimos (BTI) EPA Reg # 6218-47; NSN 6840-01-377-7049

Ovitrap Mosquito Trap-N-Kill (Dichlorvos) EPA Reg # 8730-50-66433; NSN 6840-01-628-4751

6.3 Control Standard: Mosquitoes not feeding on personnel during potential exposure period. Mosquito trap and larval counts low.

6.4 Precautions and Concerns when doing Chemical Control

6.4.1 Precautions for Sensitive Areas: Do not use repellents on individuals who may show a chemical sensitivity to their ingredients. This is particularly true when dealing with infants and children under 12 years of age.

6.4.2 Prohibited Practices: The use of repellents not in accordance with label instructions.

6.4.3 Environmental Concerns: Do not alter or disrupt designated wetlands. Do not treat uniforms where excess permethrin residue or spray-over would contaminate the environment. Targeted adulticide treatments only considered if disease threat exists.

6.4.4 Remarks: Source elimination and larval control are the best strategies to reduce the threat of mosquitoes.

7. Where to go for more information:

Armed Forces Pest Management Board: http://www.afpmb.org/

Army Public Health Center (APHC) Zika Virus website:
http://phc.amedd.army.mil/topics/discond/diseases/Pages/Zika.aspx

Centers for Disease Control and Prevention: http://www.cdc.gov/

Contingency Pest Management Guide. AFPMB Technical Guide 24:
http://www.afpmb.org/sites/default/files/pubs/techguides/tg24.pdf

Guide to Pest Surveillance during Contingency Operations. AFPMB Technical Guide 48:
http://www.afpmb.org/sites/default/files/pubs/techguides/TG48/TG48.pdf

Personal Protective Measures against Insects and other Arthropods. AFPMB Technical Guide 36:
http://www.afpmb.org/sites/default/files/pubs/techguides/tg36.pdf

Ultra Low Volume Dispersal of Insecticides using Ground Equipment. AFPMB Technical Guide 13:
http://www.afpmb.org/sites/default/files/pubs/techguides/tg13.pdf

Walter Reed Biosystematics Unit: http://www.wrbu.org/index.html

Rozendaal, J. A. 1997. Vector Control: Methods for Use by Individuals and Communities. World Health Organization, Geneva. 412 pp.
http://www.who.int/mediacentre/factsheets/zika/en/

Outline # 7	Installation: 63d RD	Date: January 2010

PEST: HOUSEHOLD ANTS (I.E. ARGENTINE ANTS, PHARAOH ANTS, AND PAVEMENT ANTS)	**SITE:** In or around buildings

Surveillance

Responsible organization: Incidental observations by facility users or maintenance personnel. Pest management technicians conduct surveys to validate complaints or to evaluate control effectiveness (bait acceptance, etc.).
Methods: Inspections for ant activity (for live ants, soil from colony development, foraging at bait, etc.). Pre- or post-treatment baiting or sticky-trapping may be performed to collect ants for identification, determine bait acceptance, and to determine infestation and nest sites.
Frequency: Incidental observations of ant activity by building personnel. Pest management technicians perform pre-treatment surveys when requested and determine control strategies. Post-treatment surveys are used to evaluate control effectiveness.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance or pest management technicians caulk crevices. Facility users and maintenance are responsible for maintaining clean work areas.	Eliminate ant harborage and entry sites by caulking minor cracks, crevices, and holes in walls or foundations, especially at food storage, consumption, and preparation areas. Store food items in tightly closed containers. Maintain tight-fitting windows and doors. Remove unnecessary ground litter (e.g. lumber, bricks, and leaves) near structures.
Mechanical Control	Grounds maintenance personnel are responsible for pruning vegetation.	Keep tree and shrub branches from contacting buildings. Remove any climbing ivy from buildings.
Cultural Control	Building occupants and maintenance personnel have the primary responsibility for removing food and garbage.	Sanitation—clean up spilled food immediately and place stored food items in closed containers. Keep break areas clean. Rinse out food containers (e.g., soda cans, coffee cups, etc.) to reduce sources that attract ants. Be sure not to overlook items such as recycle materials, etc.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Ants observed in buildings.
Responsible organization: Primarily a maintenance personnel responsibility. The first method of control should always be to set out bait stations.
Control standards: Bait acceptance by foraging ants is observed. The number of live ants observed begins to decline within 10 days after treatment began, and no live ants observed 1-5 weeks after the treatment start date. For ants found indoors in an area where control is required immediately, residual insecticide sprays should be used only very sparingly to reduce ant worker populations. Baits should serve as the primary means for control.

Approved Pesticide	User and Source
Ant bait stations containing Fipronil (i.e. Maxforce® FC, EPA Reg. No. 432-1256). Termidor SC, Fipronil, EPA Reg. No. 7969-210 Tempo Ultra , Cyfluthrin, EPA Reg. No.432-1377	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Contact pyrethroid aerosol insecticide (i.e. Prescription Treatment 565 Plus XLO®, EPA Reg. No. 499-290) labeled for surface and entry area treatments.	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: See insecticide label for sensitive areas.
Prohibited practices: Do not apply aerosol spray to food, utensils, and food preparation surfaces. Do not apply residual insecticides around ant bait stations to prevent ant repellency to bait placements.
Environmental concerns: See insecticide label for concerns.

Additional comments: Ants are normally a minor problem. Use of baits is the primary method of control. For assistance in identifying ants, contact 63d RD pest management manager.

Ants

Outline # 8	Installation: 63d RD	Date: January 2010

PEST: CARPENTER ANTS	**SITE:** Buildings with wood elements of construction

Surveillance

Responsible organization: Incidental observations by building occupants. Pest management technicians conduct surveys to validate building occupant reports. Carpenter ant inspections are included in inspections for termites. Quality Assurance Evaluators (QAE) inspect for carpenter ants to assure quality of contracted pest services.
Methods: Surveys using a stethoscope or similar device can be used to locate colonies in walls. Determination of nest sites is critical for proper treatment and control.
Frequency: Building occupants may incidentally observe ants during facility use. Surveys are performed by pest management technicians in conjunction with termite inspections or following complaints. QAEs inspect following contract work if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance personnel	Reduce moisture sources such as condensation and leaks. Caulk to minimize ant access into buildings. Clean gutters for proper drainage. Keep soffits seated and roofing well-maintained. Replace damaged wood.
Mechanical Control	Grounds maintenance personnel	Trim vegetation against siding and roofs. Remove dead trees and stumps near buildings.
Cultural Control	Facility maintenance personnel	Do not place firewood or other wood against a building to avoid bringing carpenter ant-infested wood closer and to reduce moisture accumulation next to buildings.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Presence of carpenter ants in buildings.
Responsible organization: Pest management technicians.
Control standards: When applying a residual insecticide treatment to carpenter ant nests, note any immediate control. Worker ants carrying bait back to the colony indicates there is sufficient ant activity to provide control. The number of live ants observed begins to decline within 10 days of treatment and no live ants observed 5 weeks after the treatment start date.

Approved Pesticide	User and Source
Residual insecticide containing Fipronil labeled for application to carpenter ant nests (i.e. Termidor SC, Fipronil, EPA Reg. 432-1377).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Carpenter ant bait stations containing fipronil (i.e. Maxforce® FC, EPA Reg. No. 432-1256).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Residual insecticide containing Lambda-Cypermethrin labeled for surface and entry area treatments (i.e. Demon® WP, EPA Reg. No. 100-990).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not contaminate food, utensils, food containers, food preparation areas, or water with insecticides.
Prohibited practices: Do not let unauthorized personnel in treatment areas until applied materials have dried and vapor odors subside.
Environmental concerns: See insecticide label for concerns.

Additional comments: Carpenter ants are normally a minor problem. For assistance in identifying ants, contact your USAPHC Commander.

Carpenter Ant

Outline # 9	Installation: 63d RD	Date: January 2010

PEST: FIRE ANTS	**SITE:** Buildings, maintained turf/lawn areas, and training areas that receive frequent use.

Surveillance

Responsible organization: Incidental observations by area users. Grounds maintenance personnel, Facility Coordinators, pest management technicians, and QAEs.
Methods: Incidental observations of fire ants or their mounds. Surveillance is usually done in conjunction with other maintenance of grassy areas.
Frequency: Daily incidental observations by building occupants and grounds maintenance personnel. Pest management technicians inspect when there is a need to assess if a treatment must be used. QAEs inspect to validate complaints or as part of their quality assurance surveillance plan. Surveys are best accomplished after rainfall when mound development increases.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance and Natural resources personnel	Caulk cracks and crevices in exterior building surfaces and maintain tight-fitting doors. Insert a wand into the heart of the ant hill and force pressurized hot steam down the wand. Apply steam until queen has been forced to the surface. Trap and remove queen which will lead to the rest of the fire ants abandoning the nest.
Mechanical Control	NONE	
Cultural Control	Natural resources personnel have the responsibility for grass and forest restoration. Building occupants and area users are responsible for keeping areas free of food that attracts ants.	Restoration of native tall grasses and forests may reduce some fire ant populations because it favors competing species of ants. Fire ants do not do well in heavily shaded areas under trees. Restoration of tree cover, native short grass prairies, wetlands and other habitats that are unfavorable to fire ants can help reduce numbers and limit invasion. In picnic areas and other areas with food, use tight-fitting on trash receptacles, and empty regularly.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Colonies located close to buildings, electrical boxes, telephone boxes, etc. Re-application may be required if acceptable control standards are not met.
Responsible organization: Pest management technicians.
Control Standards: Worker ants carrying bait back to the colony indicates there is sufficient ant activity to provide control. Fire ant population reductions will typically begin within 24 hours. Within 6 weeks after the initial application, fire ant activity should discontinue for an additional 12 weeks. Materials should be applied to all target sites per label directions. In small turf areas, baits are applied using a small hand-held spreader or by broadcasting the material. Large turf areas should be treated by using a calibrated mechanical or electric spreader. Individual mound treatment will be done using injection or drenching applications. For indoor infestations, chemical applications include spot treatments where infestations occur and may include exterior perimeter treatment at actual or potential entry sites.

Approved Pesticide	User and Source
Fire ant baits containing hydramethylnon (i.e. Amdro ®, EPA Reg. No. 73342-1)	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Residual insecticide containing beta-Cyfluthrin labeled for drench or injection mound treatments (i.e. Tempo® Ultra SC, EPA Reg. No. 432-1363).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Short term contact insecticide labeled for surface and entry area treatments	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not contaminate food or feed by storage, use, or disposal practices.
Prohibited practices: Read insecticide labels for additional prohibited practices.
Environmental concerns: Do not apply baits near or in water or in winds that exceed 15 mph.

Additional comments: Use exterior baits when fire ants are seen foraging. Foraging usually occurs when the soil temperature is above 60°F and air temperature is 70-90° F. Do not use exterior baits if the grass is wet or if rainfall is expected within 3 hours. Do not irrigate baited turf areas for at least 3 hours. Drench ant mounds during early morning hours, when the temperature is 65-80°°F, and following rainfall, when ants are nearer to the surface.

Fire Ant Mound

Fire Ant

Outline # 10	Installation: 63d RD	Date: January 2010

PEST: BEES, WASPS, HORNETS AND YELLOW JACKETS	**SITE:** In and around buildings and recreational areas

Surveillance

Responsible organization: Building occupants, maintenance personnel and pest management technicians.
Methods: Inspections for, or incidental observation of, live insects, hives or nests.
Frequency: Daily incidental observations by building occupants and maintenance personnel during work hours. Pest management technicians inspect when requested and following insufficient control by other methods.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance personnel and approved bee keepers	Place screens on windows and doors, and caulk gaps or crevices to prevent access. Forced/pressurized water may be used to remove mud dauber nests. Remove nests after treating with chemicals. When controlling honey bees, remove hives, swarms, and hive materials (wax, honey, and dead bees) in walls. Beekeepers remove hives and swarms.
Mechanical Control	Pest management technician	Remove bees (live and dead) and nests with a vacuum.
Cultural Control	Grounds maintenance personnel or contractors select vegetation and plants unattractive to these stinging insects.	Yellow jackets and hornets are attracted to meats, sweets, and putrid trash. Therefore, seal garbage in plastic bags and use tight-fitting lids on receptacles. Flowering plants that can attract bees or wasps should not be planted close to frequently used areas such as building entrances.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Target pests found in utility structures. Since honeybees are important economic insects, chemical control should be used only when other tactics have failed.
Responsible organization: Utility personnel, facility maintenance personnel, and pest management technicians.
Control Standards: Target pests are killed following treatment and control is maintained for 7 days. All honey beehive material must be removed (wax, dead bees, and brood) to prevent re-infestations and foraging animals/insects. Repair damaged structures.

Approved Pesticide	User and Source
Residual aerosol insecticide containing allethrin and phenothrin applying directly to insects and nests (i.e. Wasp- Freeze®, EPA Reg. No. 499-362 until 31 DEC 2016). Treat arboreal and ground nests during early mornings or evenings when most insects occupy their nests and during cool weather, when they are least active.	Applied by certified Pest Management Technician or Self-Help users. Self-Help users refer to Self-Help material listing in Appendix H. Insecticide product must be EPA registered for the application site. Wasp Freeze will be used until 31 DEC 2016.
Residual insecticide labeled for surface and entry area treatments	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply insecticide diluted with water into electrical wire areas. Extreme caution is used around electrical lines when using metal ladders and aerosol extension poles.
Prohibited practices: See insecticide label for prohibited practices.
Environmental concerns: See insecticide label for concerns.

Additional comments: Notify a local beekeeper when swarms of honey bees are found. All bees, including the queen should be removed. Chemical use is the last resort for honey bee control. Seal crevices where bees can access structures. All hive materials (dead bees, brood, wax, and honey) must be removed from walls. Do not disturb naturally- occurring honey bee swarms and hives found in training areas unless they curtail military training. Remove and dispose of nests of bees, wasps and hornets away from the treatment site after they are killed. Personnel allergic to stinging insects should avoid removing stinging insects. Relocate shrubs that attract stinging insects and are planted close to sidewalks, building entrances. Cover entrance holes of bumble bee or yellow jacket nests in the ground with soil immediately after treatment.

Outline # 11	Installation: 63d RD	Date: January 2010

PEST: MEDICALLY IMPORTANT ECTOPARASITES (TICKS, FLEAS, LICE, CHIGGERS, ETC.)	**SITE:** Building areas occupied by personnel with infestations as well as ranges and other outdoor use areas.

Surveillance

Responsible organization: Personnel make incidental observations. Field Sanitation Team members and Range personnel inspect when requested.
Methods: There are some special survey techniques available such as placing black objects on vegetation to detect the presence of chiggers, the use of specially designed traps for the detection of fleas, or the use of cloth drags to detect ticks. However, visual observation for the presence of the ectoparasites serves as the primary means of surveillance.
Frequency: Personal examination is performed daily while within and after returning from an ectoparasite habitat. Preventive medicine services may inspect for ectoparasite in high-use outdoor areas when requested. Veterinary personnel, military police, and pet owners should normally conduct daily flea and tick inspections at kennels or other places where pets are kept. Pest management technicians inspect in response to service orders and to determine the need for professional treatment.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Training site users, range maintenance personnel, pet owners, and building occupants.	Wear proper attire for outdoor activities that prevent ticks and other ectoparasite from getting inside clothing. Long pants should be worn and tucked into boot tops or socks. When possible, tape around the top of socks where they meet pants. Ticks attached to humans or pets should be removed. Wild or feral animals that are hosts for fleas should be removed or excluded from buildings.

Type	Responsible Organization	Method
Mechanical Control	Training site users, range maintenance personnel, and building occupants.	Rake litter from Bivouac areas and cut tall grasses within a two-meter perimeter of tents and other inhabited areas. When possible, grassy areas along the perimeter of ranges will be mowed as directed by Natural Resource staff or grounds/range maintenance supervisor(s). Vacuuming carpets and upholstered furniture will help to control fleas.
Cultural Control	Training site users, range maintenance personnel, and Natural Resources personnel.	When a site has a high population of ectoparasite, an alternate site should be selected for activities when possible. Controlled fires can be useful in providing season-long control at certain sites under the guidance of the appropriate Natural Resource personnel. When dealing with lice, wash all potentially infested clothing in hot water and dry clothing on the hottest setting for 20 minutes. Non-washable clothes should be dry-cleaned. Thoroughly clean toilets and floors in latrines. Vacuum carpets, mattresses, and upholstered furniture thoroughly.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: The presence of ectoparasites.
Conducted by: All on-site personnel.
Control Standards: No further presence of the target ectoparasite.

Approved Pesticide	User and Source
Standard issue DEET repellent (i.e. Cutter®, EPA Reg. No. 121-59).	Used by all on-site personnel. Follow the DoD Arthropod Repellent System published by the US Army Public Health Command.
Standard issue permethrin repellent (i.e. Permethrin Arthropod Repellent, EPA Reg. No. 50404-5) applied to the exterior of outer clothing only (not undergarments)	Used by all on-site personnel. Follow the DoD Arthropod Repellent System. See Appendix B.

Approved Pesticide	User and Source
Residual insecticide containing bifenthrin labeled for application to ground surface, leaf litter, and vegetation (i.e. Talsta P® Professional, EPA Reg. No. 279-3206).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Use Insect Growth Regulators that is labeled for fleas and larvae control on furniture and carpeting. Gentrol IGR EPA Reg. 2724-351	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Chemical (insecticide) applications applied to individuals infested with lice	Only those individuals infested with lice. Follow physician recommendations for personal treatment.
Chemical (insecticide) applications applied to individuals infested with chiggers	Only those individuals infested with chiggers. Follow physician recommendations for personal treatment.

Remarks

Sensitive areas: See insecticide label for sensitive areas.
Prohibited practices: See insecticide label for prohibited practices.
Environmental concerns: See insecticide label for concerns.

Additional comments: Prevention of ectoparasites infestations occurring in the field depends on proper uniform wearing and use of repellents. For additional information on personal protective techniques against various ectoparasites see Technical Guide No. 36, “Personal Protective Techniques Against Insects and Other Arthropods of Military Significance.” This information is available on the Armed Forces Pest Management Board website at http://www.afpmb.org/coweb/guidance_targets/ppms/TG36/TG36.pdf, and Appendix B.

Rocky Mountain Wood Tick

Soft Tick

American Dog Tick

Outline # 12	Installation: 63d RD	Date: January 2010

PEST: SPIDERS	SITE: Buildings and other structures

Surveillance

Responsible organization: Facility users or maintenance personnel may incidentally observe spiders. Pest management technicians or preventive medicine personnel may conduct surveys to validate complaints or to evaluate control. QAEs may survey for quality assurance of pest services.
Methods: Incidental observation is the primary survey method. Spiders are frequently found in dry, cool, undisturbed places. Insect sticky traps may be used for inspections.
Frequency: Building occupants may incidentally observe spiders during facility use. Facility Coordinators inspect when requested, following ineffective control, and if medically important spiders are suspected. QAEs inspect to validate complaints or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Building occupants or custodial services keep facilities clean. Maintenance personnel install, repair, or replace weather-stripping and screens.	Maintain screens and weather-stripping around doors and windows. Caulk cracks and crevices in building exteriors, maintaining tight fitting doors, and using tight-fitted window screens. When possible, place items in sealed plastic, tight meshed bags, or sealed boxes to prevent spider harborage. Keep boxes of the floor and away from walls. Control spiders outdoors by washing webs with a hose. Insect sticky traps can be placed next to doorjambs to intercept incoming spiders if suspected of entering the building. Sticky traps can be used to determine if additional control methods are needed, depending on the species of spiders trapped.

Type	Responsible Organization	Method
Mechanical Control	Building occupants or custodial services.	Sweep or vacuum spiders and spider webs.
Cultural Control	Building occupants and maintenance personnel.	Prevent infestations through good housekeeping. Keep boxes and equipment neatly stored on shelves to eliminate harborage areas for spiders. Clean and dispose of trash, debris, and old equipment. Use yellow incandescent lights at doors to attract fewer insects, reducing spider food.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Spiders present in or around buildings or structures.
Responsible organization: Maintenance personnel or Pest Management Technician.
Control standards: Spiders are killed within one hour upon contact. No live spiders observed within 24 hours and control continues for a period of 30 days

Approved Pesticide	User and Source
Contact aerosol insecticide containing phenothrin and allethrin labeled for surface and entry area treatments (i.e. Wasp Freeze®, EPA Reg. No. 499-362 authorized until 31 DEC 2016).	Applied by certified Pest Management Technician or Self-Help users. Self-Help users refer to Self-Help material listing in Appendix H. Insecticide product must be EPA registered for the application site.
Residual insecticide containing bifenthrin labeled for surface and entry area treatments (i.e. Talstar® P Professional, EPA Reg. No. 279-3206). This option is used when other control tactics failed to achieve control or the spiders are medically significant.	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply insecticide on food, utensils, and food preparation surfaces. Read the label for additional precautions.
Prohibited practices: Do not let unauthorized personnel in treatment areas until insecticide has dried and odors subsided.
Environmental concerns: Spiders are predators of many insect pests and are therefore considered beneficial. Consider using insecticides only when venomous spiders pose a risk to personnel. See insecticide label for additional concerns.

Additional comments: Venomous spiders of concern include the black widow spider and the brown recluse spider. Black widow spiders are often found in undisturbed places in warehouses, storage areas, and in and around other buildings. The adult female spiders are not overly aggressive except when they are guarding egg sacs; caution should be exercised when conducting control methods for this species. The brown recluse spider is often found in undisturbed habitats under rocks or within hollow woods in Oklahoma, Arkansas, and Texas. Be careful when manipulating outdoor equipment, piles of wood, etc. Use of gloves is recommended. All species are venomous to varying degrees. Their bite often results in scarring due to the necrotic action of their venom.

Black Widow Spider

Black Widow Spider “Hour Glass Abdomen”

Brown Recluse Spider

Brown Recluse Spider - “violin back”

Outline # 13	Installation: 63d RD	Date: January 2010

PEST: CRICKETS, EARWIGS, SCORPIONS, AND OTHER NUISANCE ARTHROPODS	**SITE**: Buildings and adjacent areas

Surveillance

Responsible organization: Pest management technicians may inspect to validate complaints and determine the correct control measures to use.
Methods: Inspections for these pests are the most common method. Sticky traps may be used indoors for crawling arthropod pests.
Frequency: Incidental observations by occupants. Pest management technicians inspect when requested, following failure of other non-chemical control methods. QAEs inspect contract work if complaints are received or as part of a quality assurance surveillance.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Building occupants or maintenance personnel	Maintain tight-fitting doors and window screens to prevent indoor infestations. Remove unnecessary plant debris, mulches, trash, leaf piles, boards, and rocks from building perimeter.
Mechanical Control	Building occupants or maintenance personnel	Small infestations can be swept or vacuumed. Cut weeds and grass around buildings. Reduce harborage and excessive moisture by pruning shrub branches to create a minimum 4-inch space underneath the bush.
Cultural Control	Building occupants or maintenance personnel	Reduce pest harborage through sanitation practices. Clean areas where pests often hide: in areas with trash, old boxes, and other debris to reduce infestations.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Crickets, earwigs, scorpions, or other crawling arthropods found within buildings.
Responsible organization: Primarily a Self-Help effort by the building occupant.
Control Standards: No live crickets or other crawling arthropods 24 hours after treatment and for a period of 30 days.

Approved Pesticide	User and Source
Contact insecticide containing Cyfluthrin labeled for surface and entry area treatments (i.e. Tempo SC Ultra, EPA Reg. No. 432-1363).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Residual crack and crevice insecticide containing cyfuthrin (i.e. Tempo SC Ultra, EPA Reg. No. 432-1363).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not contaminate food, utensils, food preparation surfaces, or food containers.
Prohibited practices: Do not let unauthorized personnel in treatment areas until insecticides dry.
Environmental concerns: See insecticide label for concerns.

Additional comments: Exclusion, harborage reduction, and moisture control are the primary methods to control. Pest management technicians should inspect when requested following failure of other control methods.

Earwig

Cricket

Bark Scorpion

Outline # 14	Installation: 63d RD	Date: January 2010

PEST: MOLE CRICKETS	SITE: Lawn and turf plantings in cantonment areas.

Surveillance

Responsible organization: Building occupants may observe mole cricket damage. Grounds maintenance inspects for mole cricket damage throughout the year during routine maintenance. Pest management technicians typically inspect for mole crickets in response to complaints.
Methods: A direct inspection for mole cricket damage is the best method. High-profile turf is checked weekly to determine egg hatching. A soapy solution of 1.5 ounces of dish washing detergent per two gallons of water should be applied during the late afternoon or early evening over 4 square feet of turf. This solution irritates nymphs forcing them to the soil surface within minutes. Treatment is justified when at least one nymph is observed after applying the soapy solution. Because adult mole crickets are less susceptible to insecticides, it is advised not to treat during the spring when there are large numbers of adults. When spring treatments are applied they are typically limited to spot treatments of severe infestations or high-profile turf areas. Control is more effective when treatments are applied during late June or early July when there is the maximum number of nymphs.
Frequency: Incidental observations of damage by area users that occurs primarily in the fall when damage is the most noticeable or in the spring during peak egg-laying activity. Turf maintenance should inspect for nymphs from spring through fall.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	NONE	
Mechanical Control	NONE	
Cultural Control	Building occupants or maintenance personnel	Do not mow Bahia and St. Augustine grasses shorter than 3 inches and centipede grass shorter than 2 inches. All other turf types will be mowed at heights recommended by the local Cooperative Extension Service recommendations. Irrigating vegetation regularly encourages healthy growth.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Significant damage or population levels exceed the treatment threshold.
Responsible organization: Pest Management Technician.
Control standards: The standard is met when an average of less than one nymph per 4 square feet is collected using the soapy water method and when turf damage is reduced significantly.

Approved Pesticide	User and Source
Residual insecticides containing beta-cyfluthrin applied and irrigated into turf areas (i.e. Tempo® Ultra WSP, EPA Reg. No. 432-1377).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Insecticide containing Bifenthrin applied to turf areas (i.e. Talstar P, EPA Reg. 279-3206	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Notify area users prior to conducting spray operations if they are near the treatment area and to avoid treated areas until the spray has dried.
Prohibited practices: Do not allow public access to treatment areas during spraying or baiting operations.
Environmental concerns: See insecticide label for concerns.
Additional comments: The optimum time to treat for this pest is in late June or early July when the most newly hatched immatures are present. To improve control, apply insecticides when soil is moist or within 24 hours of rainfall or irrigation. Since mole crickets are nocturnal feeders, apply insecticides at dusk. Post-treatment irrigation (0.25- 0.5 inches) is recommended using a wetting surfactant with the insecticide.

Mole Crickets

Mole Cricket Damage

Outline # 15	Installation: 63d RD	Date: January 2010

PEST: TERMITES	SITE: Buildings and other wooden structures

Surveillance

Responsible organization: Incidental surveys are conducted by building occupants. Evidence of a possible termite infestation includes termite damage (wood and cellulose material often lined with soil or dried mud), mud tubes, excrement, discarded wings along window sills, floors and in spider webs, or termite swarms. Certified pest management technicians are the primary surveyors for termite infestations and species identification.
Methods: Inspections are made for the presence of termites, their mud tubes, excrement, carton nests, damage, or conditions that could favor infestations. Inspections of a building's exterior, crawl space, basement, and slab-on-ground substructure, are inspected by certified Pest Management Technicians.
Frequency: Inspections are conducted annually for all buildings constructed with cellulose-containing materials. These surveys may be performed as specific termite inspections or performed in conjunction with services for other pests.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Facility maintenance personnel. Note: Accurate termite identification is required to determine the appropriate control action to take.	Eliminate moisture sources that encourage termite colonies. Examples include leaking pipes under buildings, dripping faucets, and incorrect drainage. Ensure that crawl spaces are well-ventilated. Termite shields should be used during construction. Seal expansion joints in concrete floors and around plumbing that penetrates slabs. Cover exposed soil in crawl spaces with polyethylene sheeting or roofing paper to reduce evaporation from soil and to prevent condensation on floor.
Mechanical Control	Facility maintenance personnel. Note: Accurate termite identification is required to determine the appropriate control action to take.	Replace or repair infested material. Cut or remove vegetation next to foundations that impairs inspection for termite tubes and encourages termite infestations.

Type	Responsible Organization	Method
Cultural Control	Facility maintenance personnel. Note: Accurate termite identification is required to determine the appropriate control action to take.	Use mulches such as wood chips sparingly to eliminate food and moisture sources for termites. Lumber, pallets, and other cellulose-containing materials should not be stored directly on the ground or against buildings. Remove waste lumber from construction sites before final grading. Remove tree and large shrub stumps located near buildings and remove soil at grade level when found within 4 inches of structures to eliminate earth to wood contact.
Biological Control	NONE	

Chemical Techniques

Special Note: With the concurrence of the G9-ODR Pest Management Consultant, the Contracting Officer, Contracting Officer's Representative (COR), and Pest Management Coordinator must approve the insecticide and pest management operation submitted by pest control contractors for use in 63d RD facilities. Termite control shall be done by commercial pest control contractors with a warranty provided.

Basis for treatment: Soil pre-treatment is required for all new building construction. All untreated buildings undergoing rehabilitation work, including additions or new floor work, will be treated. All active termite infestations in structures are treated, except where intra-slab heating/air conditioning duct work is present or other restrictions according to law.
Responsible organization: Certified Pest Management Technicians.
Control Standards: No subsequent termite infestations or damage from treated structures for five years after application. Structural modifications made such as: drilling holes, cutting tiles or linoleum, and installing bath trap access panels, are repaired, or replaced to match existing adjacent surfaces in quality and finish. All debris, including dust, caused by drilling or other work is removed from the treatment site.

Approved Pesticide	User and Source
EPA and state approved non-repellent termiticide containing fipronil (i.e. Termidor® SC, EPA Reg. No. 7969-210).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
EPA and state approved structural fumigant.	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Avoid getting herbicide in areas where water can become contaminated and in air ducts of buildings. Do not allow unauthorized personnel in the treatment area during termiticide application until it has dried and vapor odors have subsided. Follow label on termiticide according to law for additional precautions and prohibited practices. This is even more important in buildings that have been fumigated. Entry into a building being fumigated or inhalation of fumigant **is fatal** to humans.
Prohibited practices: Do not treat soils that are too wet (saturated or near saturated).
Environmental concerns: See insecticide label for concerns.

Additional comments: Because the applications of termiticides and fumigants require specialized equipment and experience in control techniques, increased attention should be paid to termite treatments. Records of termite inspections and treatment should be kept indefinitely. Ensure that coordination is made by the Pest Management Coordinator with the Corps of Engineers and Public Works Directorate to validate that all specifications for new construction and rehabilitation projects involve proper termite protection materials. Quality assurance must be performed on all contracted termite control projects. Notification signs that legibly state the termiticide used, treatment date, and applicator's name (and company name for contractors) must be placed at all sites that have received termite treatments.

Termites

Outline # 16	Installation: 63d RD	Date: January 2010

PEST: GYPSY MOTH LARVAE	**SITE:** Hardwood trees and ornamental plantings

Surveillance

Responsible organization: Primarily building occupants or maintenance personnel by visual observation during work. Facility management personnel or pest control contract personnel in response to service requests. Can also be a coordinated effort between the Forest Service and the IPMC.
Methods: Visual observation for the presence of or damage by gypsy moth larvae. Special attention is paid to the presence of egg masses and/or larvae. Pheromone traps can be used to survey for adult gypsy moth males.
Frequency: Visual observations are conducted by building occupants and maintenance personnel during work operations. The pest control contractor performs surveys when services are requested or during specific surveys conducted in the spring and summer months.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants or maintenance personnel	Egg masses can be removed from trees and gypsy moth guard tape can be placed around trees.
Cultural Control	NONE	
Biological Control	Forest Service and facility personnel	Gypcheck®, a nucleopolyhedrosis virus bio-control product, has shown some effectiveness in controlling gypsy moth larvae. A number of natural predators (insects and mites) can be used to control this pest species.

Chemical Techniques

Basis for treatment: Damage is occurring to the extent that the aesthetic or economic value of the plant is in jeopardy. Coordinate with state, county, and federal officials. Conduct program in accordance with Army Regulation (AR) 200-1.
Responsible organization: Contracted pest controllers, pilots (for aerial application), and U.S. Forest Service personnel.
Control standards: For gypsy moths, the number of egg masses per acre exceeds the local maximum established by the U.S. Forest Service.

Approved Pesticide	User and Source
Biological *Bacillus thuringiensis* (BT) insecticide applied to plant surfaces.	Applied by a certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Notify area users prior to conducting spray operations to avoid treated areas until the spray has dried.
Prohibited practices: Do not allow public access to treatment areas during spraying operations.
Environmental concerns: See insecticide label for concerns.

Additional comments: Often pest species become a problem when an herbicide is used on plants. Herbicides can sometimes kill natural predators but not the pest. Care and awareness should be taken when using herbicides and their subsequent impact on natural predators.

Adult gypsy moth and egg mass

Outline # 17	Installation: 63d RD	Date: January 2010

PEST: TURF AND ORNAMENTAL PESTS	SITE: Lawn, turf and ornamental plantings in cantonment areas

Surveillance

Responsible organization: Primarily building occupants or maintenance personnel by visual observation during work. Facility management personnel or pest management technicians in response to service requests.
Methods: Visual observation for the presence of turf and ornamental pests (azalea lace bugs, dogwood borers, tent caterpillars, bagworms, white grubs, Japanese beetles, chinch bugs, spider mites, southern pine beetles, aphids, scale insects, mealy bugs, white flies, etc.) or damage caused by these pests.
Frequency: Visual observations are conducted by building area occupants and maintenance personnel during work operations. Pest management technicians perform surveys when services are requested or during specific surveys conducted in the spring and summer months.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Building occupants or maintenance personnel	For tent caterpillars, remove tents from trees. This should be done in the evening, since the insects leave the tents during the day to feed. This method works when the tents are easy to reach; however, for tents higher in trees or when the tents are extensive, then alternate control methods may need to be employed. For bagworms, remove bags from trees and shrubs. This method works when the bags are easy to reach; however, for bags higher in trees or when the bags are numerous, alternate control methods are employed.

Type	Responsible Organization	Method
Mechanical Control	NONE	
Cultural Control	Building occupants or maintenance personnel	Prior to planting, select plant species that minimizes the number of host plants subject to infestation. Avoid damaging the trunks of trees by mowers, trimmers, and other equipment. Properly trim trees during dormancy. Use mulch around the base of trees to reduce the need for vegetation control and possibility of mechanical damage. Perform proper landscape turf maintenance, including irrigation, use of pH amendments, cutting at recommended height, and fertilization.
Biological Control	Lawn maintenance personnel	A number of natural predators (insects and mites) can be used to control these pest species.

Chemical Techniques

Basis for treatment: Damage is occurring to the extent that the aesthetic or economic value of the plant is in jeopardy.
Responsible organization: Pest Management Technician
Control standards: No further damage or evidence of live insects on the plants for a continuous 30 days following the treatment application.

Approved Pesticide	User and Source
Contact insecticidal soaps.	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Residual insecticides and miticides containing Cyfluthrin applied to plant surfaces (Tempo Ultra WSP, EPA Reg. 432-1377	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Residual insecticides and miticides containing Lamda-cyhalothrin applied to plant surfaces (Demand SC, EPA Reg. 100-1066)	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.
Biological *Bacillus thuringiensis* (BT) insecticide applied to plant surfaces.	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: Notify area users/occupants prior to conducting spray operations to avoid treated areas until the spray has dried.
Prohibited practices: Do not allow public access to treatment areas during spraying operations.
Environmental concerns: See insecticide label for concerns.

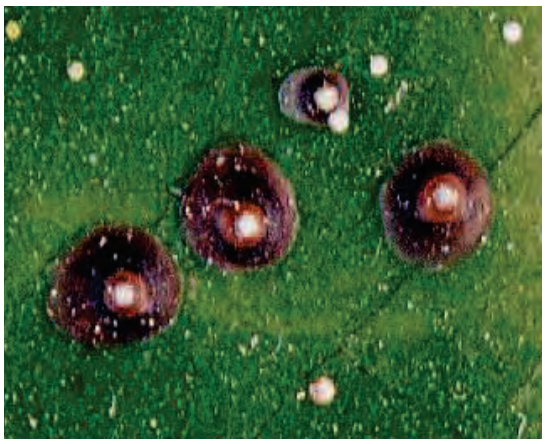
Additional comments: Often pest species become a problem when an insecticide is used on plants. Insecticides can sometimes kill natural predators but not the pest. Care and awareness should be taken when using insecticides and their subsequent impact on natural predators.

Tent Caterpillar

Adult chinch bug

Plant mite

White flies



Scale insect

Outline # 18	Installation: 63d RD	Date: January 2010

PEST: MICE AND RATS	SITE: All structures subject to infestation

Surveillance

Responsible organization: Building occupants or maintenance personnel may incidentally observe rodents. Pest management technicians and Facility Coordinators conduct surveys to validate complaints or after treatment to evaluate control methods.
Methods: Inspections for rodents, rodent damage, rub marks, burrows, droppings, or other signs. Rodent glue boards or snap traps may also be used to monitor rodent populations.
Frequency: Daily incidental observations by building occupants and maintenance personnel. Pest management technicians inspect when requested, during other pest control services, or during specific surveys for rodents. Post-treatment surveys are conducted when heavy infestations are suspected, at sites where control has historically been difficult, or sites where control is a high priority. Search out the source of the infestation!

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Maintenance personnel repairing weather stripping, doors, and windows.	Eliminate openings at building exteriors. Give particular attention to loading doors that do not always close tightly. Tightly secure window screens and vents to prevent rodent entry.
Mechanical Control	Building maintenance sets traps or glue boards for minor infestations. Pest management technicians set traps and glue boards when extensive trapping is required. Building maintenance personnel or contractors mechanically clean floor surfaces and maintains vegetation.	Snap and rodent glue boards may be used for capture. Use peanut butter as trap bait. Check traps and glue boards daily. Place trapped rodents in sealed bags for disposal. Wear rubber gloves when handling all rodents and dispose of or disinfect them after handling rodents.

Type	Responsible Organization	Method
Mechanical Control (cont.)	See above.	Glue boards and snap traps should not be used continually in order to prevent trap or glue board "shyness". Mechanical repeating catch traps (e.g., Ketch-all® or Victor® Tin Cat®) may be used by pest management technicians. Electronic control devices will not be used. Vacuum dry food spillage in food service facilities because sweeping places food particles into cracks and crevices. Cut vegetation around food handling buildings at least 6 inches away from buildings.
Cultural Control	Building occupants and maintenance personnel should practice good sanitation measures. Facility maintenance regularly repair and replace old or damaged plumbing.	Practice good sanitation to reduce food sources especially in food handling facilities and break rooms. Clean spilled food promptly. Use garbage receptacles with tight-fitting lids. Eliminate water leaks and unnecessary standing water in and around buildings. Remove excess bags, empty boxes, and other potential harborage from food storage areas. Store food items on shelving that is at least 24 inches from walls and 12 inches above floors, or on shelves with rollers to permit routine cleaning, inspection, and rodent control.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: A heavy infestation of rodents is present or use of traps, glue boards, and other control methods have failed to provide control.
Responsible organization: Pest Management Technician
Control Standards: Damage from rodents has discontinued. Reduction in the number of droppings should be seen in and around bait stations within the first 7 days following bait placement. Following 30 days of baiting, if there is no evidence of rodent subsistence, then the bait stations should be removed unless a history of repeated infestations exists for the facility. Bait stations are to be maintained with a sufficient quantity of bait so it is continually effective. This may require initial daily servicing with the service frequency gradually reduced. At no time will bait station servicing exceed 30 days. Remove and replace insect-infested baits.

Approved Pesticide	User and Source
Placement of anticoagulant rodenticide baits containing Bromadiolone (i.e. Contrac Blox, EPA Reg. No. 12455-79).	Applied by certified Pest Management Technician. Insecticide product must be EPA registered for the application site.

Remarks

Sensitive areas: See rodenticide label for sensitive areas.
Prohibited practices: Do not allow public access to treatment areas during baiting operations. Do not place rodenticides where they will be accessible to children or pets. Bait should be placed in tamper proof containers. Do not use rodenticides where there is a possibility of contaminating food or food preparation surfaces. Do not sweep rodent droppings to reduce possible pathogens from becoming airborne and inhaled by personnel. Wet mopping, wet rags, or spraying will be used (with detergent and bleach) to disinfect rodent-contaminated surfaces. Use vacuums equipped with high efficiency particulate air filters to remove rodent droppings or dry food spillage where rodent contamination is possible. Disinfect surfaces with a mixture of three tablespoons of household bleach (or other disinfectant) to one gallon of water
Environmental concerns: Keep rodenticides out of lakes, streams, or ponds. Do not contaminate water by cleaning of equipment or disposing of wastes.
Additional comments: Rodenticides are considered the last option in controlling rodents. Rodenticides must be placed in lockable bait stations. The presence of spilled food, cluttered work areas, and garbage will adversely affect any baiting or trapping program. Cooperation among personnel to store items off floors, away from walls, and keeping areas free of food and garbage is critical in achieving effective rodent control.

Roof Rat

Norway Rat

Mice

Outline # 19	Installation: 63d RD	Date: January 2010

PEST: BATS	**SITE:** Offices, warehouses, and other buildings

Surveillance

Responsible organization: Incidental observations by building occupants. Pest management technicians conduct surveys to validate complaints, identify bat species, and perform post-treatment surveys to monitor control using the methods below.
Methods: Inspections are made to detect bats, bat sounds, or bat droppings. Bat control will not be performed until the species has been identified because some species may be protected. Close examination of the bat(s) may be required for proper identification. Leather protective gloves must be worn during inspections to protect hands from being bitten by rabid bats. High HEPA filters must be worn during inspection to protect investigators from inhaling fungus spores associated with bat guano that can cause Histoplasmosis disease in humans.
Frequency: Surveys are performed when requested by building occupants. Inspect bat exclusion devices to ensure that they are properly installed at all bat exits. Post-treatment surveys are often required to ensure that all bat accesses have been properly sealed.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Certified pest management technician or Game Enforcement personnel only.	Exclusion is the only ecologically viable method to eliminate bats from a structure. Four phases are used in this program. **Phase 1** is to confirm bat presence and identify the bat species (It is possible to have more than one species in a structure). If threatened or endangered bat species are present, contact the U.S. Fish and Wildlife Service for recommendations and requirements for their management/control. For all bat species, control will not be performed during periods when young, non-flying bats are present.

Type	Responsible Organization	Method
Physical Control (cont.)		**Phase 2** will not begin until all juvenile bats are capable of flight so they are not trapped inside roosting structures. Phase 2 is to identify all active and potential bat exits and entrances. **Phase 3** involves the draping of netting over bat exits to serve as a baffle that permits bats to exit but prevents access into the structure through holes, cracks, or other gaps in the building exterior. **Phase 4** requires waiting 2-4 weeks to ensure that bats are no longer gaining access into the structure before removing the netting. On the same day of netting removal, seal or cover all bat entrances and exits. All doors and windows should be kept closed or should be screened to prevent accidental bat entry.
Mechanical Control	NONE	
Cultural Control	Natural Resources personnel	Construction of bat houses may serve as an alternative home for the displaced bats and provide a secure site for these beneficial and often endangered animals. All other possible bat harborage sites in unwanted areas must be excluded and all possible bat entrances into structures must be sealed before bat houses are likely be used by bats. Locations for all bat houses must be approved by Natural Resources personnel. Bat houses are best placed near ponds or swamps.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: **NONE**
Responsible organization: **N/A**
Control standards: **N/A**

Remarks

Sensitive areas: NONE
Prohibited practices: Bats will not be killed except for rabies examination by authorized pest management technicians.
Environmental concerns: NONE
Additional comments: Contact with bats can result in serious medical problems. Bats can carry rabies even though it is quite rare in any natural population, perhaps as low as 1-5 percent. All efforts must be made to protect oneself from airborne pathogens and avoid bat contact. Pest management technicians who control bats must receive rabies prophylaxis and wear proper protective equipment during the handling of bats and bat products. Personnel that are responsible for cleaning bat guano are required to wear personal protective equipment (i.e. HEPA masks). See the U.S. Army Center for Health Promotion and Preventive Medicine Technical Guide No. 142, “Managing Health Hazards Associated with Bird and Bat Excrement” for further guidance on excrement disposal.

Little brown bat

Outline # 20	Installation: 63d RD	Date: January 2010

PEST: BIRDS (NON-NATIVE, NON-PROTECTED PEST SPECIES)	SITE: Warehouses, loading docks, and other buildings

Surveillance

Responsible organization: Building occupants or maintenance personnel may incidentally observe bird pest issues. Pest management technicians will conduct pre-treatment surveys in response to complaints and post-treatment surveys to determine control effectiveness. QAEs may inspect for quality assurance of contract services.
Methods: Observation of birds, droppings, or nests.
Frequency: Building users and maintenance personnel may make incidental observations. Pest management technicians inspect at random to validate complaints, during the performance of other pest control services, or before and after treatment for birds. QAEs inspect after contract services if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Maintenance personnel install bird barriers. Some exclusion work for specific sites may be contracted, especially for new construction.	Habitat modifications that exclude birds from buildings are primarily used. Exclusion devices include screens, netting, high-tension netting using stainless steel posts, and spring-tensioned wires. Nest destruction in buildings is performed prior to and subsequent to the egg-laying and fledging segment of the nesting season.

Type	Responsible Organization	Method
Mechanical Control	Pest management technicians repel, trap, remove nests, and shoot pest birds. Trapping should be coordinated with local health officials when pest birds are from locations outside the installation.	Example bird repellent techniques, porcupine wires (not effective on small birds), ultra sound, auditory alarms, distress calls, flashing lights, owl decoys, and rubber snakes, etc. Auditory and visual repellents are temporary deterrents and birds will quickly acclimate to their presence. Trapping is the preferred method for reducing pest birds at a specific area. Use funnel traps to capture European starlings and house sparrows. Bob-type traps are used when controlling pigeons. Advantages to trapping pest birds include that any non-targeted (protected and unprotected) bird species captured can be released relatively unharmed and large numbers of captured target birds are conveniently located in one trap. When permitted by local laws, shooting in and around structures with a pellet gun at night is an effective method used to control small populations. Because shooting is hazardous and labor intensive, it is rarely used. Night shooting is practiced because fewer people are in control areas, and birds are concentrated at roost sites.
Cultural Control	Building occupants.	Close loading doors, unscreened windows, or other openings when not in use. People should be discouraged from feeding birds.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: A severe bird problem exists which is a threat to human health.
Responsible organization: Pest Management Technician.
Control standards: Birds do not return for 7 days following treatment.

Approved Pesticide	User and Source
Avicide bait put in feed or incorporated in special perches.	Applied by certified Pest Management Technician. Avicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Avicides are vertebrate toxins. Restrictions on the label must be enforced.
Prohibited practices: Follow label restrictions.
Environmental concerns: Do not treat in areas that may be frequented by resident or migratory endangered, threatened, or protected vertebrate (fish, amphibian, reptile, bird, and mammal) species.
Additional comments: Control by avicides is undesirable because there always are more birds to replace those that have been killed, and it may result in unwanted adverse public reaction. Avicides should only be used as a last resort after all non-chemical control methods have failed. Be sure to properly identify species in order to identify if the pest bird is a protected species. Use control practices in accordance with the Endangered Species Act. Avicides are used only with G9-ODR Pest Management Consultant approval.

Rock pigeon

European starling

Outline # 21	Installation: 63d RD	Date: January 2010

PEST: MISCELLANEOUS VERTEBRATE PESTS	SITE: All buildings and associated surroundings

Surveillance

Responsible organization: Building occupants or maintenance personnel may incidentally detect problem animals at the building site. Pest management technicians conduct surveys to validate complaints or to determine control effectiveness. The installation Game Enforcement Officers may conduct surveys during surveillance of other vertebrate wildlife. QAEs may inspect for quality assurance of contractual pest management services. Contact local game enforcement officials to evaluate problems where numerous animal pests are involved at a specific site.
Methods: Surveys involve odor detection and observation for animals (skunks, opossums, raccoons, armadillos, feral cats and dogs, etc.), burrows, tracks, foraging activity, and scat.
Frequency: Building users or maintenance personnel incidentally detect problem animals. Pest management technicians inspect when requested or during pest control services. Surveys conducted by the Game Enforcement Section are extremely rare and are usually done during other vertebrate control duties. QAEs inspect after contract work if complaints are received or as part of quality assurance surveillance.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Maintenance personnel install barriers and fill burrows. Some exclusion work for specific sites may be contracted.	Exclusion from buildings is also conducted by installing hardware cloth, skirting, or other materials around structures. Fill existing burrows at the conclusion of control operations.
Mechanical Control	Pest management technicians primarily trap animals. Only Game Enforcement officials are authorized to shoot problem animals.	Live traps (wire, barrel, or wood box traps) are used. Live trapped animals, such as skunks and raccoons, are not always relocated because of the possibility of spreading rabies, unless the local Game Enforcement officer states that relocation is be performed. In very rare situations, shooting by Game (continued below)

Type	Responsible Organization	Method
Mechanical Control (cont.)		Enforcement personnel are authorized if the animal displays signs of rabid or threatening behavior. Animals that behave abnormally, or have physical contact with a human must be delivered to the state health department for a rabies examination.
Cultural Control	Building occupants, maintenance or contract personnel.	Remove trash and use tight-fitting lids on receptacles. Do not feed stray or wild animals. Eliminate brush piles, stacked lumber, wood piles, etc.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: NONE
Responsible organization: N/A
Control Standards: N/A

Remarks

Sensitive areas: NONE
Prohibited practices: Do not feed wild or feral animals.
Environmental concerns: NONE
Additional comments: Enforcement personnel are to determine if problem animals can be trapped, relocated, or killed. All personnel who live-trap must receive rabies prophylaxis and wear heavy-duty leather gloves when handling live traps and trapped animals. Contact local health or animal control officials to determine if problem animals, showing signs of rabies (acting sick, signs of aggression, very nervous activity, or salivation), should be examined. Report all animal bites or scratches to medical authorities. All animals that have bitten or scratched personnel must be examined for rabies by local public health officials. If present, treat for fleas under buildings where animals were removed. Any necessary exclusion work should be completed only after the problem animal has been removed.

Raccoon and skunk

Opossum

Outline # 22	Installation: 63d RD	Date: January 2010

PEST: SNAKES	SITE: Cantonment areas or other mission areas

Surveillance

Responsible organization: Building occupants or maintenance personnel may incidentally observe snakes at the work site. When requested, pest management technicians and game enforcement officers conduct surveys.
Methods: Inspections for live snakes and presence of favorable snake habitat, or possible entry points into structures.
Frequency: Daily incidental observations by area users or maintenance personnel. Pest management technicians and Game Enforcement officers inspect to validate complaints.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Maintenance personnel install exclusion tools. Some exclusion work for specific sites may be contracted.	Close all openings around water pipes, electrical outlets and doors. Seal holes in masonry foundations with mortar. Use hardware cloth (1/8-inch) or sheet metal to seal holes in wooden buildings.
Mechanical Control	Trapping or removal should only be performed by experienced pest management technicians or Game Enforcement officers.	Use rodent glue boards to capture snakes in or under buildings. Remove snakes using a snake stick, tongs, or looped extension pole, or similar devices. Use extreme care when handling snakes to prevent being bitten.
Cultural Control	Pest management technicians or grounds maintenance personnel modify habitats.	Control rodents, a food source for snakes. Mow vegetation around structures. Remove brush, lumber and woodpiles, debris, rock piles, and other vegetation.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: NONE
Responsible organization: N/A
Control standards: N/A

Remarks

Sensitive areas: Troops should be trained to identify venomous, endangered, and threatened snake species before using training areas.
Prohibited practices: Do not harm or kill any snakes. Venomous snakes should be relocated. Venomous snakes may be killed only in an emergency to prevent a bite.
Environmental concerns: Capture and relocate venomous and nonvenomous snakes where they will not cause harm or disruption.
Additional comments: Personnel with snake bites will receive medical assistance immediately. Contact the Department of Wildlife and Fisheries for further assistance. If the snake has been killed, bring the dead snake along when seeking treatment or bring a photograph if someone nearby has a camera and can safely take a picture to aid in identification and treatment. Representative venomous snakes of North America are shown below.

Coral Snake

Western Cottonmouth

Diamondback Rattlesnake

Copperhead

Outline # 23	Installation: 63d RD	Date: January 2010

PEST: MOLES, GOPHERS, AND POCKET GOPHERS	**SITE:** Lawns, parade fields, and other maintained grassy areas.

Surveillance

Responsible organization: Facility manager and contracted pest controller. Incidental observations by area users. Natural Resource personnel or Game Enforcement officers conduct surveys in response to service requests or during other duties.
Methods: Inspections for animals, plant damage, tunnels, and mounds.
Frequency: As required. Surveillance is usually done in conjunction with other maintenance on grassy areas.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Contracted pest controller. Licensed and permitted Game Enforcement officers or pest management technicians trap animals. Maintenance personnel.	Trapping is the most successful method of control. For moles and pocket gophers, there are bayonet, scissor-jawed, and choker loop-type lethal traps. These traps are specifically designed for each pest. Refer to the literature to ensure that the trap is appropriate for the pest. Maintain a good turf pest control program that eliminates food sources for moles.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Presence of gophers in lawns.
Responsible organization: Contracted pest controller.
Control standards: Discontinue baiting when there are no active signs of gopher activity (new mounds).

Approved Pesticide	User and Source
Rodenticides approved by the EPA and appropriate state for use on the target pest and appropriate site.	Applied by certified Pest Management Technician.

Remarks

Sensitive areas: Bait must be applied to the burrows underground – above ground uses are prohibited. Applicator must wear gloves. Care must be taken to avoid spilling any material. See pesticide label for additional precautions. Ensure traps are properly set and covered to ensure children are not endangered.
Prohibited practices: Poisonous gases and fumigants are not authorized.
Environmental concerns: Application of rodenticides shall be in compliance with environmental regulations. Be aware that pocket gopher burrows are often home to a number of rare and threatened species.
Additional comments: Strychnine is a Restricted Use pesticide – use with extreme caution. Use bait only when large numbers of gophers are present, making trapping methods impractical from a manpower standpoint. Moles are often attracted into areas that have a heavy infestation of turf pests. Maintaining a good turf pest control program will often alleviate mole problems. Both the southeastern pocket gopher (*Geomys pinetis*) and the eastern mole (*Scalapus aquaticus*) make “hills”. The pocket gopher creates a crescent shaped hill with the opening plugged with dirt. Mole hills are round and the opening is not plugged by dirt. Both species also share the habit of rarely coming up out of the soil. However, they differ markedly in their diet. Moles eat insects and worms primarily whereas gophers eat vegetation only.

Gopher Hill

Mole Hill

Outline # 24	Installation: 63d RD	Date: January 2010

PEST: GROUND SQUIRRELS	SITE: Lawns, parade fields, and other maintained grassy areas.

Surveillance

Responsible organization: Facility manager and contracted pest controller.
Methods: Visual observations for mounds or squirrels.
Frequency: Ongoing. Surveillance is usually done in conjunction with other maintenance on grassy areas.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Contracted pest controller.	Live trapping (if applicable) with wire or solid cage traps. Release wild animals in remote areas.
Cultural Control	Building occupants and the facility manager.	Maintain landscape and reduce food sources like grasses and plant seeds and nuts.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Presence of ground squirrels in lawn.
Responsible organization: Contracted pest controller.
Control standards: Discontinue baiting when there are no active signs of ground squirrel activity.

Approved Pesticide	User and Source
Pesticide approved by the EPA and appropriate state for use on the target pest and appropriate site.	Applied by certified Pest Management Technician.

Remarks

Sensitive areas: Bait must be applied to ground squirrel holes underground – above ground uses are prohibited. Applicator must wear gloves. Care must be taken to avoid spilling any material. See pesticide label for additional precautions.
Prohibited practices: See label specifications.
Environmental concerns: Application and disposal of chemical pesticides shall be in compliance with environmental regulations.
Additional comments: None.

Outline # 25	Installation: 63d RD	Date: January 2010

PEST: BROADLEAF WEEDS	SITE: Parade fields, lawns, and other improved turf areas

Surveillance

Responsible organization: Most surveys are conducted by grounds maintenance personnel in response to service requests. Some surveys are seasonally initiated by grounds maintenance personnel at high-profile turf areas. Pest management or grounds maintenance QAEs may inspect for quality assurance of contractual pest management services.
Methods: Visual inspections for undesirable broadleaf weeds in turf.
Frequency: Unplanned inspections are typically conducted by area users who submit service requests. Grounds maintenance personnel conduct surveys on a daily basis during maintenance work in turf areas. Pest management or grounds maintenance QAEs inspect as a follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	NONE	
Mechanical Control	Building occupants, contractors, or grounds maintenance personnel.	Proper mowing involves cutting desirable grasses at the recommended height. This means removing no more than 1/3 of the total leaf surface in a mowing. Raising the mowing height during periods of drought helps maintain turf vigor. Mowing grass to maintain a uniform height does an effective job of controlling tall growing weeds.
Cultural Control	Building occupants, contractors, or grounds maintenance personnel.	Turf selection is the most important factor in developing and maintaining a high quality, problem-free turf. Turf selection is based on the environment, expected turf use, and expected management intensity. Certified seed or sprigs are used. Other factors including proper fertilization, irrigation and liming practices also have an effect on how well desirable turf areas can compete with undesirable weeds.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When there is a high potential for undesirable broadleaf weeds in turf and when surveys from previous years found undesirable broadleaf weeds.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: When applying a pre-emergent herbicide, targeted broadleaf weeds fail to germinate for 5 weeks following treatment. When applying a post-emergent herbicide, targeted broadleaf weeds are controlled within 4 weeks following treatment.

Approved Herbicide	User and Source
Pre-emergent broadleaf herbicide applied before weed germination.	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Post-emergent broadleaf herbicide applied after weed germination.	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not allow personnel on treated turf until after sprays have dried.
Prohibited practices: Do not apply pre-emergent herbicides if targeted grasses have already germinated.
Environmental concerns: Do not apply herbicides when winds may create undesirable drift.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Outline # 26	Installation: 63d RD	Date: January 2010

PEST: ALL VEGETATION	**SITE:** Utility poles, traffic and parking signs, hydrant bases, cracks in sidewalks or sidewalk edging, at fuel sites or electrical substations, around building foundations, parking lots, targets on ranges, and fence lines.

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing in desired vegetation free areas.
Frequency: Incidental observations by area users. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	NONE	
Mechanical Control	Building occupants, contractors, or grounds maintenance personnel	Mechanically remove grass and broadleaf weeds with shovels, hoes, or string trimmers. Care is exercised to not damage root systems or bark at the base of desirable plants. Mechanical control methods can be used, but are very labor-intensive and often provide only short-term control.
Cultural Control	Building occupants, contractors, or grounds maintenance personnel	Use of mulches (organic and synthetic) is encouraged to provide vegetation control. Place mulch around desirable vegetation such as trees and shrubs and along fence lines.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When vegetation is found around the bases of hydrants, utility poles, and targets, vegetation along fence lines, vegetation on or along sidewalks and building perimeters, or around fuel sites and in electrical substations.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Vegetation fails to grow or is killed at targeted sites within 2 weeks after treatment and does not return for a period of 4 months.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Soil residual herbicide containing bromacil, diuron, and/or isopropylamine salt of imazapyr, applied to soil surfaces (i.e. Hyvar® X-L, EPA Reg. No. 352-346; Arsenal® Powerline™, EPA Reg. No. 241-431).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Avoid contact with foliage of desirable vegetation. Do not apply soil residual herbicides within the root zone of desirable vegetation. Avoid direct application to any body of water. Avoid drift that could damage desirable plants. Clean equipment away from desirable vegetation.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Outline # 27	Installation: 63d RD	Date: January 2010

PEST: BERMUDAGRASS (*CYNODON SP.*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Grounds maintenance personnel conduct surveys on a daily basis during maintenance work in turf areas. Grounds maintenance personnel also inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Bermudagrass can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering.
Mechanical Control	Grounds maintenance personnel	Bermudagrass can be mowed to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Bermudagrass and bermudagrass seeds can be controlled by applying a clear plastic mulching (solarization) during periods of high solar radiation.

Type	Responsible Organization	Method
Mechanical Control (cont.)	Grounds maintenance personnel	Before applying plastic, closely mow the bermudagrass and remove clippings. Irrigate the area well and then place an ultraviolet protected polyethylene over the area, including a 2-foot buffer zone around control area. Keep plastic intact for 4-6 weeks.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Bermudagrass abundant on facility in unwanted area.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Vegetation fails to grow or is killed at targeted sites within 2 weeks after treatment and does not return for a period of 4 months.

Approved Herbicide	User and Source
Post-emergent translocated non-selective herbicide applied to actively growing plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Avoid contact with foliage of desirable vegetation. Do not apply soil residual herbicides within the root zone of desirable vegetation. Avoid direct application to any body of water. Avoid drift that could damage desirable plants.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Bermudagrass is not easy to control, especially when being controlled within an established turf or landscaped area. Herbicide application is difficult since the herbicide will also eradicated non-target plant species. Persistent removal or withholding water during summer months are the most effective means to controlling this weed (Cudney *et al.* 2007).

Bermudagrass

Outline # 28	Installation: 63d RD	Date: January 2010

PEST: BIRD'S-FOOT TREFOIL (*LOTUS CORNICULATUS*)	SITE: On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance, if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weakening the root stocks. Tillage can be used to remove the vegetative structure and incorporate it into the soil.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control bird's-foot trefoil.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control Standards: Bird's-foot trefoil no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides to the inside of ditch banks or to the inside of banks along waterways. Do not apply herbicides through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Currently there is no registered residual herbicide for controlling bird's-foot trefoil. Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying herbicides and reseeding treated areas. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides.

Bird's-foot Trefoil

Outline # 29	Installation: 63d RD	Date: January 2010

PEST: BLACK MUSTARD (*BRASSICA NIGRA*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Tillage can be used to remove the vegetative structure and incorporate it into the soil.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Black mustard no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Soil residual herbicide containing Pendimethalin or Glyphosate (Pendulum, EPA Reg. 241-341, and RoundUp Pro, EPA Reg. 524-475	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides to the inside of ditch banks or to the inside of banks along waterways. Do not apply herbicides through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Black Mustard

Outline # 30	Installation: 63d RD	Date: January 2010

PEST: BULL THISTLE (*CIRSIUM VULGARE*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Tillage can be used to remove the vegetative structure and incorporate it into the soil.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.

Control standards: Bull thistle no longer exists in treated area.	
Approved Herbicide	**User and Source**
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides to the inside of ditch banks or to the inside of banks along waterways. Do not apply herbicide through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Bull Thistle

Outline # 31	Installation: 63d RD	Date: January 2010

PEST: COMMON SUNFLOWER (*HELIANTHUS ANNUUS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Tillage can be used to remove the vegetative structure and incorporate it into the soil.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Sunflower no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides to the inside of ditch banks or to the inside of banks along waterways. Do not apply herbicides through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Sunflower

Outline # 32	Installation: 63d RD	Date: January 2010

PEST: FIELD BINDWEED (*CONVOLVULUS ARVENSIS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Manual removal by tilling or hand pulling can be used to control method, be wary to remove and dispose of the whole root/rhizome system or the plant will resprout. Field bindweed can be controlled during the growing season if tilled 8 to 12 days after **each** emergence. Plants can be covered with mulch or black plastic to deter regrowth.
Cultural Control	NONE	None
Biological Control	County agricultural commissioner's office or Natural Resources personnel	Two biological control species have been used to weaken and control field bindweed with varying success rates. These species are the bindweed gall mite (*Aceria malherbae*) and bindweed moth (*Tyta luctuosa*) (Lauriault et al 2004). The use of biological control methods should always be under the direction of the county agricultural commissioner's office.

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Field bindweed no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides to the inside of ditch banks or to the inside of banks along waterways. Do not apply herbicides through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Field bindweed is difficult to control because it is a prolific seed producer, and plants can sprout or spread from rhizomes left behind after removal (USDAFS 2006). Intensive cultivation contributes to the control of established stands, newly emerged seedlings, and may kill young field bindweed infestations. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Field Bindweed

Outline # 33	Installation: 63d RD	Date: January 2010

PEST: REDROOT AMARANTH (*AMARANTHUS RETROFLEXUS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Pigweed can be controlled during the growing season if tilled 8 to 12 days after **each** emergence. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Intensive cultivation contributes to the control of established stands, newly emerged seedlings, and may kill young field bindweed infestations.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Redroot pigweed no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides to the inside of ditch banks or to the inside of banks along waterways. Do not apply herbicides through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Redroot amaranth

Outline # 34	Installation: 63d RD	Date: January 2010

PEST: JOHNSONGRASS (*SORGHUM HALEPENSE*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Johnsongrass can be controlled during the growing season if tilled 8 to 12 days after **each** emergence. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. Best timing for hand removal of herbaceous plant species is after seedhead production but before flowering. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Intensive cultivation contributes to the control of established stands, newly emerged seedlings, and may kill young Johnsongrass infestations.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Johnsongrass no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicide directly to water or wetlands. Do not apply herbicide product through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not contaminate any sources of water or wetlands when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Johnsongrass

Outline # 35	Installation: 63d RD	Date: January 2010

PEST: FIELD SOWTHISTLE (*SONCHUS ARVENSIS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Tillage or hand pulling can be effective in reducing sowthistle stands if tilled at the 7 to 9 leaf rosette stage. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Excessive mowing can actually stimulate new plant growth from rhizomes, creating thicker stands of sowthistle.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Field sowthistle no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicide directly to water or wetlands. Do not apply herbicide product through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not contaminate any sources of water or wetlands when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Field Sowthistle

Outline # 36	Installation: 63d RD	Date: January 2010

PEST: PUNCTUREVINE (*TRIBULUS TERRESTRIS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season; for complete control, hand removal will have to be conducted for several years. Best timing for hand removal of this herbaceous plant species is before or at flowering. Mowing is not an effective form of control since the plant grows close to the ground. Synthetic mulches that block out sunlight and provide a seed barrier can be an effective form of control around ornamental plantings.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Puncturevine no longer exists in treated area.

Approved Herbicide	User and Source
Translocated non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicide directly to water or wetlands. Do not apply herbicide product through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not contaminate any sources of water or wetlands when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides.

Puncturevine

Outline # 37	Installation: 63d RD	Date: January 2010

PEST: RUSSIAN THISTLE (*SALSOLA SP.*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Mowing or hand pulling young plants can prevent seed production. Planting competitive, more desirable species can also be an effective method of preventing Russian thistle establishment in most landscaped areas. Russian thistle competes poorly in firm, regularly irrigated soil, and it is rarely a problem in managed gardens, turfgrass, or landscapes. Avoid tilling or loosening the soil in abandoned areas because loose soil is necessary for Russian thistle germination.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.

Control standards: Russian Thistle no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, post-emergent, non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicide directly to water or wetlands. Do not apply herbicide product through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not contaminate any sources of water or wetlands when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Russian Thistle

Outline # 38	Installation: 63d RD	Date: January 2010

PEST: QUEEN ANNE'S LACE (*DAUCUS CAROTA*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal or mowing close to ground level when plants are 7 to 10 inches tall and before flowering. Where possible, regular tillage for 2 years may decrease infestations. Frequent tilling promotes seed germination, depletes the soil seed bank, and ultimately destroys seedlings before they can mature and reproduce.
Cultural Control	Grounds maintenance personnel	Establishing and maintaining healthy stands of native and desirable vegetation can reduce Queen Anne's lace infestations.
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Queen Anne's Lace no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, post-emergent, non-selective herbicide containing triclopyr, applied to plant leaf surfaces (i.e. Garlon® 4 Ultra, EPA Reg. No. 62719-527).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicide directly to water or wetlands, to areas where surface water is present, or to intertidal areas below the mean high-water mark. Do not apply herbicide through any type of irrigation system. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not contaminate any sources of water or wetlands when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Queen Anne's Lace

Outline # 39	Installation: 63d RD	Date: January 2010

PEST: SALT CEDAR (*TAMARIX SP.*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal is recommended for small infestations of saplings under 1-inch diameter. Root-cutting and bulldozing has had mixed success, plus it is costly, labor intensive and may cause extensive damage to soils and lead to resprouting. Controlled fires have also been used with some success, but saltcedars are fire-adapted and readily resprout after fire. Flooding can be used to control salt cedar if root crowns remain submerged for at least three months.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Salt cedar no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site. Do not remove saltcedar crown growth for 3 years after herbicide application or it may promote resprouting.

Remarks

Sensitive areas: Avoid spray drift of herbicides outside treatment area. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate any sources of water or wetlands when cleaning equipment.
Additional comments: None.

Salt Cedar

Outline # 40	Installation: 63d RD	Date: January 2010

PEST: YELLOW SWEETCLOVER (*MELILOTUS OFFICINALIS)*	SITE: ON FACILITY GROUNDS

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	When soil is moist, hand pulling can be effective on small infestations. Hand pulling first year stems of yellow/white sweet clover is more effective when conducted in late summer or early fall while the plants are still green and easily detected among the dried grasses. Second year plants should be pulled before flowering or seed set. Mowing can be effective if conducted prior to flower emergence and resprouting is less likely to occur if plants are cut close to the ground.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Yellow/white sweet clover no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, post-emergent, non-selective herbicide applied as a spray containing sulfometuran methyl, applied to plant leaf surfaces (i.e. DuPont™ Oust® XP, EPA Reg. No. 352-601).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Soil residual, pre-emergent herbicide incorporated applied on dry fertilizer. Herbicides containing sulfometuran methyl, applied to plant leaf surfaces (i.e. DuPont™ Oust® XP, EPA Reg. No. 352-601).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not contaminate irrigation ditches or water used for domestic purposes with herbicides. Do not apply herbicides through any type of irrigation system. Do not apply herbicides where possible downward movement into soil or surface washing may cause contact with roots of desirable plants such as trees and shrubs. Application of herbicides to water is not permitted. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Yellow Sweetclover

Outline # 41	Installation: 63d RD	Date: January 2010

PEST: YELLOW NUTSEDGE (*CYPERUS ESCULENTUS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. Hand removal should be conducted soon after germination to prevent maturation of tuber. Mowing to remove foliage and prevent the plant from setting viable seed, as well as inhibiting the plant's ability to produce food and weaken the root stocks. Yellow nutsedge is not shade tolerant and control may be reached by planting vegetation that creates shade over areas established by this sun-loving species.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Yellow nutsedge no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, post-emergent, non-selective herbicide applied as a spray containing sulfometuran methyl, applied to plant leaf surfaces (i.e. DuPont™ Oust® XP, EPA Reg. No. 352-601).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Soil residual, pre-emergent herbicide incorporated applied on dry fertilizer. Herbicides containing sulfometuran methyl, applied to plant leaf surfaces (i.e. DuPont™ Oust® XP, EPA Reg. No. 352-601).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not contaminate irrigation ditches or water used for domestic purposes with herbicides. Do not apply herbicides through any type of irrigation system. Do not apply herbicides where possible downward movement into soil or surface washing may cause contact with roots of desirable plants such as trees and shrubs. Application of herbicides to water is not permitted. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water sources when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Yellow Nutsedge

Outline # 42	Installation: 63d RD	Date: January 2010

PEST: YELLOW STAR-THISTLE (*CENTAUREA SOLSTITIALIS*) AND MALTESE STAR-THISTLE (*CENTAUREA MELITENSIS*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand pulling can be effective in controlling yellow star-thistle if conducted prior to flowering and seed production. Hand pulling is most effective on newly established infestations. Tilling practices that sever the roots below the soil surface is also an effective means of control. Tillage should be conducted prior to flowering and should be repeated periodically to deplete the seed bank. Mowing is generally not effective in controlling yellow star-thistle because mowed plants tend to grow more prostrate after intensive cuttings.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Yellow star-thistle and Malta star thistle no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces during bud or bloom stage (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Yellow Star-thistle

Maltese Star-thistle

Outline # 43	Installation: 63d RD	Date: January 2010

PEST: ALKALI MALLOW (*MALVELLA LEPROSA*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Mallows are best controlled through tillage or pulling out young plants. Cutting off young mallow at the crown can also kill the plant, but older plants may resprout from the crown. Mallows grow viable buds low to the ground which makes mowing a non-effective method of control.
Cultural Control	Grounds maintenance personnel	Plant competitive desirable plants in areas where mallow is a problem. Planting shade plants will reduce germination and growth of seedlings. Organic mulches (3” in depth) can also be effective.
Biological Control	NONE	

Chemical Techniques

Mallows are very difficult to control with chemical herbicides. Due to its erratic germination pattern, it is difficult to predict how to time herbicide applications on these weeds. Many herbicides for mallows will only result in a partial or limited control of that pest species. Mallows are one of the few weeds that glyphosate, the chemical agent in Roundup®, is ineffective on.

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Alkali mallow no longer exists in treated area.

Approved Herbicide	User and Source
Pre-emergent herbicide containing oryzalin applied to soil surfaces can partially control mallows (i.e. Surflan® A S, EPA Reg. No. 70506-44)	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until 3 months after use of pre-emergent herbicides.

Alkali Mallow

Outline # 44	Installation: 63d RD	Date: December 2009

PEST: FOUNTAIN GRASS (PENNISETUM SETACEUM) AND KIKUYUGRASS (PENNISETUM CLANDESTINUM)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand-weeding is the most effective method of control. Tilling is can be detrimental to control because it breaks rhizomes and transplants them to new areas. Make sure when hand-pulling that the whole root system has been pulled out of the ground. Mulching placed over strong landscape fabric can be effective if it is overlapped and no light is allowed to penetrate to the soil.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Fountain grass and kikuyugrass no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces for post-emergent control (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Pre-emergent herbicide containing oryzalin applied to soil (i.e. Surflan® A S, EPA Reg. No. 70506-44).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Kikuyugrass

Fountaingrass

Outline # 45	Installation: 63d RD	Date: December 2009

PEST: FRENCH BROOM (*GENISTA MONSPESSULANA*) AND SPANISH BROOM (*SPARTIUM JUNCEUM*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand pulling or mechanical grubbing (with a shovel, pick, or weed wrench) to physically remove smaller infestations is the most effective means of control. Early spring or late fall is when plants should be removed because soil is moist, and it is easy to dislodge the whole root system.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: French broom and Spanish broom no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces for post-emergent control (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides.

French Broom

Spanish Broom

Outline # 46	Installation: 63d RD	Date: December 2009

PEST: SWEET FENNEL (*FOENICULUM VULGARE*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. However, hand removal alone must be performed more than once in a growing season. Best timing for hand removal of herbaceous plant species is before flowering.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: When mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Sweet fennel no longer exists in treated area.

Approved Herbicide	User and Source
Non-selective herbicide containing glyphosate, (i.e. Roundup Pro®, EPA Reg. No. 524-475)	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides.

Sweet Fennel

Outline # 47	Installation: 63d RD	Date: December 2009

PEST: ICE PLANT (CARPOBROTUS CHILENSIS)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by pulling or cutting the vegetation with hand tools. Be sure to remove the whole underground root system. Pulled plants should be placed in a garbage bag and placed in a container for refuse collection. Pulling this plant will cause a lot of ground disturbance. To prevent invasion by other exotic species due to ground disturbance plant a more desirable plant(s) where the ice plant was recently pulled.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control Standards: Ice plant no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, non-selective herbicide containing isopropylamine salt of glyphosate, applied to plant leaf surfaces for post-emergent control (i.e. Roundup Pro®, EPA Reg. No. 524-475).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.
Pre-emergent herbicide containing oryzalin applied to soil (i.e. Surflan® A S, EPA Reg. No. 70506-44).	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by broadleaf weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides or 3 months after use of pre-emergent herbicides.

Ice Plant

Outline # 48	Installation: 63d RD	Date: December 2009

PEST: PAMPAS GRASS (*CORTADERIA SELLOANA*)	**SITE:** On facility grounds

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for vegetation growing.
Frequency: Ongoing. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Mechanical and Physical Control	Building occupants, contractors, or grounds maintenance personnel	Hand removal. Species can be removed from small areas by cutting the vegetation and digging up the complete root with hand tools. Best timing for hand removal of herbaceous plant species is before flowering. If plant has already flowered, seed heads must be tightly covered with a garbage bag before cutting to prevent seeds from being dispersed by the wind. Do not leave plant lying on the ground or it may take root and reestablish.
Cultural Control	NONE	
Biological Control	NONE	

Chemical Techniques

Basis for treatment: Mechanical methods have failed to control.
Responsible organization: Grounds maintenance personnel, pest management technicians, or contractors.
Control standards: Pampas grass no longer exists in treated area.

Approved Herbicide	User and Source
Translocated, non-selective herbicide containing isopropylamine salt of glyphosate, (i.e. Roundup Pro®, EPA Reg. No. 524-475) applied to plant leaf surfaces for post-emergent control	Applied by certified Pest Management Technician or grounds maintenance contractor. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Do not apply herbicides where spray drift can affect any desirable plants. Do not use herbicides where product may leach through soil to groundwater. See herbicide label for additional precautions.
Prohibited practices: To reduce runoff and effectiveness, do not apply herbicides if precipitation is anticipated within 6 hours.
Environmental concerns: Do not apply herbicides directly to water or wetlands. Do not contaminate water when cleaning equipment.
Additional comments: Good turf management practices involving mechanical and cultural control is essential in establishing and maintaining healthy turf that can resist invasion by weeds. Apply the herbicide product according to label recommendations. The local county extension agent can be contacted to determine dates for applying pre-emergent herbicides. Do not attempt seeding treated areas until at least 4 weeks after treatment with post-emergent herbicides.

Pampas Grass

Outline # 49	Installation: 63d RD	Date: December 2009

PEST: AQUATIC WEEDS	SITE: LAKES, PONDS AND DITCHES

Surveillance

Responsible organization: Incidental observations during area use. Grounds maintenance personnel conduct surveys when requested and during grounds maintenance operations. Natural Resources personnel conduct inspections during their fishery surveys. Pest management or grounds maintenance QAEs may survey for quality assurance of contracted pest management services.
Methods: Visual inspections for aquatic weed growth in bodies of water.
Frequency: Incidental observations by area users. During fishery duties by Natural Resources personnel or in response to complaints by anglers. Grounds maintenance personnel inspect when services are requested, during the performance of other services, or during planned surveys for weeds in high-profile sites. Surveys may include inspections conducted during the previous or current growing season to determine the need for control measures. Pest management or grounds maintenance QAEs inspect as follow-up after contract performance if complaints are received or as part of their quality assurance surveillance plan.

Non-chemical Techniques

Type	Responsible Organization	Method
Physical Control	NONE	
Mechanical Control	Natural Resource personnel or by contract.	Drag lines or backhoes are frequently used for mechanical control of aquatic weeds in ditches, canals, boat landings or shorelines. Mechanical harvesters will sometimes kill many small fish along with cutting the vegetation. A variety of floating, cutter and harvester machines can be used in many aquatic sites.
Cultural Control	NONE	

Type	Responsible Organization	Method
Biological Control	Natural Resources personnel	Aquatic weed control can be handled biologically with insects or plant-eating fish. Sterile grass carp may be introduced to reduce excessive aquatic vegetation. Insects have helped control some introduced weeds. For alligatorweed, three species have been released (*Agasicles hygrophila, Amynothrips andersoni, Arcola malloi*). For Hydrilla, four species have been released (*Bagous affinis*, *Hydrellia pakistanae*, *Hydrellia balciunasi*, *Hydrellia balciunasi*) with limited success. For water hyacinth, weevils (*Neochetina eichhorniae, Neochetina bruchi*) and a moth (*Niphograpta albiguttalis*) species have been released. For water lettuce, two species have been released. The *Neohydronomous affinis* has been successful, while *Spodoptera pectinicornis* have failed to establish in the U.S.

Chemical Techniques

Basis for treatment: Aquatic vegetation is too thick to navigate watercraft, impeding water circulation or inhibiting fish population growth.
Responsible organization: Contracted pest management technicians.
Control standards: Maintain aquatic vegetation so that it does not negatively impact water flow or water recreation and fishing activities.

Approved Herbicide	User and Source
Translocated herbicide containing glyphosate applied to emerged aquatic weeds (i.e. Rodeo, EPA Reg. No. 62719-324). Only effective in knocking back portions of plants growing above the waterline.	Applied by contracted pest management technicians. Herbicide product must be EPA registered for the application site.

Remarks

Sensitive areas: Avoid contact with foliage of desirable vegetation.
Prohibited practices: Refer to the product label directions, paying particular attention to any water runoff restrictions.
Environmental concerns: Contact State Natural Resources Division, Game and Fresh Water Fish Commission and water authorities in areas where control activities can affect public waters.
Additional comments: Non-chemical control should be considered first before any chemical control action is taken. Grass carp for restocking must be sterile (triploid) and obtained from sources approved by the Game and Fresh Water Fish. Restocking rates and frequency are determined by Natural Resources personnel.

APPENDIX G. STANDARD LIST OF PESTICIDES AVAILABLE TO DoD COMPONENTS AND AGENCIES

This Page Intentionally Left Blank

Standard List of Pesticides Available to DoD Components and Agencies

June 1, 2020

This list comprises the pesticides that the Armed Forces Pest Management Board (AFPMB) has approved for DLA Aviation/DSCR stockage. DoD policy (DoD Instruction 4150.07) requires that the use of most of these pesticides whether procured from DLA or locally, be pre-approved by a professional pest management consultant. This is usually done when the command pest management consultant approves the Installation's pest management plan, but can be approved on a case-by-case basis. DoD policy also requires that only trained and certified applicators may apply pesticides on DoD installations. Only authorized personnel should procure and use these pesticides. Note: For Contingencies, see the Contingency Pesticides List and AFPMB Technical Guide 24.

Table of Contents

Section	Product Type
1.	Herbicides/Fungicides
2.	Repellents
3.	Insecticides
4.	FIFRA 25(b) Exempt Pesticide Products
5.	Rodenticides
6.	Surfactants

Emergency Procurement of Pesticides and Pest Management Equipment

Pesticide Mode of Action (MOA) Code Definitions

1. Herbicides/Fungicides

The following herbicides must be applied by a DoD Certified Pesticide Applicator or under the direct supervision of a DoD Certified Pesticide Applicator.

NSN 6840-	Item Name (Alternative Trade Name)	MOA Code	Unit Package	AAC*	Price	UOI	DOD Users**
01-360-4741 SDS Label	Fungicide, Methylisothiocyanate, 97% (MITC-FUME) ***RESTRICTED USE PESTICIDE***	NA	18 tubes	J	47.03	CO	A, N, F
01-457-6588 SDS Label	Fungicide, Azoxystrobin, 50% (Heritage)	11	(6) 1 lb cont.	H	6566.10	BX	A, N, M
01-643-0704 SDS Label	Herbicide Aminocyclopyrachlor, 39.5% and Chlorsulfuron, 15.8% (Perspective)	O, B	(12) 1.25 lb bt	J	974.16	BX	A, N, M, F
01-643-0697 SDS Label	Herbicide Aminocyclopyrachlor, 39.5% and Metsulfuron methyl, 12.6% (Streamline)	O, B	(8) 3 lb bt	J	2191.86	BX	A, N, M, F
01-643-0702 SDS Label	Herbicide Aminocyclopyrachlor, 22.8%; Metsulfuron methyl, 7.3% and Imazapyr 31.6% (Viewpoint)	O, B	(8) 5 lb bt	J	2841.30	BX	A, N, M, F
01-561-9603 SDS Label	Herbicide, Aminopyralid, 40.6% (Milestone)	O	(2) 2.5 gal co	J	2951.95	BX	A, N, M, F
00-392-7593 SDS Label	Herbicide, Bromacil, 21.9% lithium salt of bromacil, liquid (Hyvar X-L)	C1	(4) 1 gal co	H	615.65	BX	A, F, M, N
01-408-9079 SDS Label	Herbicide, Bromacil, 80%, wettable powder (Hyvar-X)	C1	(12) 4 lb bags	H	2230.58	BX	A, M, N
01-005-7523 SDS Label	Herbicide, Diquat, 37.3%, water soluble liquid (Reward)	D	1 gal co	H	494.72	GL	F, N
00-815-2799 SDS Label	Herbicide, Diquat, 37.3%, water soluble liquid (Reward)	D	(2) 2.5 gal co	H	1051.39	BX	A, N, F
01-341-9346 SDS Label	Herbicide, Diuron, mínimum 80% diuron, granular	C2	25 lb bag	H	265.39	BG	A, N, F, M
00-001-7710 SDS Label	Herbicide, 40% bromacil, 40% diuron, granular (Krovar I DF)	C2,C1	6 lb bag	H	118.21	BG	A, N, F, M

01-630-3501 SDS Label	Herbicide, 40% bromacil, 40% diuron, granular (Krovar I DF)	C2,C1	25 lb bag	H	294.95	BG	F
01-356-6001 SDS Label	Herbicide, Fluridone, 5%, pellets (Sonar SRP)	F1	40 lb co	J	646.92	CO	A, N
01-356-8888 SDS Label	Herbicide, Fluridone 41.7% liquid (Sonar A.S.)	F1	1 qt co	H	1172.45	QT	A, N
01-525-5869 SDS Label	Herbicide, Imazapic ammonium salt 23.6% liquid (Plateau)	B	(2) 1 gal co	J	1428.84	BX	A, N, M, F
01-108-9578 SDS Label	Herbicide, Isopropylamine salt of glyphosate, 41%, water soluble liquid (Roundup Pro/Ranger Pro/Razor Pro/Glyfos Pro)	G	(2) 2.5 gal co	H	164.59	BX	A, N, F, M
01-388-0142 SDS Label	Herbicide, Isopropylamine salt of glyphosate, 41%, water soluble liquid (Roundup Pro/Ranger Pro/Razor Pro/Glyfos Pro)	G	30 gal drum	H	1062.34	DR	A, F, N
01-356-8893 SDS Label	Herbicide, Isopropylamine salt of glyphosate**,** 53.8**%**, water soluble liquid (Rodeo/Roundup Custom)	G	(2) 2.5 gal co	H	381.76	BX	A, F, M, N
01-377-7113 SDS Label	Herbicide, Isopropylamine salt of glyphosate, 2.0**%**, Pelargonic acid 2.0% (Roundup Ready-to-Use)	G	24 oz pump spray bottle	H	9.55	BT	N, F
01-399-0673 SDS Label	Herbicide, Ammonium salt of glyphosate, 73.3% and 2.9% Diquat dibromide, (Quik Pro)	G, D	5 pkg.	H	19.67	BX	A, F, M
01-545-4540 SDS Label	Herbicide, Ammonium salt of glyphosate, 73.3% and 2.9% Diquat dibromide, (Quik Pro)	G, D	6.8 lb co	H	198.67	CO	A, N, M, F
01-356-8902 SDS Label	Herbicide, Isopropylamine salt of Imazapyr, 26.7% (Arsenal Powerline)	B	(2) 2.5 gal co	H	2901.40	BX	A, N, F, M
01-532-5403 SDS Label	Herbicide, Isopropylamine salt of Imazapyr, 27.7% (Habitat)	B	(2) 2.5 gal co	H	2300.84	BX	A, N, M
01-318-7417 SDS Label	Herbicide, Oryzalin, 40.4% (Surflan A.S.)	K1	(2) 2.5 gal co	H	415.99	BX	A, N, F, M

00-145-0013 SDS Label	Herbicide, Prometon, 25% prometon, emulsifiable concéntrate (Pramitol 25E)	C1	(2) 2.5 gal co	H	281.26	BX	A, F, N
01-356-8891 SDS Label	Herbicide, Sulfometuron methyl, 75% (Oust XP)	B	48-oz co	H	280.11	CO	A, N, M
01-319-2890 SDS Label	Herbicide, Tebuthiuron, 80% (Spike 80 DF)	C2	4 lb bag	J	138.53	BG	A, N, F
01-457-6576 SDS Label	Herbicide, Tebuthiuron-Diuron, 1% Tebuthiuron, 3% Diuron (Spraykil SK-13)	C2	40 lb container	H	154.77	CO	A, N, M
01-552-1822 SDS Label	Herbicide, Triclopyr, 60.45% (Garlon 4 Ultra)	O	(2) 2.5 gal co	H	705.76	BX	A, N, M, F
00-577-4194 SDS Label	Herbicide, 2,4-Dichlorophenoxy-acetic acid (2,4-D), 67.2% oil miscible/water emulsifiable liquid (low volatile ester form)	O	(2) 2.5 gal co	H	215.49	BX	A, N, M
00-664-7060 SDS Label	Herbicide, 2,4-Dichlorophenoxy-acetic acid (2,4-D), 46.8% water soluble liquid (amine salt form)	O	(2) 2.5 gal co	H	143.19	BX	A, N, M
01-377-7110 SDS Label	Herbicide, 2,4-Dichlorophenoxy-acetic acid (2,4-D), 0.128%, 0.22% Mecoprop-p and 0.05% Dicamba water soluble liquid (Weed-B-Gon)	O	24-oz pump spray bottle	H	12.09	BT	F, N

2. Repellents							
The following repellents must be applied by trained personnel or a DoD certified pesticide applicator.							
01-334-2666 SDS Label	Insect Repellent, clothing application, 40% permethrin, liquid (2-Gal sprayer)	3A	(12) 151 ml bt	H	141.16	BX	A, N, F, M
Click here for guidance regarding uniform retreatment using permethrin							

All DoD personnel following label and SDS familiarization may apply the following repellents.							
01-284-3982 SDS Label	Insect Repellent, personal application, Ultrathon (3M)	NA	(12) 2 oz tubes	H	90.18	BX	A, N, F, M
01-278-1336 SDS Label	Insect Repellent, clothing application, aerosol (Permethrin Arthropod Repellent)	3A	(12) 6 oz cans	H	72.64	BX	A, N, F, M
01-137-8456 SDS Label	Insect Repellent, personal application, 5% benzocaine, 10% precipitated sulfur (Chigg-Away)	NA	118 ml bt	H	6.16	BT	A, N, F, M
01-345-0237 SDS Label	Insect Repellent, clothing application, permethrin (IDA)	3A	12 kits	H	47.40	BX	A, N, F, M
01-584-8393 SDS Label	Insect Repellent, personal application, 30% DEET (SP532-Ultra30, Liposome formulation)	NA	(12) 2 oz tubes	H	75.15	BX	A, N, M, F
01-584-8598 SDS Label	Insect Repellent, personal application, 25% DEET, pump spray bottles (Cutter Backwoods Insect Repellent)	NA	(12) 6 oz bt	H	74.44	BX	A, N, F, M
01-619-4795 SDS Label	Insect Repellent, personal application, 20% Picaridin, pump spray bottle (NATRAPEL Insect Repellent)	NA	(12) 3.4 oz bt	H	109.27	BX	A, N, M, F
01-656-7707 SDS Label SDS Label	Insect Repellent, 20% IR3535 pump spray bottle (Bullseye Bug Repellent or Coleman 7466-1)	NA	(12) 4 oz bt	D	68.84	BX	A, N, F, M

3. Insecticides							
The following insecticides must be applied by a DoD certified pesticide applicator or under the direct supervision of a DoD certified pesticide applicator.							
01-642-8892 SDS Label	Insecticide, Acetamiprid 4.4% (End Zone Insecticide Stickers)	4A	(12) pkg of 20 stickers per pkg	J	601.71	BX	A, N, F, M
01-543-0662 SDS Label	Insecticide, Abamectin, 0.011%, (Advance 360A Dual Choice Ant Bait Stations)	6	72 bait stations	H	104.44	BX	A, N, M, F

01-561-9766 SDS Label	Insecticide, Abamectin, 0.05% (Avert Dry Flowable Cockroach Bait)	6	(12) 30 gram tubes	H	432.45	BX	A, N, M, F
01-561-9649 SDS Label	Insecticide, Abamectin, 0.05% (Avert Cockroach Bait Stations)	6	4 bags. Each bag contains 72 bait stations	H	181.49	BX	A, N, F, M
00-145-0016 SDS Label	Insecticide, Aluminum phosphide, 55 % tablets (Phostoxin/Fumitoxin) ***RESTRICTED USE PESTICIDE***	24A	100 tablets	H	39.14	CN	A, N, F
00-442-5698 SDS Label	Insecticide, Aluminum phosphide, 55 % pellets (Phostoxin/Fumitoxin) ***RESTRICTED USE PESTICIDE***	24A	1660 pellets	H	71.04	BT	A, N, F, M
01-377-7049 SDS Label	Insecticide, *Bacillus thuringiensis*, 10.31% (Summit BTI Briquets)	11A	100 Briquets	H	122.09	BX	A, N, F, M
01-565-8243 SDS Label	Insecticide, *Bacillus thuringiensis,* subspecies *israelensis*, strain AM 65-52, 2.8% (VectoBac GR)	11A	40 lb bag	J	119.74	BG	A, N, F, M
01-565-8241 SDS Label	Insecticide, *Bacillus thuringiensis*, subspecies *israelensis*, strain AM 65-52, 37.4%% (VectoBac WDG)	11A	(24) 1 lb bags/co	H	1338.08	CO	A, N, M, F
01-287-3938 SDS Label	Insecticide, Boric Acid, 35.5% aerosol (Perma-Dust)	8D	(12) 9 oz cans	Y	112.65	BX	A, N, F, M
01-525-6888 SDS Label	Insecticide, Bifenthrin, 7.9% liquid (Talstar P Professional)	3A	1-qt co	H	63.46	QT	A, N, M, F
01-104-0887 SDS Label	Insecticide, Carbaryl, 43%, liquid (Carbaryl 4L)	1A	(2) 2.5 gal co	H	384.99	BX	F, N
01-525-7139 SDS Label	Insecticide, Chlorfenapyr, 21.45% liquid (Phantom)	13	(4) 75 oz co	H	1145.02	BX	A, N, F, M
01-313-7359 SDS Label	Insecticide, Beta-Cyfluthrin, 11.8% (Tempo SC Ultra)	3A	(12) 240 ml bt	H	625.84	BX	A, N, F, M
01-383-6251 SDS Label	Insecticide, Beta-Cyfluthrin, 10% (Tempo Ultra WSP)	3A	(32) 50 gm packs	H	467.92	BX	A, N, F, M
01-561-9717 SDS Label	Insecticide, Cyfluthrin, 0.1%, aerosol (PT Cy-Kick CS)	3A	(12) 17.5 oz cans/box	H	187.60	BX	A, M, F, N

01-561-9669 SDS Label	Insecticide, Lambda-cyhalothrin, 0.05% aerosol (PT 221L Residual)	3A	(12) 17.5 oz cans/box	H	162.22	BX	A, M, N, F
01-390-4822 SDS Label	Insecticide, Cypermethrin, 40% (Demon WP)	3A	1 lb jar	H	60.39	LB	A, N, M
01-573-5024 SDS Label	Insecticide, Deltamethrin, 0.03% (Kills Bedbugs II)	3A	(4) 1 gal jugs	J	107.44	BX	A, N, M
01-431-3345 SDS Label	Insecticide, Deltamethrin, 0.05% (DeltaDust)	3A	1 lb co	H	22.09	LB	A, N, F, M
01-642-9286 SDS Label	Insecticide, Deltamethrin, 0.1% granules (DeltaGard G)	3A	20 lb bag	J	180.80	BG	A, N, F, M
01-561-9745 SDS Label	Insecticide, Deltamethrin, 0.06%, aerosol (D-Force)	3A	8 x 14 oz cans/box	H	142.50	BX	A, N, M, F
00-142-9438 SDS Label	Insecticide, Dichlorvos, 20% (Hot Shot No-Pest Strips)	1B	48 strips	H	224.16	BX	A, N, F, M
01-603-5650 SDS Label	Insecticide, Dichlorvos, 20% (NUVAN PROSTRIPS + 65 Gram)	1B	6 packs per box (3 strips per pack)	H	427.99	BX	A, N, M, F
01-603-5654 SDS Label	Insecticide, Dichlorvos, 20% (NUVAN PROSTRIPS 16 Gram)	1B	6 packs per box (12 strips per pack)	J	507.38	BX	A, N, M
01-628-4751 SDS Label	Insecticide, Dichlorvos,10.75% (Ovitrap Mosquito Trap-N-Kill)	1B	12 traps per box	J	113.77	BX	A, F, N, M
01-647-8840 SDS Label	Insecticide, 0.5% Dichlorvos (Nuvan Directed Spray Aerosol)	1B	(12) 17 oz aerosols per box	J	507.38	BX	A, N, M, F
01-647-8844 SDS Label	Insecticide, 0.50% Dinotefuran, 0.04% (Z)-9-Tricosene (Quikstrike Fly Bait)	4A	5 lb co	J	36.53	CO	A, N, M, F
01-412-4634 SDS Label	Insecticide, D-Phenothrin, 2%, (Black Knight Roach Killer) aerosol	3A	12 oz can	H	19.31	CN	A, N, F, M
01-675-2534 SDS Label	Insecticide, 2% Permethrin aerosol, US DoD use only, (Callington Aircraft Insecticide) *****FOR USE IN UNOCCUPIED US**	3A	(12) 100 gram cans per box	D	508.05	BX	A, N, F, M

	DoD AIRCRAFT INTERIORS ONLY* **						
66-131-2263 SDS Label	Insecticide, D-Phenothrin 2% and Permethrin 2% (Callington 1-Shot Aircraft Insecticide) *****FOR USE IN DISINSECTION OF AIRCRAFT CARGO HOLDS ONLY*****	3A	150 gram can	H	50.62	CN	N, F
01-586-8718 SDS Label	Insecticide, 0.125% d-Phenothrin, 0.1% Prallethrin, aerosol (Raid House & Garden Bug Killer)	3A	15 oz can	H	7.73	CN	A, N, M, F
01-067-2137 SDS Label	Insecticide, d-trans Allethrin 0.125%, Resmethrin 0.2%, aerosol (Kill Zone House & Garden Insect Killer Formula 4)	3A	14 oz can	Y	3.60	CN	A, N, F, M
01-573-4964 SDS Label Supplemental	Insecticide, Etofenprox, 20% (Zenivex E20)	3A	(2) 2.5 gal co	H	2817.87	BX	A, N, M
01-619-6396 SDS Label	Insecticide, Etofenprox 1.0%, Pyrethrins 0.15%, Tetramethrin 0.5% and Piperonyl Butoxide 1.5% (Zenprox Aerosol)	3A	(6) 16 oz cans	H	96.94	BX	A, N, F, M
01-183-7244 SDS Label	Insecticide, Methomyl, 1%, (Z)-9-Tricosene, 0.049%, fly bait (Golden Malrin/Stimukil)	1A	5 lb can	Y	21.71	CN	A, N, F, M
01-667-4358 SDS Label	Insecticide, Methomyl, 1%, (Z)-9-Tricosene, 0.049% Fly Bait, (Golden Malrin/Stimukil)	1A	10 lb co	Z	41.60	CO	A, N, M, F
01-287-3913 SDS Label	Insecticide, Hydramethylnon, 0.73% (Amdro Fire Ant Bait; PROBAIT Fire Ant Bait)	20A	(12) 6 oz bt	H	270..35	BX	A, N, F, M
01-501-2905 SDS Label	Insecticide, (S)-Hydroprene, 90.6% (Gentrol Point Source)	7A	20 devices/box	H	42.68	BX	A, M, N
01-585-9976 SDS Label	Insecticide, (S)-Hydroprene, 0.36%(Gentrol Aerosol)	7A	(12) 16 oz cans	H	195.33	BX	A, N, M F

01-424-2494 SDS Label	Insecticide, Fenoxycarb, 1% (Award Brand of Logic)	7B	25 lb bag	H	433.06	BG	A, N, F, M
01-585-9950 SDS Label	Insecticide, Fipronil, 0.0143% (Topchoice Fire Ant Granules) ***RESTRICTED USE PESTICIDE***	2B	50 lb bag	H	294.94	BG	A, N, M, F
01-224-1269 SDS Label	Insecticide, Fipronil, cockroach, large size 0.03 % (COMBAT MAX Roach Killing Bait Stations)	2B	8 bait stations/box/12 boxes	H	169.43	PG	A, N, F, M
01-180-0167 SDS Label	Insecticide, Fipronil, cockroach, regular size 0.03% (COMBAT MAX Roach Killing Bait Stations)	2B	12 bait stations/box/12 boxes	H	160.43	PG	A, N, F, M
01-483-3065 SDS Label	Insecticide, Fipronil 0.01% (Maxforce FC Roach Killer Bait Gel)	2B	(24) 60 gram reservoirs/box	H	353.09	BX	A, N, M
01-471-5650 SDS Label	Insecticide, Fipronil 0.01% (Maxforce FC Roach Killer Bait Gel)	2B	(4) 30 gram reservoirs/box	H	30.00	BX	N, M
01-500-4579 SDS Label	Insecticide, Fipronil 0.001% (Maxforce Carpenter Ant Bait Gel)	2B	4 reservoirs/box	H	34.15	BX	A, N, M
01-602-8269 SDS Label	Insecticide, Fipronil 0.05% (Maxforce FC Magnum Roach Killer Bait Gel)	2B	12-33 gram reservoirs per box	H	174.65	BX	A, N, M, F
01-298-1122 SDS Label	Insecticide, Fipronil 0.01% (MaxForce FC Ant Bait Stations)	2B	96 stations	H	126.88	PG	A, N, F, M
01-483-3072 SDS Label	Insecticide, Fipronil 80% (Termidor 80WG)	2B	24 co/box	H	3796.26	BX	A, N, M
01-483-3068 SDS Label	Insecticide, Fipronil 9.1% (Termidor SC)	2B	(4) 78 oz bt/box	H	1172.64	BX	A, N, M
01-318-7416 SDS Label	Insecticide, (S)-Hydroprene, 9.0%, emulsifiable concentrate (Gentrol IGR)	7A	(10) 1 oz bt	H	75.36	BX	A, N, F, M
01-591-2150 SDS Label	Insecticide, Imidacloprid 21%, beta-Cyfluthrin 10.5% (Temprid SC)	4A, 3A	400 ml co	H	149.05	CO	A, N, F, M
01-642-9292 SDS Label	Insecticide, Imidacloprid 0.05% and beta-Cyfluthrin 0.025% (Temprid Ready-To-Spray)	4A, 3A	15 fl oz	Z	23.07	CN	A, N, F, M

01-518-5807 SDS Label	Insecticide, Imidacloprid 0.5%, (Z)-9-Tricosene 0.1% (Maxforce Granular Fly Bait)	4A	5 lb co	H	53.14	CO	A, N, F, M
01-555-9369 SDS Label	Insecticide, Imidacloprid 10%, (Z)-9-Tricosene 0.1% (Maxforce Fly Spot Bait)	4A	(50) 2 oz pkg/box	H	333.37	BX	A, N, M, F
01-457-6580 SDS Label	Insecticide, Imidacloprid, 0.5% granular (Merit 0.5 g)	4A	30 lb bag	H	228.31	BG	A, N, F, M
01-647-8857 SDS Label	Insecticide, Imidacloprid, 0.025% (Kaput Rodent Flea Control Bait) ***RESTRICTED USE PESTICIDE***	4A	25 lb co	J	101.48	CO	A, N, M, F
01-428-6646 SDS Label	Insecticide, Lambda-cyhalothrin, 9.7% (Demand CS)	3A	(8) 8 oz bt	H	459.11	BX	A, N, M
00-655-9222 SDS Label	Insecticide, Malathion, 57.0%, emulsifiable concentrate, class 2	1B	1 gal co	H	69.54	GL	A, N, F, M
00-685-5438 SDS Label	Insecticide, Malathion, 57.0%, emulsifiable concentrate, class 2	1B	5 gal can	Y	284.17	CN	A, N, F, M
00-926-1481 SDS Label	Insecticide, Malathion, 96.5%, liquid, (Fyfanon ULV)	1B	54 gal drum	H	3938.02	DR	A, N, F, M
01-169-1842 SDS Label	Insecticide, Malathion, 96.5%, liquid, (Fyfanon ULV)	1B	5 gal can	H	354.66	CN	A, N, F, M
01-424-2495 SDS Label	Insecticide, (S)-Methoprene 2.1% (Altosid XR Briquets)	7A	220 briquettes	H	1016.25	BX	A, N, F, M
01-511-0535 SDS Label	Insecticide, (S)-Methoprene 4.25% (Altosid Pellets)	7A	(2) 22 lb co/box	H	2092.27	BX	A, N, F, M
01-424-2493 SDS Label	Insecticide, (S)-Methoprene 20% (Altosid Liquid Larvicide Conc.)	7A	(2) 2.5 gal co	H	9247.64	BX	A, N, F, M
01-591-2155 SDS Label	Insecticide, (S)-Methoprene 0.085%, Permethrin 0.35%, Phenothrin 0.3%, N-octyl bicycloheptene dicarboximide 2%, and Piperonyl butoxide 1.75% (Precor 2000 Plus)	7A	12 aerosols/box	H	225.94	BX	A, N, M, F
01-270-9765 SDS Label	Insecticide, Naled, 87.4%, liquid (Dibrom)	1B	30 gal drum	H	7461.67	DR	A, F, N

01-532-5414 SDS Label	Insecticide, Naled, 78%, liquid (Trumpet EC)	1B	30 gal drum	J	8791.60	DR	A, N, F, M
00-597-6111 SDS Label	Insecticide, Naphthalene 99.95%, ball form (Enoz Old Fashioned moth balls)	NA	14 oz box	H	7.34	BX	A, N, F, M
01-467-0994 SDS Label	Insecticide, Nithiazine 1%, Fly Strips (Quikstrike), 2 strips per package	4A	(12) pkg/box	H	265.58	BX	A, N, F
00-174-1825 SDS Label	Insecticide, P-Dichlorobenzene 99.9%, crystal/flake (Enoz moth ice crystals)	NA	100 lb drum	J	382.20	DR	A, N, F
00-174-1824 SDS Label	Insecticide, P-Dichlorobenzene 99.9%, crystal GSA (Enoz moth ice crystals)	NA	1 lb can	J	17.04	LB	N, F
01-606-8581 SDS Label	Insecticide, Permethrin-Piperonyl Butoxide (20.6+ 20.6%), All Pro Aqualuer 20-20	3A	(2) 2.5 gal co/box	H	1511.87	BX	A, N, F, M
01-550-5660 SDS Label	Insecticide, Permethrin-Piperonyl Butoxide (4.6+4.6%), (Kontrol 4-4)	3A	(2) 2.5 gal co	H	140.44	BX	A, N, F, M
01-104-0780 SDS Label	Insecticide, Pyrethrins, 3% with synergists, liquid (ULV fog concentrate)	3A	1 gal bt	H	226.91	GL	A, N, F, M
00-459-2443 SDS Label	Insecticide, Prallethrin 0.1% aerosol (Wasp-Freeze II)	3A	(12) 17.5 oz cans	H	127.88	BX	A, N, F, M
00-823-7849 SDS Label	Insecticide, Pyrethrins 0.5%, Piperonyl butoxide 1% and N-octyl bicycloheptene dicarboximide 1%, aerosol (PT 565 Plus XLO)	3A	(12) 20 oz cans	H	277.47	BX	A, N, F
01-359-8533 SDS Label	Insecticide, Resmethrin 4%, Piperonyl butoxide 12.42% (Scourge) *****RESTRICTED USE PESTICIDE*****	3A	5 gal can	Y	757.78	CN	A, N, F
01-457-6583 SDS Label	Insecticide, Spinosad, 11.6% (Conserve SC)	5	1 quart co	H	218.71	QT	A, N, M
01-617-0886 SDS Label	Insecticide, Spinosad, 0.50% and (Z)-9-tricosene (Pheromone), 0.04% (Conserve Fly Bait)	5	4 lb co	J	35.28	CO	N, M, F
01-474-7751 SDS Label	Insecticide, Sumithrin-Piperonyl Butoxide, 10%-10%, (Anvil 10+10 ULV)	3A	(2) 2.5 gal co/box	H	2336.38	BX	A, M, N

01-474-7706 SDS Label	Insecticide, Sumithrin-Piperonyl Butoxide, 10%-10%, (Anvil 10+10 ULV)	3A	250 gal co	J	----------	CO	A, N
01-657-8033 SDS Label	Insecticide, Tau-fluvalinate, 22.3% liquid (Mavrik Perimeter)	3A	8 oz co	Z	49.37	CO	A, N, F, M
01-424-3132 SDS Label	Insecticide, Temephos, 45% (ALLPRO Provect 4E Larvicide)	1B	2.5 gal co	H	1566.66	CO	A, N, F, M
01-652-1530 SDS Label	Mosquito Larvicide, Mineral Oil, 10% (CocoBear Oil)	NA	(2) 2.5 gal co/box	J	202.95	BX	A, N, F, M

4. FIFRA 25(b) Exempt Pesticide Products							
The following are FIFRA 25(b) exempt pesticides that have been approved by the AFPMB for stock listing.							
01-607-0000 SDS Label	Insecticide, Thyme Oil, 4.1%; (TyraTech Tech Dust Natural Insecticide)	NA	10 lb pail	J	86.25	CO	A, N, M

5. Rodenticides							
The following rodenticides must be applied by trained personnel or a DoD certified pesticide applicator.							
00-089-4664 SDS Label	Rodenticidal Bait, Anticoagulant, 0.005% Diphacinone (Ditrac/Ramik), blocks	1st Gen	40 blocks	H	114.10	BX	A, N, F, M
01-577-2202 SDS Label	Rodenticide, Anticoagulant, (Kaput Combo Bait Pellets), 0.020% Imidacloprid and 0.025% Warfarin	1st Gen	250 packets/box	H	174.73	BX	A, N, F, M
01-598-2617 SDS Label	Rodenticidal Bait, Anticoagulant, 0.005% Bromadiolone (Maki), pellets	2nd Gen	175 pkgs/co	Y	155.00	CO	A, N, M. F
01-666-3395 SDS Label	Rodenticidal Bait, Anticoagulant, 0.005% Bromadiolone (Maki-87112), pellets	2nd Gen	4 pails each w/ 75 place packs per box	H	192.80	BX	A, N, F, M
01-598-4840 SDS Label	Rodenticidal Bait, Anticoagulant, 0.005% Brodifacoum (Talon-G), pellets	2nd Gen	2 pails each w/150 pkgs per box	H	169.65	BX	A, N, M, F
01-501-2858 SDS Label	Rodenticidal Bait, Anticoagulant, 0.005% Bromadiolone, (Contrac Blox), 1 oz. bait blocks	2nd Gen	18 lb co	H	91.96	CO	A, N, M, F
01-503-5348 SDS Label	Rodenticidal Bait, Anticoagulant, 0.005% Brodifacoum, (Final Blox), 20-gram bait blocks	2nd Gen	18 lb co	H	115.75	CO	A, M, N
00-753-4972 SDS Label	Rodenticide, Anticoagulant, concentrate 0.106% sodium salt of diphacinone (LIQUA-TOX II)	1st Gen	50 pouches	V	36.10	BX	A, N, F, M
01-598-4844 SDS Label	Rodenticide, Anticoagulant, concentrate 0.106% sodium salt of diphacinone (LIQUA-TOX II)	1st Gen	4 pkgs per box w/8 packets per pkg	H	123.06	PG	A, N, M, F
01-435-9318 SDS Label	Rodenticide, 10% zinc phosphide (ZP Tracking Powder) ***RESTRICTED USE PESTICIDE***	Non	(4) 500 g bt	H	46.53	BX	N

01-619-6419 SDS Label	Rodenticide, Anticoagulant, Difethialone 0.0025% (First Strike Soft Bait Rodenticide)	2nd Gen	16 lb co	H	216.89	CO	A, N, M, F

6. Surfactants							
Surfactants are not pesticides, but are wetting agents that lower the surface tension, allowing easier spreading, and lower the interfacial tension between two liquids. Some pesticides, particularly herbicides, either require the use of a surfactant or performance may be improved by the addition of a surfactant. Refer to the pesticide label to determine if a surfactant is recommended by manufacturer.							
01-546-3053 SDS Label	Surfactant, Pesticide, Spray Adjuvant (Cygnet Plus)	NA	(2) 2.5 gal co	H	142.32	BX	A, N, M, F
01-356-8896 SDS Label	Surfactant, Pesticide, Spray Adjuvant (Cide-Kick II)	NA	(2) 2.5 gal co	H	251.77	BX	A, N, M, F
01-356-8897 SDS Label	Surfactant, Pesticide, Spray Adjuvant (Cide-Kick)	NA	(2) 2.5 gal co	H	228.79	BX	A, N, M, F

*Acquisition Advice Codes (AAC)

D. DoD Integrated Material Manager (IMM) Stocked, and Issued. Issue, transfer, or shipment is not subject to specialized controls other than those imposed by the Integrated Material Manager/Military Service supply policy.
   1. The item is centrally managed, stocked, and issued.
   2. Requisitions will be submitted in accordance with Military Service requisitioning procedures.

G. General Services Administration (GSA) Integrated Material Managed, Stocked and Issued. Identifies GSA managed items available from GSA Supply Distribution Facilities. Requisitions and fund citations will be submitted in accordance with GSA/Military Service requisitioning procedures.

H. Central Contract - Not Stocked Item. Direct delivery under central contract # (non-stocked items) issue, transfer, or shipment is not subject to specialized controls other than those imposed by IMM/Service/Agency supply policy.
   1. The item is centrally managed and procured.
   2. Normal issue is by direct shipment from the vendor to the user at the order of the ICP or IMM. However, orders for quantities less than the vendor's minimum order of quantity may be issued from stock by ICP or IMM supply distribution facilities.
   3. Requisitions and fund citations will be submitted in accordance with IMM/Service/Agency requisitioning procedures.
   4. Generally, delivery will be made within applicable Service/Agency guidelines addressing customer-required time frame.

I. Direct Ordering from a Central Contract/Schedule. Issue, transfer, or shipment is not subject to specialized controls other than those imposed by Integrated Material Manager/Military Service supply policy. The item is covered by a centrally issued contractual document, or by a multiple award Federal Supply schedule for GSA managed items, which permits using activities to place orders on vendors for direct delivery to the user.

J. Not Stocked, Controlled Procured. Identifies IMM/Military Service centrally managed but not stocked items. Long lead times must be anticipated, since procurement will be initiated only after receipt of a requisition. Requisitions will be submitted in accordance with IMM/Military Service requisitioning procedures.

K. Centrally Stocked for Overseas Only. Main means of supply is local purchase. Item is stocked in domestic supply system for those overseas activities unable to procure locally due to non-availability of procurement sources or where local purchase is prohibited. Requisitions will be submitted by overseas activities in accordance with Service/Agency requisitioning procedures. NOTE: CONUS activities will obtain supply support through local procurement procedures.

L. Local Purchase. IMM/Military Service managed items authorized for local purchase, as a normal means of support, by the Military Service, or base, post, camp, or station level. Items not stocked in wholesale distribution system of IMM/Military Service ICP. The local purchase forms authorized by the individual IMM/Military Service must be used. NOTE: GSA FSS items are included.

V. Terminal Item. Identifies items in stock; but future procurement is not authorized. Requisitions may continue to be submitted until stocks are exhausted. Preferred items National Stock Number (NSN) normally provided by the application of the phrase, "When Exhausted Use (NSN)". Requisitions will be submitted in accordance with IMM/Military Service requisitioning procedures as applicable.

X. Semiactive Item-No Replacement. A potentially inactive NSN which must be retained in the supply system as an item of supply because (1) stocks of the item are on hand or in use below the wholesale level and (2) the NSN is cited in equipment authorization documents TO&E, TA, TM, etc. or in-use assets are being reported.
   1. Items are authorized for central procurement but not authorized for stockage at wholesale level.
   2. Requisitions for in-use replacement will be authorized in accordance with individual Military Service directives.
   3. Requisitions may be submitted as requirements generate. Repetitive demands may dictate at ACC change to permit Wholesale stockage.

Y. Terminal Item. Further identifies AAC V items on which wholesale stocks have been exhausted. Future procurement not authorized.
   1. Requisitions will not be processed to the wholesale suppliers.
   2. Internal Services' requisitioning may be continued in accordance with Military Service requisitioning policies.

Z. Insurance/Numeric Stockage Objective Item. Items, which may be required occasionally or intermittently and prudence requires that a nominal quantity of material be stocked due to the essentiality or the lead-time of the item.
   1. The item is centrally managed, stocked and issued.
   2. Requisitions will be submitted in accordance with IMM/Military Service requisitioning procedures.

**User Code A = Army, N = Navy, F = Air Force, M = Marines, SOS (DSCR-Richmond/DLA Aviation) = SMS

Emergency Procurement of Pesticides and Pest Management Equipment

The Defense Logistics Agency (DLA) has established Emergency Supply Operations Center (ESOC) to provide equipment and supplies to deploying forces with urgent requirements and in a timely manner.

For insect repellents, pesticides, pesticide application equipment, personal protection equipment (bednets, head nets, *etc*.) and respirators:

Contact the DLA Customer Interaction/Contact Center at Tel: 1-877-352-2255 or DSN: 661-7766. They are open 24/7/365 days a year for all customer inquiries and submittal of requisitions. Email and related contact info is listed below:

Email Address: DLAContactCenter@dla.mil
Phone: 1-877-352-2255
Phone: 269-961-7766
DSN: 661-7766
Fax: 269-961-7791
DSN Fax: 661-7791

For technical/quality/logistical/ordering inquires/questions: contact the DLA Chemist/Product Manager at (804) 279-3995, DSN: 695-3995. Normal business hours are 0800-1700 hours weekdays EST.

Pesticide Mode of Action (MOA) Codes

Fungicide Resistance Action Committee (FRAC)			
Code	**Mode of Action**	**Chemical Class**	**Physiological Functions Affected**
11	Complex III of fungal respiration	Methoxyacrylates	Respiration
NA	Not assigned		

Herbicide Resistance Action Committee (HRAC)			
Code	**Mode of Action**	**Chemical Class**	**Physiological Functions Affected**

B	Inhibition of ALS (branched chain amino acid synthesis)	Imidazolinones and Sulfonylureas	Cell metabolism
C1, C2	Inhibition of photosynthesis at PS II	Uracils and Ureas	Light processes
D	PS I electron diversion	Bipyridyliums	Light processes
F1	Inhibition of PDS	Other (PDS)	Light processes
G	Inhibition of EPSP synthase	Glycines	Cell metabolism
K1	Inhibition of microtubule assembly	Dinitroanilines	Growth/Cell division
O	Synthetic auxin	Phenoxy-carboxylic acids, Pyridine-carboxylic acids, Pyrimidine carboxylic acids	Growth/Cell division

Insecticide Resistance Action Committee (IRAC)			
Code	**Mode of Action**	**Chemical Class**	**Physiological Functions Affected**
1A, 1B	Acetylcholinesterase (AChE) inhibitors	Carbamates, Organophosphates	Nerve and muscle
2B	GABA-gated chloride channel blockers	Phenylpyrazoles	Nerve and muscle
3A	Sodium channel modulators	Pyrethroids	Nerve and muscle
4A	Nicotinic acetylcholine receptor (nAChR) competitive modulators	Neonicotinoids	Nerve and muscle
5	Nicotinic acetylcholine receptor (nAChR) allosteric modulators	Spinosyns	Nerve and muscle
6	Glutamate-gated chloride channel (GluCl) allosteric modulators	Avermectins	Nerve and muscle
7A, 7B	Juvenile hormone mimics	Juvenile Hormone Analogues, Fenoxycarb	Growth
8D	Miscellaneous non-specific (multi-site) inhibitors	Borates	Unknown or non-specific
11A	Microbial disruptors of insect midgut membranes	Bacillus thuringiensis and	Midgut

		the insecticidal proteins produced	
13	Uncouplers of oxidative phosphorylation via disruption of the proton gradient	Chlorfenapyr	Respiration
20A	Mitochondrial complex III electron transport inhibitors	Hydramethylnon	Respiration
24A	Mitochondrial complex IV electron transport inhibitors	Phosphides	Respiration
NA	Not assigned		

Rodenticide Resistance Action Committee (RRAC)			
Code	**Mode of Action**	**Chemical Class**	**Physiological Functions Affected**
1st Gen	First generation anticoagulant. All anticoagulant rodenticides have the same mode of action, they inhibit the synthesis of vitamin K-dependent clotting factors, which results in hemorrhaging and death. One of the series of rodenticide active substances invented, mainly during the 1950s and 1960s, the first of which was warfarin. The most commonly used of these compounds are chlorophacinone and diphacinone (1,3-indandiones) and coumachlor, coumatetralyl, and warfarin (4-hydroxycoumarins).	Indandiones, Hydroxycoumarins	Blood clotting
2nd Gen	Second generation anticoagulant. All anticoagulant rodenticides have the same mode of action, they inhibit the synthesis of vitamin K-dependent clotting factors, which results in hemorrhaging and death. Invented mainly during the 1970s and 1980s, in response to the development of resistance to compounds of the first-generation. The five second-generation anticoagulants are (in order of their chronological introduction) difenacoum, bromadiolone, brodifacoum, flocoumafen (4-hydroxycoumarins) and difethialone (4-thiochromenones). Difenacoum and bromadiolone are sometimes called 'multi-feed' compounds because rodents usually require more than one feeding for a	Hydroxycoumarins, Thiochromenones	Blood clotting

	lethal effect. The other three compounds, brodifacoum, flocoumafen and difethialone, are called 'single feed' because often one feed is sufficient for lethality.		
Non	Non-anticoagulant. Upon ingestion of Zinc phosphide the toxic gas phosphine will be produced. The mode of action of phosphine is by inhibition of cytochrome C oxidase, which is vital to mitochondrial respiration, and will cause damage to internal organs and heart failure. Non-anticoagulants are generally acute acting substances unaffected by physiological resistance to anticoagulants and therefore present useful options for resistance management. However, they are mainly older products, with higher toxicity and the main drawback of many of them is that they are not as reliably effective as anticoagulants.	Phosphides	Respiration

In order to provide the most current information to the DoD Pest Management Community, the Armed Forces Pest Management Board and DLA Aviation/Defense Supply Center Richmond (DSCR) jointly publish this list. Comments and questions are welcome. Please send them to:

E-mail: osd.pentagon.ousd-atl.mbx.afpmb@mail.mil
Telephone: Commercial (301) 295-7476, DSN 295-7476
Fax: Commercial (301) 295-7473
Mail: Armed Forces Pest Management Board
Attn: Equipment Committee Ex-Officio
US Army Garrison Forest Glen
2460 Linden Lane, Bldg. 172
Silver Spring, MD 20910

APPENDIX H. DoD CONTINGENCY PESTICIDES

This Page Intentionally Left Blank

DoD Contingency Pesticides

May 28, 2020

This DoD Contingency Pesticides list provides basic information on pesticides approved by the Armed Forces Pest Management Board (AFPMB) Contingency Advisory Committee for control of disease vectors and pests during military deployments field operations worldwide. Pesticides should be used only as a part of an integrated pest management program (IPM). IPM is an approach that combines a variety of control techniques – including physical, mechanical, educational, biological, and chemical – to prevent disease and injury or economic loss due to vector arthropods and pests. Since pesticides are usually a last resort, the IPM approach reduces our dependency on pesticides and reduces the health and environmental risks associated with pesticide treatments.

Most pesticides in this list and addressed in AFPMB TG 24, "Contingency Pest Management Guide," should only be applied by personnel (i.e., preventive medicine or pest control personnel) who have been formally trained and certified in accordance with DoD Manual 4150.07-Vol1 "DoD Pest Management Training and Certification Program: The DoD Plan for Pesticide Applicators," May 23, 2013. All other personnel should not procure or use pesticides unless specifically authorized by Service instructions, regulations, or directives.

This list is maintained and periodically reviewed by the Armed Forces Pest Management Board's Pesticides Committee. Users are encouraged to submit notice of errors and additional information to the Armed Forces Pest Management Board by e-mail at osd.pentagon.ousd-atl.mbx.afpmb@mail.mil; or by telephone at (301) 295-7476 or DSN 295-7476; fax at (301) 295-7473; or mail to: Armed Forces Pest Management Board, Attn: Equipment Committee Ex-Officio, US Army Garrison Forest Glen, 2460 Linden Lane, Bldg 172, Silver Spring, MD 20910; and to DLA Aviation, ATTN: FAJA, 8000 Jefferson Davis Hwy, Richmond, VA 23297-5809.

Disclaimer

The Contingency Pesticides list does not constitute procurement authority for materiel listed herein. Use of trade names in this list is solely for the purpose of providing specified information to aid in the identification of specific products and does not imply endorsement of the products named or criticism of products not mentioned. Products mentioned in this list do not constitute a guarantee or warranty of these products by the AFPMB, the Military Departments, or the DoD.

Table of Contents

Section	Product Type
1.	Herbicides
2.	Repellents
3.	Insecticides
4.	Rodenticides

Recording, Reporting, and Archiving Pesticide Use During Contingency Operations

Shipping Information

Assistance with Contingency Operations (including emergency requisition of pesticides)

Defense Support to Civil Authorities (DSCA)

1. Herbicides

The following herbicides must be applied by a DoD certified pesticide applicator or under the direct supervision of a DoD Certified pesticide applicator.

Nomenclature	U/I	AAC[1]	Price[2]	NSN
Herbicide, Isopropylamine salt of glyphosate 41%, water soluble liquid (Roundup Pro, EPA Reg. No. 524-475; Ranger Pro, EPA Reg. No. 524-517; Razor Pro, EPA Reg. No. 228-366; Glyfos Pro, EPA Reg. No. 67760-57), (2) 2.5 gal containers per box Proper Shipping Name – N/A (not DOT-regulated), Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	164.59	6840-01-108-9578

Herbicide, Ammonium salt of glyphosate 73.3%, Diquat dibromide 2.9%, (Quik Pro, EPA Reg. No. 524-535), 5 packages per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	19.67	6840-01-399-0673

2. Repellents

The following repellent must be applied by trained personnel or a DoD certified pesticide applicator.

Nomenclature	U/I	AAC	Price	NSN
Insect Repellent, Permethrin 40%, Clothing Application, Emulsifiable Concentrate (2-Gal sprayer) (Insect/Arthropod Repellent Fabric Treatment, EPA Reg. No. 63120-1), (12) 151 ml bottles per box Proper Shipping Name – FLAMMABLE LIQUIDS, N.O.S. (contains insecticide – Permethrin and petroleum naphtha) Hazard Class – 3, UN/ID Number – UN1993, PG – III, DOT Label – Limited Quantity, FLAMMABLE LIQUID SDS Label **Click here for guidance regarding uniform retreatment using permethrin**	BX	H	141.16	6840-01-334-2666
All DoD personnel following label and SDS familiarization may apply the following repellents.				
Insect Repellent, Permethrin 0.5%, Clothing Application, Aerosol (Permethrin Insect Repellent, EPA Reg. No. 50404-6-58188), (12) 6 oz cans per box Proper Shipping Name – AEROSOLS, NON-FLAMMABLE, N.O.S. (contains insecticide – Permethrin, each not exceeding 1 L capacity Hazard Class 2.2, UN/ID Number – UN1950, PG – III, DOT Label – NONFLAMABLE	BX	H	72.64	6840-01-278-1336

GAS SDS Label				
Insect Repellent, DEET 34.34%, Personal Application, Lotion (Ultrathon, EPA Reg. No. 58007-1), (12) 2 oz tubes per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	90.18	6840-01-284-3982
Insect Repellent, Permethrin 40%, Clothing Application, Emulsifiable Concentrate (IDA Kit, EPA Reg. No. 63120-3), 12 kits per box Proper Shipping Name – FLAMMABLE LIQUID, N.O.S. (contains insecticide – Permethrin and petroleum naphtha) Hazard Class – 3, UN/ID Number – UN1993, PG – III, DOT Label – Limited Quantity, FLAMMABLE LIQUID SDS Label	BX	H	47.40	6840-01-345-0237
Insect Repellent, Picaridin 20%, Personal Application, Pump Spray (Natrapel, EPA Reg. No. 56575-15), (12) 3.4 oz bottles per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	109.27	6840-01-619-4795
Insect Repellent, DEET 30%, Personal Application, Lotion (Ultra 30 Insect Repellent Lotion, EPA Reg. No. 82810-1-58188), (12) 2 oz tubes per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	75.15	6840-01-584-8393
Insect Repellent, DEET 25%, Personal Application, Pump Spray (Cutter Backwoods Insect Repellent Pump Spray, EPA Reg. No. 305-61-121), (12) 6 oz bottles per box	BT	H	74.44	6840-01-584-8598

Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label				
Insect Repellent, IR3535 20%, Personal Application, Pump Spray (Bullseye Bug Repellent, EPA Reg. No. 70759-3-90867; Coleman SkinSmart Insect Repellent, EPA Reg. No. 70759-3-79533), (12) 4 oz bottles per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label (Bullseye) SDS Label (Coleman)	BT	D	68.84	6840-01-656-7707

3. Insecticides

The following insecticides must be applied by a DoD certified pesticide applicator or under the direct supervision of a DoD Certified pesticide applicator.

Nomenclature	U/I	AAC	Price	NSN
Insecticide, *Bacillus thuringiensis* subspecies *israelensis* strain AM 65-52 2.8% (VectoBac GR, EPA Reg. No. 73049-486), 40 lb bag Proper Shipping Name – N/A (not subject to regulations as HAZMAT when in non-bulk packages Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label –N/A SDS Label	BG	J	119.74	6840-01-565-8243
Insecticide, Bifenthrin 7.9% Liquid (Talstar P Professional, EPA Reg. No. 279-3206), 1 quart container Proper Shipping Name – N/A (not subject to regulations as HAZMAT when in non-bulk packages	QT	H	63.46	6840-01-525-6888

Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label –N/A SDS Label				
Insecticide, Beta-Cyfluthrin 10% (Tempo Ultra WSP, EPA Reg. No. 432-1377), (32) 50 gram packs per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	467.92	6840-01-383-6251
Insecticide, Cypermethrin 40% (Demon WP, EPA Reg. No. 100-990), 1 lb jar Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	LB	H	60.39	6840-01-390-4822
Insecticide, Deltamethrin 0.05% (DeltaDust, EPA Reg. No. 432-772), 1 lb container Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	LB	H	22.09	6840-01-431-3345
Insecticide, Deltamethrin 0.03% (Kills Bedbugs II, EPA Reg. No. 45385-97-56), (4) 1 gal jugs per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	J	107.44	6840-01-573-5024
Insecticide, Etofenprox 20% (Zenivex E20, EPA Reg. No. 2724-791), (2) 2.5 gal containers per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	2,817.87	6840-01-573-4964

Insecticide, Etofenprox 1.0%, Pyrethrins 0.15%, Tetramethrin 0.5% and Piperonyl Butoxide 1.5% (Zenprox Aerosol, EPA Reg. No. 2724-675) Proper Shipping Name – N/A (not DOT-regulated), (6) 16 oz cans per box Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	96.94	6840-01-619-6396
Insecticide, (S)-Hydroprene 0.36% (Gentrol Aerosol, EPA Reg. No. 2724-484), (12) 16 oz cans per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	195.33	6840-01-585-9976
Insecticide, (S)-Methoprene 2.1% (Altosid XR Extended Residual Briquets, EPA Reg. No. 2724-421), 220 briquettes per box Proper Shipping Name – N/A (not DOT-regulated Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	1,016.25	6840-01-424-2495
Insecticide, (S)-Methoprene 20% (Altosid Liquid Larvicide Concentrate, EPA Reg. No. 2724-446), (2) 2.5 gal containers per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	9,247.64	6840-01-424-2493
Insecticide, Naled 87.4%, Liquid (Dibrom Concentrate, EPA Reg. No. 5481-480), 30 gal drum Proper Shipping Name – Organophosphorus pesticides, liquid, toxic (Naled) Hazard Class – 6.1, UN/ID Number – UN3018, PG – III, DOT Label – TOXIC SDS Label *****RESTRICTED USE PESTICIDE*****	DR	H	7,461.67	6840-01-270-9765 **Operational Note: For Use in U.S. Air Force Aerial Spray Systems Only**

Insecticide, Naled 78%, Liquid (Trumpet EC, EPA Reg. No. 5481-481), 30 gal drum Proper Shipping Name – Organophosphorus pesticides, liquid, toxic (Naled) Hazard Class – 6.1, UN/ID Number – UN3018, PG – III, DOT Label – TOXIC SDS Label *****RESTRICTED USE PESTICIDE*****	DR	J	8,791.60	6840-01-532-5414 **Operational Note: For Use in U.S. Air Force Aerial Spray Systems Only**
Insecticide, Permethrin 4.6%, Piperonyl Butoxide 4.6% (Kontrol 4-4, EPA Reg. No. 73748-4), (2) 2.5 gal containers per box Proper Shipping Name – Environmentally hazardous substance, liquid, N.O.S. (Permethrin) Hazard Class – 9, UN/ID Number – UN3082, PG – III, DOT Label – Class 9 SDS Label	BX	H	1,511.87	6840-01-550-5660
Insecticide, Sumithrin 10%, Piperonyl Butoxide 10% (Anvil 10+10 ULV, EPA Reg. No. 1021-1688-8329), (2) 2.5 gal containers per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	2,336.38	6840-01-474-7751
Insecticide, Pyrethrins 3% with Synergists, Liquid (Pyronyl UL-300 Oil Concentrate, EPA Reg. No. 89459-27; ULD BP-300, EPA Reg. No. 499-522; Pyrethrins Fogging Concentrate 3610, EPA Reg. No. 6218-56), 1 gal bottle Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	GL	H	226.91	6840-01-104-0780

Insecticide, Resmethrin 4.14%, Piperonyl Butoxide 12.42% (Scourge, EPA Reg. No. 432-716), 5 gal can Proper Shipping Name – N/A (not DOT regulated) Hazard Class – N/A, UN/ID # N/A, PG – N/A, DOT Label – N/A SDS Label *****RESTRICTED USE PESTICIDE*****	CN	V	757.78	6840-01-359-8533
Insecticide, Malathion 96.5%, Liquid (Fyfanon ULV Mosquito Insecticide, EPA Reg. No. 279-3539), 5 gal can Proper Shipping Name – Environmentally Hazardous Substance, Liquid, N.O.S. (Malathion) UN3082, PG III Hazard Class – 9, UN/ID Number – UN3082, PG – III, DOT Label – N/A SDS Label	CN	H	354.66	6840-01-169-1842
Insecticide, Fipronil 80% (Termidor 80 WG, EPA Reg. No. 7969-209), 24 containers per box Proper Shipping Name – N/A (Not DOT regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	3,796.26	6840-01-483-3072
The following insecticides must be applied by trained personnel or a DoD certified pesticide applicator.				
Insecticide, *Bacillus thuringiensis* 10.31% (Summit B.t.i. Briquets, EPA Reg. No. 6218-47), 100 briquettes per box Proper Shipping Name – N/A (not DOT regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label N/A SDS Label	BX	H	122.09	6840-01-377-7049
Insecticide, Imidacloprid 0.5%, (Z)-9-Tricosene 0.1% (Maxforce Granular Fly Bait, EPA Reg. No. 432-1375), 5 lb container Proper Shipping Name – N/A (not DOT-regulated)	CO	H	53.14	6840-01-518-5807

Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label				
Insecticide, Methomyl 1%, (Z)-9-Tricosene 0.049%, Fly Bait (Golden Malrin, EPA Reg. No. 2724-274; Stimukil, EPA Reg. No. 53871-3), 5 lb can Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	CN	V	21.71	6840-01-183-7244
Insecticide, Methomyl 1%, (Z)-9-Tricosene 0.049%, Fly Bait (Golden Malrin, EPA Reg. No. 2724-274; Stimukil, EPA Reg. No. 53871-3), 10 lb container Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label (Golden Malrin) SDS Label (Stimukil)	CO	Z	41.60	6840-01-667-4358
Insecticide, Fipronil 0.01% (Maxforce FC Roach Killer Bait Gel, EPA Reg. No. 432-1259), (24) 60 gram reservoirs per box Proper Shipping Name – N/A (not DOT-regulated), Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	353.09	6840-01-483-3065
Insecticide, Fipronil 0.01% (Maxforce FC Roach Killer Bait Gel, EPA Reg. No. 432-1259), (4) 30 gram reservoirs per box. Use w/ syringe NSN 3740-01-483-3012 Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	30.00	6840-01-471-5650
All DoD personnel following label and SDS familiarization may apply the following insecticides.				
Insecticide, D-Phenothrin 2%, Aerosol (Black Knight Roach Killer, EPA Reg. No. 901-	CN	H	19.31	6840-01-412-4634

82), 12 oz can Proper Shipping Name – AEROSOLS, NONFLAMMABLE, N.O.S., (containing substances in Division 6.1), PG III Hazard Class – 2.2, UN/ID Number – UN1950, PG – III, DOT Label – NONFLAMMABLE GAS SDS Label				
Insecticide, D-Phenothrin 2%, Permethrin 2%, Aerosol (Callington 1-Shot Aircraft Insecticide, EPA Reg. No. 83795-1), 150 gram can Hazard Class – 2.2, UN/ID Number – UN1950, PG –III, DOT Label – NONFLAMMABLE GAS SDS Label *****FOR USE IN DISINSECTION OF AIRCRAFT CARGO HOLDS ONLY*****	CN	H	50.62	6840-66-131-2263
Insecticide, Permethrin 2%, Aerosol, US DoD Use Only (Callington Aircraft Insecticide, EPA Reg. No. 88144-1), (12) 100 gram cans per box Hazard Class – 2.2, UN/ID Number – UN1950, PG –III, DOT Label – NONFLAMMABLE GAS SDS Label *****FOR USE IN UNOCCUPIED US DoD AIRCRAFT INTERIORS ONLY*****	BX	D	508.05	6840-01-675-2534
Insecticide, Prallethrin 0.1% Aerosol (PT Wasp-Freeze II, EPA Reg. No. 499-550), (12) 17.5 oz cans per box Proper Shipping Name – CONSUMER COMMODITY Hazard Class – ORM-D, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	127.58	6840-00-459-2443
Insecticide, Fipronil 0.01% (MaxForce FC Ant Bait Stations, EPA Reg. No. 432-1256), 96 stations per package Proper Shipping Name – CONSUMER COMMODITY Hazard Class – ORM-D, UN/ID Number – N/A, PG – N/A, DOT Label – N/A	PG	H	126.88	6840-01-298-1122

SDS Label				
Insecticide, Fipronil 0.03%, Cockroach, Large Size (COMBAT MAX Roach Killing Bait Stations, EPA Reg. No. 64240-34), 12 boxes of 8 bait stations each per package Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	PG	H	169.43	6840-01-224-1269
Insecticide, Fipronil 0.03%, Cockroach, Regular Size (COMBAT MAX Roach Killing Bait Stations, EPA Reg. No. 64240-33), 12 boxes of 12 bait stations each per package Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	PG	H	160.43	6840-01-180-0167

4. Rodenticides

The following rodenticides must be applied by trained personnel or a DoD certified pesticide applicator.

Nomenclature	U/I	AAC	Price	NSN
Rodenticidal Bait, Anticoagulant, Diphacinone 0.005% (Ditrac Super Size Blox, EPA Reg. No. 12455-14; Ramik Bars, EPA Reg. No. 61282-12), 40 blocks per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	114.10	6840-00-089-4664
Rodenticide, Anticoagulant, Concentrate, Sodium Salt of Diphacinone 0.106% (LIQUA-TOX II, EPA Reg. No. 12455-61), 50 pouches per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A	BX	V	36.10	6840-00-753-4972

SDS Label				
Rodenticidal Bait, Anticoagulant, Imidacloprid 0.02%, Warfarin 0.025% (Kaput Combo Bait Pellets, EPA Reg. No. 72500-13), 250 packets per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	174.73	6840-01-577-2202
Rodenticide, Anticoagulant, Concentrate, Sodium Salt of Diphacinone 0.106% (LIQUA-TOX II, EPA Reg. No. 12455-61), 4 packs of 8 packets each per package Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	PG	H	123.06	6840-01-598-4844
Rodenticidal Bait, Anticoagulant, Brodifacoum 0.005% (Talon-G Rodenticide Bait Pack Mini-Pellets, EPA Reg. No. 100-1050), 2 pails of 150 place packs each per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	169.65	6840-01-598-4840
Rodenticidal Bait, Anticoagulant, Bromadiolone 0.005% (Maki Pellets Place Packs, EPA Reg. No. 7173-188), 4 pails of 75 place packs per box Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	BX	H	192.80	6840-01-666-3395
Rodenticidal Bait, Anticoagulant, Bromadiolone 0.005% (Maki Pellets Place Packs, EPA Reg. No. 7173-188), 175 packages per container Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	CO	V	155.00	6840-01-598-2617

Rodenticide, Anticoagulant, Difethialone 0.0025% (First Strike Soft Bait, EPA Reg. No. 7173-258), 16 lb container Proper Shipping Name – N/A (not DOT-regulated) Hazard Class – N/A, UN/ID Number – N/A, PG – N/A, DOT Label – N/A SDS Label	CO	H	216.89	6840-01-619-6419

Recording, Reporting, and Archiving Pesticide Use During Contingency Operations

Paragraph 5.4.6, DoD Instruction 4150.07, "DoD Pest Management Program," May 29, 2008, instructs the following: Record and permanently archive all pesticide applications, except skin and clothing arthropod repellents, performed during military deployments using the Defense Occupational Environmental and Health Readiness System (DOEHRS), the DoD Integrated Pest Management Information System (IPMS), or the AFPMB-approved Excel DD Form 1532-1 located on the AFPMB webpage at: http://www.acq.osd.mil/eie/afpmb/docs/standardlists/dd1532-1.xlsx

Shipping Information

Refer to the interservice AFM 24-204/Army TM 38-250/NAVSUP PUB 505/MCO P4030.19J/DLAI 4145.3, "Preparing Hazardous Materials for Military Air Shipments," 3 December 2012, for guidance on air transportation of pesticides. The International Air Transportation Association's "Shippers Declaration for Dangerous Goods" form must be used for air transport of those pesticides, which are regulated. Service Focal Points jointly establish procedures and prepare documentation necessary to implement the manual. In accordance with paragraph 1.2.2, of the manual, users should contact their Service Focal Points for all clarification and waivers. Service Focal Points are:

Army

US Army Material Command
Logistics Support Activity

Packaging, Storage, and Containerization Center
ATTN: AMXLS-AT
11 Hap Arnold Blvd, Tobyhanna PA 18466-5097
(570) 895-7070/6408, DSN: 795-7070/6408.

Navy

Commander, Naval Inventory Control Point
Code 0772.19
P.O. Box 2020
5450 Carlisle Pike, Mechanicsburg, PA 17055-0788
(717) 605-4527, DSN: 430-4527.

Air Force

Air Force Global Logistics Support Center (AFGLSC)
401st Supply Chain Management Squadron (401 SCMS/GUMA)
5375 Chidlaw Rd, Wright-Patterson AFB, OH 45433-5540
(937) 257-4503/1984, DSN: 787-4503/1984.

Marine Corps

Commandant of the Marine Corps (LPD)
Headquarters, U.S. Marine Corps
3000 Marine Corps Pentagon, Washington, DC 20350
(703) 695-7930, DSN: 225-7930.

Defense Logistics Agency

Defense Logistics Agency
Attn: J3731

8725 John J. Kingman Road, Suite 4330
Fort Belvoir VA 22060-6221
(703) 767-6582, DSN: 427-6582.

Shipping papers are required for all hazardous materials in transit and should be within the reach of transport drivers/operators at all times. Information contained on the shipping papers includes: proper shipping name, hazard class, and UN identification number, reportable quantity (RQ) if applicable, and package quantities or weight.

Marking regulations require information on the specific hazardous material to be visible or "marked" on the outside of the package. Information required to be marked on the packages includes proper shipping name, UN identification number and consignors or consignee's name.

Packages containing hazardous materials must have the appropriate Department of Transportation (DOT) Label attached to the outside container. For additional instructions, refer to Attachment 15, "Labeling Hazardous Materials," in AFJM 24-204/TM 38-250/NAVSUP PUB 505/MCO P4030-19G/DLAI 4145.3.

Shipping information provided is believed to be current but may be incomplete due to revisions and/or not applicable to all conditions or situations that may exist or occur. Users must verify the suitability of the shipping information listed below prior to use.

Assistance with Contingency Operations

Deploying forces often need pesticides and equipment on short notice. The Defense Logistics Agency (DLA) has established Emergency Supply Operations Center (ESOC) to provide equipment and supplies to deploying forces with urgent requirements and in a timely manner.

For insect repellents, pesticides, pesticide application equipment, personal protection equipment (bednets, head nets, *etc*.) and respirators, contact the DLA Customer Interaction/Contact Center at Tel: 1-877-352-2255 or DSN: 661-7766. They are open 24/7 365 days a year for all customer inquiries and submittal of reqns. Email and related info is listed below:

Email Address: DLAContactCenter@dla.mil

Phone: 1-877-352-2255
Phone: 269-961-7766
DSN: 661-7766
Fax: 269-961-7791
DSN Fax: 661-7791

For technical/quality/logistical/ordering inquires/questions, contact the DLA Chemist/ Product Manager at (804) 279-3995, DSN: 695-3995. Normal business hours are 0800-1700 hours' weekdays EST.

AFPMB Technical Guide 24, "Contingency Pest Management Guide." (TG 24) is intended for field use by deployed forces during contingency operations and exercises. It provides basic information on using pesticides and pest management equipment to control disease vectors and pests during field operations worldwide.

Most of the pesticides listed above, and addressed in AFPMB TG 24, should only be applied by preventive medicine personnel or pest control personnel who have been formally trained and certified in accordance with DoD Manual 4150.07 "DoD Pest Management Training and Certification Program: The DoD Plan for Pesticide Applicators," May 23, 2013. All other personnel should not procure or use pesticides unless specifically authorized by Service instructions, regulations, or directives.

You may obtain copies of TG 24 and other AFPMB publications by writing to: The Armed Forces Pest Management Board, U.S. Army Garrison Forest Glen, 2460 Linden Lane, Bldg 172, Silver Spring, MD, or calling DSN 295-7476 or commercial (301) 295-7476. You may also electronically access AFPMB publications via the AFPMB home page: http://www.acq.osd.mil/eie/afpmb

If additional information is needed to clarify specific issues, contact the AFPMB, Contingency Liaison Officer by writing to AFPMB, ATTN: Contingency Liaison Officer, Armed Forces Pest Management Board, U.S. Army Garrison Forest Glen, 2460 Linden Lane, Bldg 172, Silver Spring, MD 20910, or calling DSN 295-7476 or commercial (301) 295-7476.

Defense Support to Civil Authorities (DSCA)

Defense Support to Civil Authorities (DSCA) is outlined in DoD Directive 3025.18, December 29, 2010, Incorporating Change 1, September 21, 2012, http://www.dtic.mil/whs/directives/corres/pdf/302518p.pdf . Follow Chain of Command guidance and ensure proper coordination prior to rendering any support.

DoD Humanitarian Assistance (HA) and/or Disaster Relief (DR) support to civilian authorities under FIFRA jurisdiction and outside of DoD facilities may require use of pesticides not on either list in paragraph E above or the Standard Pesticide List. Each state requires state EPA registration of any pesticide authorized for use within its jurisdiction. Therefore, pesticides applied by DoD certified personnel off DoD facilities for DSCA support must be products that are registered for use within that state. It is recommended that the state Public Health Department be contacted for a list of state authorized pesticides prior to ordering and applying any pesticides. This does not apply to pesticides applied on DoD facilities that may be within the area affected by the DR/HA.

To confirm the state registration of a pesticide and for help contacting state and local public health and environmental authorities during Contingency Operations within the CONUS, including the District of Columbia, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any territory or possession of the United States or any political subdivision thereof: contact the DoD Pesticide Hotline at (410) 436-3773, DSN: 584-3773 during normal business hours 0900-1700 weekdays EST. If calling outside normal business hours contact the U.S. Army Public Health Command Staff Duty Officer at (410) 436-4375, DSN: 584-4375.

---

[1] Acquisition Advice Codes (AAC):

Code D: DoD Integrated Material Manager (IMM) Stocked, and Issued. Issue, transfer, or shipment is not subject to specialized controls other than those imposed by the Integrated Material Manager/Military Service supply policy.
1. The item is centrally managed, stocked, and issued.
2. Requisitions will be submitted in accordance with Military Service requisitioning procedures.

Code H: Central Contract – Not Stocked Item. Direct delivery under central contract # (non-stocked items) issue, transfer, or shipment is not subject to specialized controls other than those imposed by IMM/Service/Agency supply policy.
1. The item is centrally managed and procured.
2. Normal issue is by direct shipment from the vendor to the user at the order of the ICP or IMM. However, orders for quantities less than the vendor's minimum order quantity may be issued from stock by ICP or IMM supply distribution facilities.

3. Requisitions and fund citations will be submitted in accordance with IMM/Service/Agency requisitioning procedures.
4. Generally, delivery will be made within applicable Service/Agency guidelines addressing customer required delivery time frame.

Code J: Not Stocked, Controlled Procured. Identifies IMM/Military Service centrally managed but not stocked items. Long lead times must be anticipated, since procurement will be initiated only after receipt of a requisition. Requisitions will be submitted in accordance with IMM/Military Service requisitioning procedures.

Code L: Local Purchase. IMM/Military Service-managed items authorized for local purchase, as a normal means of support, by the Military Service, or base, post, camp, or station level. Items not stocked in wholesale distribution system of IMM/Military Service ICP. The local purchase forms authorized by the individual IMM/Military Service must be used. NOTE: GSA FSS items are included.

Code Z: Insurance/Numeric Stockage Objective Item. Items, which may be required occasionally or intermittently and prudence requires that a nominal quantity of material be stocked due to the essentiality or the lead-time of the item. The item is centrally managed, stocked and issued. Requisitions will be submitted in accordance with IMM/Military Service requisitioning procedures.

[2] Prices listed are current and subject to change. Prices are provided as a reference benchmark.

APPENDIX I. AFPMB TECHNICAL GUIDE NO. 41 PROTECTION FROM RODENT-BORNE DISEASES WITH SPECIAL EMPHASIS ON OCCUPATIONAL EXPOSURE TO HANTAVIRUS

This Page Intentionally Left Blank

Armed Forces Pest Management Board

TECHNICAL GUIDE NO. 41

PROTECTION FROM RODENT-BORNE DISEASES

WITH SPECIAL EMPHASIS ON OCCUPATIONAL EXPOSURE TO HANTAVIRUS

Published and Distributed by the
Defense Pest Management Information Analysis Center
Forest Glen Section
Walter Reed Army Medical Center
Washington, DC 20307-5001

Office of the Deputy Under Secretary of Defense
(Environmental Security)

December 2013

TECHNICAL GUIDE NO. 41

PROTECTION FROM RODENT-BORNE DISEASES

TABLE OF CONTENTS

ACKNOWLEDGMENTS ii

DISCLAIMER ii

FOREWORD iii

CHAPTER 1 - Rodent-Borne Diseases 1

CHAPTER 2 - About Hantaviruses 11

CHAPTER 3 - Hantavirus Risk Reduction 19

CHAPTER 4 - Precautions for Personnel Camping, Hiking, or Conducting other Outdoor Activities 23

CHAPTER 5 - Decontamination of Traps and Disposal of Dead Rodents 25

CHAPTER 6 - Protection for Personnel Inspecting or Working in Rodent-Contaminated Buildings and Structures 27

CHAPTER 7 - Cleanup Procedures for Rodent-Contaminated Buildings 30

CHAPTER 8 - Personal Protection for Workers Involved with Surveillance for Rodent-Borne Diseases 32

CHAPTER 9 - Personal Protection and Decontamination of Workers Involved in Processing Rodents for Diseases and Workers Cleaning Rodent-Infested Buildings 37

APPENDIX A – References 44

APPENDIX B - Respirators and HEPA Filters Available through the Paperless Order Placement System (POPS) 45

APPENDIX C - Health and Safety Plan for Hantavirus Surveys and Rodent Cleanup Operations 46

APPENDIX D - Hantavirus Safety Briefing 52

APPENDIX E - Disposal of Waste Generated During Hantavirus Surveys 57

APPENDIX F - Hantavirus Prevention: Cleanup of Rodent Contamination.....59

ACKNOWLEDGMENTS

The AFPMB acknowledges and thanks Mr. F.J. Harrison, Jr., for preparing this document; Mr. William Irwin for providing information on hantavirus surveillance; and members of the Rodent and Tick-Borne Disease Subcommittee and the AFPMB staff for reviewing drafts. MAJ Richard Johnson provided final editing and publication preparation. Special thanks are given to Dr. Brian Hjelle, University of New Mexico School of Medicine, for his continuing guidance and information on hantaviruses in the Americas.

DISCLAIMER

Trade names are used in this Technical Guide (TG) to provide specific information and do not imply endorsement of the products named or criticism of similar ones not mentioned. Mention of trade names does not constitute a guarantee or warranty of the products by the AFPMB, the Military Services, or the Department of Defense (DoD).

FOREWORD

This document provides guidance on the protection of individuals from rodent-borne diseases. Information on diseases associated with rodents is presented in tabular form. Rodents may serve as reservoirs for diseases that are transmitted though contact with contaminated food and water by arthropods. Rodents may also transmit diseases through direct contact with humans, such as through bites, or though aerosolization of excreta and body fluids. Prevention of these diseases involves vector control and good sanitation practices. A great amount of literature has been devoted to protection against rodent-associated diseases that are transmitted by vectors or unsanitary conditions. The contents of this manual address the prevention of diseases caused by hantaviruses, which are spread through inhalation or ingestion of materials contaminated with rodent saliva, urine, or feces. Although these diseases are relatively uncommon, the high fatality rate of hantaviruses in the Americas, and the inability to determine from visual observation infected from noninfected rodents, heighten the awareness that must accompany rodents. Because the hantavirus threat was not recognized in 1993, information on rodent hosts and disease distribution, as well as prevention strategies aimed at reducing the incidence of hantavirus pulmonary syndrome, has been limited by time and available technologies. Personal protection measures against hantaviruses are presented for a variety of military situations involving contact with rodents or rodent contamination. Since individuals on military installations may not be able to determine the presence or absence of hantaviruses in every situation involving rodents, the universal use of the precautions in this manual should afford adequate protection.

In light of the current pace of research on rodent-borne diseases, I fully expect that our Board will need to revise this TG in a relatively short time. Your constructive comments are most welcome and will be given full consideration in the updating of this document.

Stanton E. Cope, PhD
Captain, Medical Service Corps, US Navy
Director
Armed Forces Pest Management Board

CHAPTER 1

RODENT-BORNE DISEASES

1. Rodents are involved in the transmission of a variety of diseases found around the world. Although the roles that rodents play in the maintenance and spread of these diseases will vary depending on the disease and the geographic region, certain patterns of involvement emerge.

a. Rodents may serve as intermediate hosts for parasites that ultimately infect man. Although the rodents themselves pose no direct threat to humans, their presence in a geographic region may play a key role in perpetuating infectious organisms that pose a health threat to people in the area. For example, capillariasis, a human liver disease, caused by the adult worm *Capillaria hepatica*, is primarily an infection in rats.

b. Rodents may serve as reservoirs of disease agents (e.g., Lyme disease spirochete, *Borrelia burgdorferi*) that are picked up by arthropod vectors and transmitted to humans through bites. In this case, direct contact with the rodent or its excreta pose no health risk; however, the rodent maintains the disease in the geographic area.

c. Rodents may not only serve as reservoirs but may also play a key role in the transmission of the disease. Hantavirus is a good example of this scenario. There is no vector. The disease agent, a virus, is found in the saliva, urine and feces of the infected rodent. Spread to humans is via inhalation of aerosolized excreta, ingestion of excreta, or by direct contact with the rodent itself.

d. Rodents may directly transmit a pathogen to man through bites, as is the case in rat bite fever.

2. Tables 1-1 and 2-1 list the majority of diseases associated with rodents around the world. These lists are intended to form the basis for further investigation of the risks associated with rodents in areas of the world where US forces may already be located or may be deployed. Further information on rodent-borne or rodent-associated diseases should be sought prior to movement into a given area of the world. Some of the sources listed below should be consulted to broaden knowledge of the health risks associated with rodents.

a. DVEPs - Disease Vector Ecology Profiles, available through the Armed Forces Pest Management Board – DSN 295-7476 or commercial (301) 295-7476.

b. DEARs- Disease and Environmental Alert Reports available through the National Center for Medical Intelligence (NCMI), Fort Detrick, MD, formerly the Armed Forces Medical Intelligence Center (AFMIC).

c. FM 8-33, Control of Communicable Diseases Manual, 18th ed., 2004. D. L. Heymann (*ed*.), Amer. Public Health Assn., Washington, DC. 700 pp. This reference may be obtained through military or public health channels.

d. USACHPPM TG No. 103, Prevention and Control of Plague, September 1995.

e. USACHPPM TG No. 138, Guide to Commensal Rodent Control, December 1991.

f. Medical Entomology personnel located within the various services:

(1) The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), DSN 584-3613 or commercial (410) 671-3613 (http://phc.amedd.army.mil/).

(2) The Navy and Marine Corps Public Health Center (NMCPHC), DSN: 253-5500 or commercial: (757) 762-5500, (http://www-nehc.med.navy.mil/prevmed)

and the Navy Entomology Center of Excellence (NECE), NAS Jacksonville, FL, DSN: 942-2424 or commercial: (904) 542-2424.

(3) The Air Force School of Aerospace Medicine, Brooks City-Base, TX - DSN: 240-2058 or commercial: (210) 536-2058 .

g. The U. S. Centers for Disease Control and Prevention (http://www.cdc.gov):

(1) Atlanta, GA – telephone: (404) 639-3311.

(2) Fort Collins, CO - telephone: (970) 221-6400.

h. World Health Organization - WHO Bulletins can be found in most reference libraries or from their webpage (http://www.who.int).

i. State and local health departments - information can usually be obtained by contacting the State Epidemiologist or Vector Control Specialist.

j. National and local health officials in the host country.

Table 1-1. Diseases Associated with Rodents.*

DISEASE	RODENT	TRANSMISSION	REGION
Group C Virus Disease - Apeu, Caraparu, Itaqui, Madrid, Marituba, Marutucu, Nepuyo, Oriboca, Ossa, Restan	Rodents serve as reservoirs	Bite of infective mosquito - *Aedes* and *Culex* (*Melanoconion*)	Tropical South America, Panama, and Trinidad
Omsk Hemorrhagic Fever	Rodents and shrews serve as reservoirs	Bite of infective ticks - *Dermacentor reticulatus* (*pictus*) and *D. marginatus*	Forest steppe region of Siberia, within the Omsk, Novosibirsk, Kurgan and Tjumen regions
Kyasanur Forest Disease	Rodents, shrews and monkeys serve as reservoirs	Bite of infective ticks - esp. *Haemaphysalis* spp.	Kyasanur Forest of the Shimoga and Kanara Districts of Karnataka, India
Babesiosis	Rodents serve as reservoirs for *B. microti* (and the related species *B. divergens* in Europe)	Bite of nymphal *Ixodes scapularis* ticks that have fed on infected rodents - other *Ixodes* spp. in the West (and *I. ricinus*, in Europe)	United States - Northeast, Wisconsin, California, Washington, and Mexico (lesser-known but related *Babesia* spp. occur in Europe, Asia, & Africa)
Capillariasis	Primarily found in rats and other rodents	Ingestion of embryonated eggs in soil	North and South America, Turkey, Switzerland, Czechoslovakia, Yugoslavia, Italy, Africa, Hawaii, India, Japan and Korea

DISEASE	RODENT	TRANSMISSION	REGION
Clonorchiasis	Rats serve as reservoirs	Eating raw or undercooked freshwater fish containing encysted larvae	China, Japan, Taiwan, Korea, Vietnam, principally in the Mekong River delta
Lassa Fever	Wild rodents; in West Africa, mice in the *Mastomys* species complex	Aerosol or direct contact with excreta of infected rodents	Sierra Leone, Liberia, Guinea and parts of Nigeria
Leishmaniasis	Wild rodents serve as reservoirs	Bite of infective sand flies	The Middle East, former Soviet Union, Mediterranean littoral, Pakistan, India, China, sub-Saharan savanna, Sudan, Ethiopia, Kenya, Namibia, south-central Texas, Mexico, all of Central America, every South American country except Chile and Uruguay
Lyme Disease	Wild rodents, particularly *Peromyscus* spp.	Bite of infected ticks of *Ixodes* (subgenus *Ixodes*)	Eastern United States, Wisconsin and Minnesota, the West Coast, and Canada. Also found in Europe, the former Soviet Union, China and Japan
Plague	Wild rodents, especially ground squirrels. Commensal rodents will also support outbreaks of plague in urban areas	Bite of infected fleas (other routes of transmission uncommon or rare)	Worldwide, maintained between outbreaks in sylvatic cycles of wild rodents and their fleas (primarily in semi-arid regions)

DISEASE	RODENT	TRANSMISSION	REGION
Rat-Bite Fever	Infected rats, rarely in squirrels, weasels, and gerbils	Transmitted by urine or secretions of the mouth, nose or conjunctival sac of infected rodents, most often through biting	Worldwide, but uncommon in North and South America and most European countries
Relapsing Fever	Wild rodents serve as reservoirs for tickborne relapsing fever	Bite or coxal fluids of infected argasid ticks, principally *Ornithodoros hermsi* and *O. turicata* in the United States, *O. rudis* and *O. talaje* in Central and South America, *O. moubata* and *O. hispanica* in Africa, and *O. tholozani* in the Near and Middle East	Tropical and central Africa, Spain, Saudi Arabia, Iran, India, parts of central Asia, and North and South America
Schistosomiasis	Rodents are potential hosts of *Schistosoma japonica*. *S. malayensis* appears to be a rodent parasite that can infect humans	Infection from water that contains free-swimming larval forms (cercariae) that have developed in snails	China, Taiwan, the Philippines, and Sulawesi
Murine Typhus Fever	Rats, mice, and other small mammals	Infective rat fleas defecate rickettsiae while sucking blood, contaminating the bite site and other fresh skin wounds	Worldwide - found in areas where people and rats occupy the same buildings and where large numbers of mice live

DISEASE	RODENT	TRANSMISSION	REGION
Q Fever	Many species of feral rodents	Airborne dissemination of rickettsiae in dust from premises contaminated by placental tissues, birth fluids, and excreta of infected animals	Worldwide
Sabia (Brazilian) Hemorrhagic Fever	Reservoir is unknown, although rodents are suspected	Inhalation of small particle aerosols derived directly from virus-contaminated rodent excreta and saliva. May be spread by secondary aerosols from farming, by ingestion, or by contact with cuts or abrasions.	Brazil
Junin (Argentinian) Hemorrhagic Fever	Wild rodents, primarily *Calomys musculinus*	Same as above	Argentina
Machupo (Bolivian) Hemorrhagic Fever	The rodent *Calomys callosus* is the reservoir	Same as above	Bolivia
Guanarito (Venezuelan) Hemorrhagic Fever	Cane rats (*Zygodontomys brevicauda*) and cotton rats (*Sigmodon alstoni*) are the reservoirs	Same as above	Venezuela

DISEASE	RODENT	TRANSMISSION	REGION
Colorado Tick Fever	Ground squirrels, chipmunks, and *Peromyscus* spp.	Bite of infective tick, immature *Dermacentor andersoni*	Mountainous regions above 5000 feet in the western U. S. and Canada
Far Eastern Tickborne Encephalitis, Central European Tickborne Encephalitis, and Powassan Virus Encephalitis	Wild rodents and other animals serve as reservoirs	Bite of an infective tick - *Ixodes persulcatus* in Eastern Russia, *I. ricinus* in western Russia and Europe, and *I. cookei* in eastern Canada and the U. S.	Far eastern region of the former Soviet Union, Europe, Canada and the U. S.
Leptospirosis	Wild rodents, particularly rats	Contact of skin or mucous membranes with water, soil or vegetation contaminated with urine of infected animals; ingestion of food contaminated with urine from infected rats	Worldwide in urban and rural areas except for polar regions
Lymphocytic Choriomeningitis	House mouse, *Mus musculus*	Oral or respiratory contact with virus-contaminated excreta, food or dust; virus shed in mouse urine, saliva, and feces	Americas and Europe
Salmonellosis	Wild rodents	Ingestion of food contaminated by feces of infected animal	Worldwide

DISEASE	RODENT	TRANSMISSION	REGION
American Trypanosomiasis	Numerous wild animals, including rats and mice	Contamination of abrasions, conjunctiva, skin wounds or mucous membranes (including bite site) following bite of infected vector Reduviidae (e.g., *Triatoma*, *Rhodnius*, and *Panstrongylus*	Western Hemisphere, especially Mexico, Central and South America
Cryptosporidiosis	Guinea pigs, mice, rats, and rabbits	Ingestion of infective sporulated oocysts	Worldwide
Tularemia	Wild rodents: voles, muskrats, beaver; also lagomorphs (rabbits, hares)	Bite of infected arthropods, including wood ticks, dog ticks, lone star ticks, deer flies, and the mosquito *Aedes cinereus* in Sweden	North America, Europe, former Soviet Union, China, Japan, and Mexico
Yersiniosis	Rodents serve as reservoirs for *Yersinia pseudotuberculosis*	Fecal-oral transmission by eating or drinking contaminated food and water or by direct contact with infected animals	Worldwide; *Y. pseudotuberculosis* is primarily a zoonotic disease with humans as incidental hosts
Rickettsialpox	House mouse	Transmitted by bite of infected mites, *Allodermanyssus sanguineus*	Eastern United States, particularly New York, and the former Soviet Union

DISEASE	RODENT	TRANSMISSION	REGION
Giardiasis	Rodents, as well as other animals	Ingestion of cysts in contaminated water as well as fecal-oral contamination	Worldwide
Pasteurellosis	Mice may be infected, as well as rabbits	Infection in man is rare, but may be caused by the bite of infected rodents	Worldwide
Toxoplasmosis	Rodents serve as intermediate hosts - definitive hosts are cats and other felines	Ingestion of sporulated oocysts from cat feces; eating undercooked meat containing tissue cysts	Worldwide
Scrub Typhus	Transovarial passage in mites - mites that are often supported by rodents	Bite of infected larvae of certain chigger mites (*Leptotrombidium* spp.)	East and Southeast Asia, North Australia
Rocky Mountain Spotted Fever	Maintained in nature in ticks by transovarial and transstadial passage - ticks often carried and supported by rodents	Bite of infected ticks; in the U. S. by *Dermacentor variabilis*, *D. andersoni*, and *Amblyomma americanum*, and in Latin America by *A. cajennense* (possibly also *Rhipicephalus sanguineus*)	United States, Canada, Mexico, Panama, Costa Rica, Colombia, and Brazil

DISEASE	RODENT	TRANSMISSION	REGION
Boutonneuse Fever	Same as RMSF above	Bite of infected ticks; in the Mediterranean area by *Rhipicephalis sanguineus*, and in South Africa by *Haemaphysalis leachi, Amblyomma hebraeum, R. appendiculatus, Boophilus decoloratus,* and *Hyalomma aegyptium*	Africa, Europe, Middle Ease, and Southeast Asia
North Asian Tick Fever	Same as RMSF above	Bite of infected ticks in the genera *Haemaphysalis* and *Dermacentor*	Asiatic areas of the former Soviet Union, China, and Mongolia
Queensland Tick Fever	Same as RMSF above	Bite of infected ticks; *Ixodes holocyclus* is probably the principal vector	Queensland and New South Wales, Australia
Hymenolepiasis	Mice and rats	Ingestion of eggs or infected intermediate hosts (insects) or by fecal-oral contamination	Africa, South America, the Caribbean, Italy, Japan, United States, the former Soviet Union
Trichinellosis	Rats and many wild animals	Eating undercooked or raw meat containing encysted larvae	Worldwide

* Hantaviruses are also associated with rodents, but, due to the volume of information, are not included in this table. See Chapter 2 (Table 2-1) for more information on hantaviruses.

CHAPTER 2

ABOUT HANTAVIRUSES

1. There are two types of hantaviruses. One group of hantaviruses causes hemorrhagic fever with renal syndrome (HFRS), while another group causes hantavirus pulmonary syndrome (HPS). Information on hantaviruses can be found in Table 2-1.

a. Hemorrhagic fever with renal syndrome is mostly associated with human cases in Europe and Asia (Korean hemorrhagic fever). As the name implies, the kidneys are the primary target of these viruses. The hantaviruses that cause this disease have been known for some time. This disease is usually not life-threatening (fatality rate 5 - 15 percent) but can cause severe illness for up to several weeks, with convalescence from weeks to months. The reservoirs are usually field rodents, with the exception of Seoul virus, which is maintained by *Rattus* spp. Seoul virus is also found in the United States, but is usually less severe than in other parts of the world.

b. Hantavirus pulmonary syndrome is an acute viral disease that primarily affects the lungs. The illness, which can cause respiratory failure and cardiogenic shock, has a fatality rate of approximately 35 percent. Unlike HFRS, however, recovery from HPS is usually rapid with full restoration of lung function. HPS does not appear to be limited to a particular age, race, ethnic group, or gender. The chance of exposure to hantavirus is greatest when individuals work, play, or live in closed spaces where there is an active rodent infestation. It is important to be aware of possible rodent exposure, for example, when working in buildings or other structures that have been closed for extended periods or when opening or working with pieces of equipment that have been infested by rodents.

2. The following Summary of Known and Proposed Hantaviruses (Bunyaviridae: *Hantavirus*) was provided via electronic message by Charles H. Calisher, Ph.D., AIDL, Department of Microbiology, Colorado State University, Fort Collins, Colorado, on November 26, 1996.

a. Before the 1993 outbreak of HPS in the U. S., the genus *Hantavirus* consisted of the following distinct viral species: Hantaan, Puumala, Seoul, and Prospect Hill. Dobrava-Belgrade virus was under investigation as a possible fifth serotype. One limiting factor in the recognition of new members of the genus has been the relative difficulty of their primary *in vitro* cultivation.

b. The HPS outbreak investigation made extensive use of genetic methods that led to the recognition of the etiologic agent, Sin Nombre virus (SNV), well before SNV was propagated in cell cultures. The successes of RT-PCR in the rapid detection and genetic characterization of SNV, as well as the development of diagnostic antigens through recombinant DNA expression of SNV genes, has encouraged the widespread adaptation of these methods to the study of other hantaviruses. As a consequence, the pace of discovery of new hantaviruses has greatly accelerated since 1993. A number of new hantaviruses are known only genetically, while others have been subjected to serologic comparisons with previous serotypes using either tissue culture-adapted isolates or recombinant DNA methodologies.

c. Each hantavirus appears to be closely adapted to a single predominant rodent host. This observation suggests an ancient relationship between virus and host. In most instances, the virus has not been proved to be present throughout the host's entire range. For many hantaviruses, there are well-documented examples of a rodent other than that listed (Table 2-1) playing an important, even predominant, carrier role. For example, *Microtus rossiaemeridionalis* may play a role in maintenance of Tula virus in some settings, and *Peromyscus leucopus* and *P. boylii* can be important reservoirs for SNV. There are also many examples of occasional "spillover" of viruses into hosts separated from the predominant carrier at the generic, familial or higher level, but these events are considered by some to be of little epidemiologic or evolutionary importance.

d. All hantaviruses except Thottapalayam (TPM) have been isolated from or detected in murid rodents. Because TPM virus was isolated on only a single occasion from a shrew (Order Insectivora), the host assignment must be considered tentative.

3. Between May 1993 and March 2008, there were approximately 500 cases of hantavirus (HPS) reported in the U. S., with death resulting in 165 cases, approximately 35 percent. Of these cases, 39 were identified retrospectively prior to the initial outbreak of hantavirus in the Four Corners area of the southwest in 1993.

4. American hantaviruses are newly recognized, not newly emerging. Several factors indicate that these viruses have been in the Americas for thousands of years:

a. The viruses seem to cause no pathology in their rodent hosts, indicating that the virus-host relationship has been ongoing for a long period of time.

b. The viruses are passed from rodent to rodent by contact (e.g., fighting, grooming, exposure to saliva, urine and feces, and mating). Because no arthropod vector has been found, the spread of these diseases across extensive geographic areas probably took a long time.

c. There are many different types of hantaviruses found in many different species of rodents. This genetic divergence within the virus group and rodent populations also took considerable time to develop.

5. This picture of virus-host relationships indicates that the exposure of people in the Americas to New World hantaviruses has been ongoing for centuries. Until 1993, deaths from these diseases were probably attributed to other causes, usually pneumonia since the lungs are involved. There does appear to be evidence that hantaviruses have proliferated in certain geographic regions for short periods of time. This may be due to environmental conditions that allow wild rodents harboring the viruses to "explode" in numbers, thus increasing the exposure of people to rodents and their excreta. The majority of human cases of hantavirus in the U. S. have been caused by SNV. Following the initial discovery of SN in 1993, other hantaviruses have been found in this country that cause disease in people.

a. Bayou virus (BAY), which has been found in *Oryzomys palustris*, the rice rat has been confirmed to be pathogenic to humans. Three cases of hantavirus have been confirmed to have been caused by Bayou virus by analyzing human sera. This virus can cause human death.

b. New York virus (NYV) closely resembles SNV, causes HPS, and has resulted in several fatalities. The white-footed mouse, *Peromyscus leucopus*, is thought to be the primary reservoir.

c. Black Creek Canal virus (BCC), found in cotton rats, *Sigmodon hispidus*, has caused illness in one human case. Although the patient survived, there is no evidence that subsequent cases of BCC will not be fatal.

d. Other hantaviruses have been found in rodents, but not in humans. It may be that these viruses do not cause illness in people, as in the case of Prospect Hill virus (PHV), or it may be that conditions for human infection have not been favorable.

7. Rodents are the primary reservoir hosts of the recognized hantaviruses. Each hantavirus appears to have a preferred rodent host, but other small mammals can be infected as well. Rodents in the genus *Peromyscus* have been especially targeted for capture and processing during field surveys conducted by local, state, and federal health agencies because of this genus' involvement in hantavirus in the Four Corners Area of the Southwest during the last four years. *Peromyscus maniculatus*, the deer mouse, has been implicated as the primary reservoir for SNV.

8. Hantaviruses do not cause obvious illness in their rodent hosts. Infected rodents shed virus in saliva, urine, and feces for many weeks, but the duration and period of maximum infectivity are unknown.

9. Human infection may occur when infective saliva or excreta are inhaled as aerosols. Transmission may also occur when fresh or dried materials contaminated by rodent excreta are disturbed, introduced into broken skin or the eyes, or, possibly, ingested in contaminated food or water. Persons have also become infected after being bitten by rodents.

10. Ticks, fleas, mosquitoes and other biting insects are not known to have a role in transmission of hantaviruses. Person-to-person transmission has not been associated with any of the previously identified hantaviruses or with the recent outbreak in the southwestern U. S.; however, such transmission is being evaluated in South America. Cats and dogs are not known to be reservoirs of hantaviruses in the U. S., but these animals may bring infected rodents into contact with humans.

11. Travel to and within all areas where hantavirus infection has been reported is safe. The possibility of exposure to hantavirus for campers, hikers, and tourists is very small and reduced even more if steps are taken to minimize rodent contact.

12. Hantaviruses have lipid envelopes that are susceptible to most disinfectants (e.g., dilute hypochlorite solutions, detergents, ethyl alcohol, or most general-purpose household disinfectants). How long these viruses survive after being shed in the environment is uncertain. Ultraviolet light (sunlight) has been shown to inactivate hantaviruses, but sunlight will not disinfect large agglomerations of feces.

13. Five hundred human cases in 15 years is not a great number. However, the high fatality rate is ample reason for concern. Because we now know the source of hantavirus infection (breathing or ingesting virus-contaminated feces, urine or saliva), it is prudent to assume a "worst case scenario" when dealing with wild rodents or rodent-contaminated buildings. Specific information on various groups of people occupationally or recreationally exposed to rodents associated with hantaviruses will be discussed in other chapters in this manual.

Table 2-1. Hantaviruses.[1]

Species	Disease	Principal Reservoir	Distribution of Virus	Distribution of Reservoir
Hantaan (HTN)	HFRS[a]	*Apodemus agrarius* (striped field mouse)	China, Russia, Korea	C Europe south to Thrace, Caucasus, and Tien Shan Mtns; Amur River through Korea to E Xizang and E Yunnan, W Sichuan, Fujian, and Taiwan (China)
Dobrava/ Belgrade (DOB)	HFRS	*Apodemus flavicollis* (yellow-neck mouse)	Balkans	England and Wales, from NW Spain, France, S Scandinavia through European Russia to Urals, S Italy, the Balkans, Syria, Lebanon, and Israel
Seoul (SEO)	HFRS	*Rattus norvegicus* (Norway rat)	Worldwide	Worldwide
Puumala (PUU)	HFRS	*Clethrionomys glareolus* (bank vole)	Europe, Russia, Scandinavia	Palearctic from Scandinavia to Lake Baikal, south to France and N Spain, N Italy, Balkans, Altai and Sayan Mtns; Britain and SW Ireland
Thailand (THAI)	nd[b]	*Bandicota indica* (bandicoot rat)	Thailand	Sri Lanka, peninsular India to Nepal, Burma, NE India, S China, Laos, Taiwan, Thailand, Vietnam
Prospect Hill (PHV)	nd	*Microtus pennsylvanicus* (meadow vole)	United States, Canada	C Alaska to Labrador, Newfoundland and Prince Edward Island, Canada; Rocky Mountains to N New Mexico, Great Plains to N Kansas, mid-Atlantic states, Appalachians to N Georgia, USA
Khabarovsk (KBR)	nd	*Microtus fortis* (reed vole)	Russia	Transbaikalia Amur region; E China

Species	Disease	Principal Rerservoir	Distribution of Virus	Distribution of Reservoir
Thottapalayam (TPM)	nd	*Suncus murinus* (musk shrew)	India	Afghanistan, Pakistan, India, Sri Lanka, Nepal, Bhutan, Burma, China, Taiwan, Japan, Indomalayan region
Tula (TUL)	nd	*Microtus arvalis* (European common vole)	Europe	Throughout Europe to Black Sea and NE to Kirov region, Russia
Sin Nombre (SNV)	HPS[c]	*Peromyscus maniculatus* (deer mouse)	United States	Alaska panhandle across N Canada, south through most of continental USA, excluding SE and E seaboard, to southernmost Baja California Sur and to NC Oaxaca, Mexico
New York (NYV)	HPS	*Peromyscus leucopus* (white-footed mouse)	United States	C and E USA to S Alberta and S Ontario, Quebec and Nova Scotia, Canada; to N Durango and along Caribbean coast to Isthmus of Tehuantepec and Yucatan Peninsula, Mexico
Black Creek Canal (BCC)	HPS	*Sigmodon hispidus* (cotton rat)	United States	SE USA, from S Nebraska to C Virginia south to SE Arizona and peninsular Florida; interior and E Mexico through Middle America to C Panama; in South America to N Colombia and N Venezuela
El Moro Canyon (ELMC)[d]	nd	*Reithrodontomys megalotis* (Western harvest mouse)	United States, Mexico	SC British Columbia and SE Alberta, Canada; W and NC USA, S to N Baja California and interior Mexico to central Oaxaca

Probable Species[e]	**Disease**	**Principal Rerservoir**	**Distribution of Virus**	**Distribution of Reservoir**
Bayou (BAY)[d]	HPS	*Oryzomys palustris* (rice rat)	United States	SE Kansas to E Texas, eastward to S New Jersey and peninsular Florida
Topografov (TOP)	nd	*Lemmus sibiricus* (Siberian lemming*)*	Siberia	Palearctic, from White Sea, W Russia, to Chukotski Pemninsula, NE Siberia, and Kamchatka; Nearctic, from W Alaska E to Baffin Is and Hudson Bay, S in Rocky Mtns to C British Columbia, Canada
Andes (AND)[d]	HPS	*Oligoryzomys longicaudatus*[f] (long-tailed pygmy rice rat)	Argentina	NC to S Andes, approximately to 50 deg S latitude, in Chile and Argentina
To be named[d]	HPS	*Calomys laucha* (vesper mouse)	Paraguay	N Argentina and Uruguay, SE Bolivia, W Paraguay, and WC Brazil
Isla Vista (ISLA)[d]	nd	*Microtus californicus* (California vole)	United States	Pacific Coast, from SW Oregon through California, USA, to N Baja California, Mexico
Bloodland Lake (BLL)[d]	nd	*Microtus ochrogaster* (prairie vole)	United States	N and C Great Plains, EC Alberta to S Manitoba, Canada, S to N Oklahoma and Arkansas, E to C Tennessee and W West Virginia, USA; relict populations elsewhere in USA and Mexico
Muleshoe (MUL)[d]	nd	*Sigmodon hispidus* (cotton rat)	United States	SE USA, from S Nebraska to C Virginia south to SE Arizona and peninsular Florida; interior and E Mexico through Middle America to C Panama; in South America to N Colombia and N Venezuela

Probable Species[e]	**Disease**	**Principal Rerservoir**	**Distribution of Virus**	**Distribution of Reservoir**
Rio Segundo (RIOS)[d]	nd	*Reithrodontomys mexicanus* (Mexican harvest mouse)	Costa Rica	S Tamaulipas and WC Michoacan, Mexico, S through Middle American highlands to W Panama; Andes to W Colombia and N Ecuador
Rio Mamore (RIOM)[d]	nd	*Oligoryzomys microtis* (small-eared pygmy rice rat)	Bolivia	C Brazil south of Rios Solimoes-Amazon and contiguous lowlands of Peru, Bolivia, Paraguay, and Argentina

[1] Reprinted with permission of the authors: C. Schmaljohn and B. Hjelle. 1997. Hantaviruses: A Global Disease Problem. Emerg. Inf. Dis., vol. 3(2):, April-June.

[a] HFRS, hemorrhagic fever with renal syndrome

[b] nd, none documented

[c] HPS, hantavirus pulmonary syndrome

[d] not yet isolated in cell culture

[e] viruses for which incomplete characterization is available, but for which there is no clear evidence indicating that they are unique

[f] suspected host, but not confirmed

CHAPTER 3

HANTAVIRUS RISK REDUCTION

1. The rate of hantavirus-positive rodents from a given trapping location may not accurately represent the virus' distribution in the entire area. Geographic areas within the Southwest have shown hantavirus infection rates in certain populations of *P. maniculatus* to be as high as 70 percent. However, the number of positive or negative rodents may vary from location to location, from species to species, and from one time of year to another.

2. Public education and awareness about hantavirus are the best methods of protection. All personnel potentially exposed to rodent droppings or urine should be aware of the possibility of acquiring hantavirus. Building surveys should be performed on a regular basis, and any indication of rodent activity should be addressed on every occasion. When controlling rodents, pay special attention to the following suggestions.

a. Rodent infestations in bunkers, warehouses, and outbuildings can be controlled by the use of snap traps, glue boards, and poison bait. Detailed information on commensal rodent control is outlined in USACHPPM TG 138, Commensal Rodent Control (Reference 3).

b. Preventive control is a very important aspect of rodent management. All buildings should be rodent-proofed, if possible.

c. Sanitation practices are essential in deterring rodents from entering buildings. All sources of food and water available to rodents should be eliminated.

3. Rodent surveillance should be conducted before occupying any seldom used buildings. These buildings should first be aired out. Inspections of equipment and supplies stored in them should also be done prior to use of any materials. Occupied buildings should be inspected on a regular basis for evidence of rodent activity or infestations and any personnel noting rodent activity should report it to the proper authorities.

4. Almost every hantavirus case can be traced to direct contact with rodents or with rodent infestations in enclosed buildings. Rodent urine and feces pose the greatest health risk to people. Risk is increased when rodent droppings or urine are aerosolized in enclosed spaces such as buildings, bunkers or warehouses. Persons moving equipment, cleaning buildings, or otherwise disturbing deposited urine or feces may be at risk if not adequately protected.

Areas with evidence of rodent infestations should be thoroughly disinfected and cleaned to reduce the likelihood of exposure to hantavirus-infected materials. Direct contact with rodent droppings may also be a means of transmitting the virus to humans. Cleanup procedures should be performed in a manner that limits the potential for aerosolization of rodent-contaminated material (droppings, urine, or nests). Anyone involved in cleaning rodent-infested buildings or handling dead rodents should use proper procedures.

5. Personnel training, working, or participating in events outdoors may be at a significantly lower risk of acquiring hantavirus infection than personnel exposed to rodent droppings or urine indoors. Lower risks of acquiring hantavirus outdoors as opposed to indoors may be due to:

a. Infected rodent excreta may be less concentrated outdoors.

b. Winds (air movement) may dissipate any aerosolized virus.

c. Direct exposure to sunlight for >30 min. may destroy any viable hantavirus.

d. The usual density of field rodents outdoors is much less than that encountered indoors.

People who can be considered at a higher risk might include pest controllers, wildlife biologists, contractors, plumbers, electricians, carpenters, maintenance workers, building inspectors, and workers involved in demolition or cleaning of old buildings.

6. Personnel tasked with inspection and cleanup of rodent contaminated buildings and other personnel identified as being at risk of acquiring hantavirus infection should be well instructed in preventive measures, symptoms of the disease, and when to seek medical attention. A medical surveillance program for all people routinely exposed to rodents should include a medical history, a physical examination with attention to the pulmonary and renal systems, medical clearance for respirator use, and baseline blood tests. A baseline serum sample for each worker at risk, drawn in a red-top tube, should be stored frozen (at -20^{o}C) for future analysis if needed.

7. To minimize the risk of hantavirus infection, personal protective equipment should be worn by those exposed to field rodents or their droppings/urine. This equipment should include respirators with high-efficiency particulate air (HEPA) filters, goggles, solvent-resistant gloves, coveralls, and boots. Detailed guidance on personal protection for various classes of potentially exposed individuals against hantavirus infection was published by the CDC as a special report in the MMWR (Reference 5). Appendix B lists the respirators and HEPA filters available through the Paperless Order Placement System (POPS). Table 3-1 provides a quick guide to personal protection against hantavirus infection for various classes of individuals and the tasks they perform on military installations that may bring them into contact with rodents or rodent-contaminated areas. Additional information on personal protective equipment for various individuals exposed to rodents or rodent-contaminated buildings can be found in Chapters 5-9, this guide.

Table 3-1. Quick Guide to Personal Protection for Individuals When Rodents or Rodent Contaminants are Present.

INDIVIDUALS INVOLVED	TASK/ACTIVITY	PERSONAL PROTECTIVE EQUIPMENT	REFERENCE
Hikers, Campers, Soldiers, other Recreational Users	Outdoor activities	None	Chapter 4
Hikers, Campers, Soldiers, other Recreational Users	Indoor activities - initial entry into building or structure	Leave building immediately if rodents/contamination found	Chapter 4
Hikers, Campers, Soldiers, other Recreational Users	Indoor activities - activities require presence in rodent-contaminated building	Gloves, coveralls, goggles, work boots or shoes, respirator with HEPA filter	Chapters 6, 7 and 9
Family Housing Residents	Disposal of rodents and traps	Plastic gloves, plastic bags, and disinfectant	Chapter 5
Pest Controllers	Disposal of rodents and traps (cantonment area)	Plastic gloves, plastic bags, and disinfectant	Chapter 5
Plumbers, Electricians and other Occupational Workers	Infrequent rodent contact in or under buildings and structures	Coveralls, work boots or shoes, plastic gloves, goggles (when in confined spaces) -- respirator with HEPA filter if signs of rodents/contamination are present	Chapter 6

INDIVIDUALS INVOLVED	TASK/ACTIVITY	PERSONAL PROTECTIVE EQUIPMENT	REFERENCE
Pest Controllers or other Special Detail Personnel	Clean up rodent-contaminated buildings and structures	Coveralls or surgical scrubs, surgical gown, plastic apron, two pairs of surgical gloves, boot covers, PAPR	Chapters 7 and 9
Medical Personnel, Pest Controllers, Range Control or others	Inspect buildings for rodents or rodent contamination	Gloves, coveralls, goggles, work boots or shoes, respirator with HEPA filter	Chapters 6, 7 and 9
Medical Personnel (including field soldiers), Mammalogists, Wildlife Biologists, or others	Collecting rodent traps	Gloves, coveralls, goggles, work boots or shoes, respirator with HEPA filter; soldiers can wear M-40 mask as respirator	Chapters 8 and 9
Medical Personnel (including field soldiers), Mammalogists, Wildlife Biologists or others	Handling and processing rodents	Coveralls or surgical scrubs, surgical gown, plastic apron, two pairs of surgical gloves, boot covers, PAPR; soldiers can wear MOPP Level 4 in lieu of above	Chapters 8 and 9

CHAPTER 4

PRECAUTIONS FOR PERSONNEL CAMPING, HIKING, OR CONDUCTING OTHER OUTDOOR ACTIVITIES

1. Individuals on military installations may participate in a variety of outdoor activities where rodents are present. The risk of acquiring hantavirus outdoors is greatly reduced compared to entering rodent-contaminated buildings or structures. However, since some contact with rodents may occur outdoors, the following precautions, recommended by CDC (see Reference 5 for additional information), should be taken:

a. Avoid coming in contact with rodents and rodent burrows or disturbing dens (such as pack rat nests).

b. Do not use cabins or other enclosed shelters that are rodent infested until they have been appropriately cleaned and disinfected (this includes field latrines that are used infrequently or seasonally). See Chapter 7 for cleanup procedures.

c. Do not pitch tents or place sleeping bags in areas near rodent feces or burrows or near possible rodent shelters (e.g., garbage dumps or woodpiles).

d. If possible, do not sleep on the bare ground. Use a cot with a sleeping surface at least 12 inches above the ground. Use tents with floors.

e. Keep food in rodent-proof containers.

f. Promptly bury (or--preferably--burn and bury, when in accordance with local requirements) all garbage and trash, or discard in covered trash containers.

g. Use only bottled water or water that has been disinfected by filtration, boiling, chlorination, or iodination for drinking, cooking, washing dishes, and brushing teeth.

2. Soldiers bivouacking in the field are at minimal risk if the procedures listed above are followed. However, if soldiers are required to use seasonal buildings or shelters, then an initial inspection for rodents or signs of rodent contamination should be made before troops enter and begin to disturb dust and furnishings inside. Care must also be taken when entering bunkers, sheds or other structures that are infrequently used. If evidence of rodents (live or dead animals, droppings, urine or nesting material) is found inside the building, then entry and use should be prohibited until rodent contamination is removed or personnel wear equipment that protects them against hantavirus infection.

3. Individuals using horse stables should be at low risk of acquiring hantavirus. Rodents that carry hantavirus are usually not found in large numbers in stalls where horses are kept, but

significant numbers of rodents may be encountered in barns, feed bins, or other structures in and around the stables. If rodent contamination is encountered, adequate precautions should be taken to limit access to the contaminated areas until proper inspection, cleanup and decontamination can be performed (see Chapters 6, 7 and 9).

CHAPTER 5

DECONTAMINATION OF TRAPS AND DISPOSAL OF DEAD RODENTS

NOTE: Most rodents captured in cantonment buildings will be house mice. Since these rodents are not associated with hantaviruses that infect people, special respirators and more expensive personal protective equipment, mentioned in various chapters in this guide, are not recommended. In some cases, pest controllers and family housing residents may trap field rodents that enter their homes. Keep rodents and traps away from the face when following the procedures below, and keep them downwind when working outdoors or when there is an air current indoors (e.g., fan, air conditioner). The procedures described here should be sufficient for occasional disposal of rodents that may carry hantavirus. However, if several field rodents are captured, or if signs indicate that an ongoing rodent infestation is present, then rodent trapping and disposal should be performed by a knowledgeable pest controller with higher-level protective clothing and equipment. A family housing unit heavily infested with field rodents should be treated the same way as other rodent-contaminated buildings (see Chapter 7).

1. Mammalogists, pest controllers, and other individuals on installations may occasionally have to dispose of dead rodents and decontaminate rodent traps. The following procedures should be followed:

a. All individuals handling rodents or traps should wear impermeable, washable gloves.

b. Dispose of dead rodents by picking up the trap with rubber or plastic gloves, placing the carcasses in a plastic bag containing sufficient general-purpose household disinfectant to thoroughly wet the carcasses. The disinfectant may be sprayed into the bag or liquid may be added. Seal the bag and then dispose of it as permitted by local regulations. Three tablespoons of household bleach in one gallon of water may be used in place of a commercial disinfectant.

c. Traps contaminated by rodent urine or feces or in which a rodent was captured should be disinfected with a commercial disinfectant or bleach solution. The trap may be sprayed in place, decontaminated in the bag with the rodent, or treated separately after the rodent is removed.

2. Family housing occupants may also encounter dead rodents in traps that they have set. The procedures listed above are recommended when handling rodents in traps. However, the following procedures may be used when house mice (not deer mice or other field rodents) are involved, particularly in areas of the country where hantavirus has not been found.

a. A plastic bag, inverted over the hand, can be used to pick up a trap with rodent, or a rodent-contaminated trap without a rodent. After grasping the trap with the plastic-protected hand, the rest of the bag is then pulled over the hand and the trap. The inside of the bag, as well as the rodent and trap, should be sprayed with a disinfectant as described above.

NOTE: The majority of rodents captured in buildings in the cantonment area will be house mice. Since these rodents are not associated with hantaviruses that infect people, special respirators and more expensive personal protective equipment, mentioned in various chapters in this guide, are not recommended. In some cases, pest controllers and family housing residents may trap field rodents that enter their homes. Keep rodents and traps away from the face when following these procedures. Keep rodents and traps downwind when working outdoors or when there is an air current indoors (e.g., fan, air conditioner). The procedures mentioned above should be sufficient for occasional disposal of rodents that may carry hantavirus. However, if several field rodents are captured, or if signs indicate that an ongoing rodent infestation is present, then rodent trapping and disposal should be performed by a knowledgeable pest controller wearing higher-level protective clothing and equipment. A family housing unit heavily infested with field rodents should be treated the same as other rodent-contaminated buildings (see Chapter 7).

b. The bag should be sealed with the zip lock or a twist tie, rolled up in newspaper, and placed in the local trash receptacle.

c. Hands should be thoroughly washed with soap and water.

3. Whenever captured rodents are to be used for scientific investigation (e.g., hantavirus detection), disinfecting the rodent carcasses may interfere with subsequent analytical procedures. Dead rodents should be placed in sealable (e.g., ziplock) bags that are then placed in another container (e.g., ice chest or cooler). When the rodent processing is completed, then the outer surfaces of the container should be sprayed or wiped down with disinfectant. The inner surfaces of the container should not be sprayed with disinfectant -- the rodents are considered contaminated and should not be sprayed with anything (disinfectant) that could alter the ability to extract viruses at a later date. The container should be opened inside a bio-hood and handled by personnel wearing appropriate protective equipment. When the container is no longer needed, the inside should be disinfected. Care should be taken to prevent unauthorized personnel from opening the container. More detailed information concerning field processing of rodents can be found in Chapter 8.

NOTE: Traps that contain live rodents will be decontaminated within the perimeter of the rodent processing site (see chapter 9). Rodents caught in snap traps or on glue boards should be sprayed with disinfectant at the trap site before being removed from buildings. Appropriate personal protective clothing and equipment should be worn whenever rodents and rodent-contaminated traps are handled. Information on additional protection can be found in Chapters 6-9.

CHAPTER 6

PROTECTION FOR PERSONNEL INSPECTING OR WORKING IN RODENT-CONTAMINATED BUILDINGS AND STRUCTURES

1. Many rodents naturally seek food and shelter in buildings and other structures on military installations. Available food is always an attractant, whether the building is occupied or vacant. Frequently used buildings on the cantonment, such as offices, clinics and hospitals, and other administrative facilities, are usually infested with commensal rodents, primarily the house mouse, *Mus musculus*, and/or the Norway rat, *Rattus norvegicus*. Neither of these two species has been implicated as a reservoir of hantaviruses causing HPS in the U.S., but Norway rats may serve as reservoirs of Seoul virus, both in CONUS and in overseas areas. Warehouses, bunkers, and other storage facilities may be subject to infestation by both commensal and field rodents. Because it is not always possible for workers to determine which species of rodents are infesting buildings and structures, certain precautions should be taken to prevent hantavirus infection.

2. Some occupational workers on the installation may infrequently come in contact with rodent-contaminated buildings or structures. Most such contact will be incidental but, occasionally, heavily-contaminated areas may be encountered. If visible signs of rodent infestations are present (droppings, dead rodents, nesting materials), then the worker should leave the building and request that an inspection team evaluate the contaminated site.

a. Workers should be informed about the symptoms of hantavirus and be given detailed guidance on preventive measures. Information should include how to recognize rodent infestations or contamination.

b. Workers who develop a febrile or respiratory illness within 45 days of the last exposure to rodent-infested or contaminated areas should seek medical attention immediately and inform the attending physician of the potential occupational risk of hantavirus infection.

c. The following personal protective measures should be taken:

(1) Coveralls, work shoes or boots, and gloves should always be worn, not only to protect the individual from rodent contamination, but from other environmental contaminants as well.

(2) In confined spaces (e.g., crawl spaces under buildings), goggles should be worn.

(3) If there are signs of rodents, and the work to be done in the building cannot be postponed for inspection and decontamination, then wear respirators fitted with HEPA filters.

(4) Adequate handwashing facilities should be provided at the site, especially if known or potentially rodent-contaminated dust and soil are encountered.

NOTE. The procedures listed above are for situations where contact with rodents is infrequent or light rodent contamination is encountered. Degrees of contamination are often difficult to determine since there are no standards by which to judge. Light contamination may mean several rodent droppings, whereas heavy contamination may be characterized by the presence of rodent droppings throughout the facility. If the level of contamination is unclear, then the procedures described below should be followed.

3. Certain installation personnel may be tasked to inspect buildings for rodent contamination. Medical personnel and pest controllers may be requested to perform inspections following complaints from workers or building managers who have encountered rodents. Personnel from other directorates (e.g., Public Works, Range Control) may be detailed to inspect infrequently used buildings or buildings waiting to be demolished. These individuals may be at higher risk than occupational workers, who may infrequently encounter rodent-contaminated buildings. The following procedures should be adopted by those individuals who perform rodent inspections.

a. A baseline serum sample, preferably drawn at the time of employment, should be available from all persons whose occupations involve frequent rodent contact. The serum sample should be stored at -20^{o}C.

b. Workers in potentially high-risk settings should be informed about the symptoms of hantavirus and given detailed guidance on preventive measures. Information should include how to recognize rodent infestations or contamination.

c. Workers who develop a febrile or respiratory illness within 45 days of the last exposure to rodent-infested or contaminated areas should seek medical attention immediately and inform the attending physician of the potential occupational risk of hantavirus infection.

d. The minimum personal protective equipment should include:

(1) Coveralls.

(2) Gloves. Either disposable or cleanable, reusable (e.g., nitrile). Cloth or leather gloves should not be worn since they are difficult to decontaminate.

(3) Goggles. These afford eye protection from direct contact with rodent-contaminated soil or dust or from gloved hands that have handled rodent-contaminated materials.

(4) Work boots or shoes.

(5) Half or full-face respirator with HEPA cartridges or an N100 respirator. These devices protect against breathing aerosolized rodent urine or fecal particles containing virus and also provides protection of the mouth and nose from gloved hands that have handled rodent-contaminated materials.

(6) Respirators that rely on positive pressure for protection (e.g., PAPR - Powered Air Purifying Respirator) can be worn by individuals with or without facial hair. In fact, if the individual will be wearing a respirator for a prolonged period of time (e.g., more than one hour), a PAPR may be more comfortable since it provides a flow of air across the face. This is particularly desirable under hot conditions. An added feature of a PAPR is that it accommodates wearing glasses under the device.

e. All individuals who are required to wear a respirator must be evaluated and fit-tested by their appropriate medical authority. Respirators that require fit-testing (i.e., those that have a tight seal around the respirator edges) are not considered protective if facial hair interferes with the face seal, since proper fit cannot be assured.

f. Provision should be made for individuals to decontaminate their hands at the inspection site prior to resuming normal duties (e.g., driving a vehicle away from the site, taking a break to smoke, eat or drink, using toilet facilities). This can be accomplished by washing the gloved hands with soap and water, provided in the building or carried on the vehicle, or with a dilute solution of household disinfectant; gloves can also be decontaminated with spray disinfectant. Household bleach, 3 tablespoons in a gallon of water, may be used in place of a commercial disinfectant. At the end of the inspection, the outside of the respirator and goggles should be sprayed with a mild disinfectant, such as Lysol™ or a dilute solution of water and hypochlorite bleach. When using a chlorine solution, avoid spilling the mixture on clothing or other items that it may damage. Thoroughly wash hands with soap and water after removing gloves.

CHAPTER 7

CLEANUP PROCEDURES FOR RODENT CONTAMINATED BUILDINGS

1. A building to be decontaminated should be declared off limits to unauthorized personnel. This can be done by placing placards and a tape barrier around the structure. All entrances should be closed except for one designated entry/exit point. A decontamination station should be located in the immediate vicinity of the exit door (within the taped boundary) for personnel exiting the cleanup area. Windows should be opened to allow dissipation of contaminants that may have aerosolized inside the building. More information on decontamination of personnel following cleanup can be found in Chapter 9.

2. Areas with evidence of rodent infestations (e.g., rodent droppings, chewed materials) should be thoroughly treated with a wet disinfectant and cleaned to reduce the possibility of exposure to hantavirus-infected materials. Cleaning procedures must be performed in a manner that limits the potential for aerosolization of rodent-contaminated dust and other materials. Follow these procedures when cleaning up rodent infestations.

a. A site supervisor should be designated. This individual will act as team leader to ensure that all cleanup personnel are adequately briefed on the risks of acquiring hantavirus and the proper wearing of personal protective clothing and equipment. The site supervisor will provide a safety briefing to all individuals involved in the cleanup. See Appendices C and D for a Health and Safety Plan and a Hantavirus Safety Briefing.

b. All personnel involved in cleaning should wear protective equipment and clothing -- individually fit-tested respirators (with high-efficiency particulate air (HEPA) filters or National Institute for Occupational Safety and Health approved N100 filters) or powered air purifying respirators (PAPR), goggles, solvent-resistant gloves, coveralls, and boots. More information on personal protection and personal decontamination procedures can be found in Chapter 9.

c. Spray the floors and those portions of the walls where evidence of rodent activity is present with a general-purpose disinfectant solution. Special attention must be given to dead rodents, rodent nests, droppings, food, or other items that have been contaminated by rodents; thoroughly soak these items with the disinfectant and place them in a double plastic bag. Use a shovel to remove the soaked material. Seal the plastic bags(s) when full or when the cleanup is completed and dispose of them in accordance with the installations medical practices. More information on disposal of waste can be found in Appendix E. **Do not attempt to remove dry contaminated materials with a vacuum or by sweeping.**

NOTE: An exception to vacuuming can be made if the vacuum is equipped with a HEPA filter to capture minute particles of dust and other materials.

d. Mop all floors with water containing a general-purpose disinfectant and detergent. Clean carpets and upholstered furniture by steam cleaning or shampooing with commercial-grade equipment. Carpets can be effectively disinfected with household disinfectant, but care should be taken to not damage them with hypochlorite (bleach) solutions. If rodents have nested inside furniture and the nests are not accessible for decontamination, the furniture should be sprayed with a disinfectant, then removed and burned. Spray all buildings with dirt floors with a general-purpose disinfectant before use. Remove rodent nests from furniture or equipment and decontaminate. Materials that cannot be decontaminated should be disposed of by burning or burying in accordance with the installations medical practices.

e. Disinfect all work surfaces, storage cabinets, drawers, etc., by washing them with a solution of water containing a general-purpose disinfectant and a detergent followed by an additional wiping-down with disinfectant.

f. Launder any potentially contaminated clothing and bedding in hot water with a detergent. Use rubber or plastic gloves when handling the dirty laundry, then wash and disinfect the gloves in the decontamination solution. Items that cannot be laundered may be dry cleaned. NOTE: clothing and bedding should first be treated with a disinfectant to prevent contamination of individuals involved in laundering or dry cleaning.

g. Appendix F, Hantavirus Prevention: Cleanup of Rodent Contamination, provides additional guidance on safe removal of rodent contamination from buildings. Eleven scenario boxes describe “Personnel Involved”, “Level of Rodent Contamination”, “Protective Clothing and Equipment”, and “Cleanup Methods”. Two scenarios, “Vehicle Maintenance Personnel” and “Personnel Cleaning Out Electrical Utility Boxes”, do not involve buildings, but a clear health risk exists for personnel removing rodent contamination under the conditions described.

CHAPTER 8

PERSONAL PROTECTION FOR WORKERS INVOLVED WITH SURVEILLANCE FOR RODENT-BORNE DISEASES

1. Rodents are found worldwide and there are very few geographic areas where there are no diseases associated with local rodent populations. Regardless of the setting and situation, it is always important to know what diseases may be present and to what extent they threaten the health of US forces and civilian personnel.

2. At the installation level, medical and veterinary personnel are usually involved with surveillance for diseases that affect the health of the command. Rodent-borne diseases fall into this category. Medical personnel are often found in the preventive medicine section of the local hospital or health clinic. At times, field preventive medicine units may augment the installation's medical surveillance mission. Pest control personnel may also be involved in surveillance for rodents but are usually not responsible for evaluating the medical threat associated with these animals. Additional medical personnel may also perform rodent-borne disease surveillance on military installations, although not directly stationed there. These individuals are usually associated with specialized preventive medicine support above the installation level and are called in to supplement the local medical staff when needed. The Air Force and Navy also teach operational entomology courses that may place students and instructors in intimate contact with rodents that harbor diseases. Because all of the individuals mentioned above can anticipate more than casual contact with rodents, they must be adequately protected from rodent-borne diseases.

3. Medical personnel who trap and handle rodents as part of their disease surveillance mission are among those at highest risk of contracting rodent-borne diseases. The tasks associated with trapping and handling rodents and their tissues may expose workers to parasites (both internal and external), aerosolized urine, saliva and excreta, rodent bites, and internal body fluids (i.e., blood). Methods for trapping and processing rodents can be found in USACHPPM TG 103, Plague Prevention and Control, and in the CDC's Methods for Trapping & Sampling Small Mammals for Virologic Testing (References 2 and 6).

4. Chapter 9 discusses detailed precautions and personal protection for individuals working with rodents where hantavirus may be present. The procedures and equipment used to reduce the risk of acquiring hantavirus infection offer protection from nearly all rodent-borne diseases. In addition, protection from arthropods that are vectors of rodent-borne diseases may be necessary because the protective suits used for hantavirus may not prevent insects from biting through the thin layers of clothing or stop ticks from crawling in through clothing’s openings. AFPMB TG 36, Personal Protective Techniques Against Insects and Other Arthropods of Military Importance (Reference 4), discusses protection from biting arthropods.

5. Adequate protective clothing should be worn when collecting traps that contain rodents. Since most rodent surveys rely on trapping rodents alive, the movement of the animal in the trap may result in contamination from urine and feces. If a closed trap is opened during the collection process, adequate precautions must be taken against breathing any aerosols created while opening and handling the trap and the rodent. When picking up traps, it is a good idea to use two sets of doubled plastic garbage bags (approximately 30-gallon size), one set made of light-colored material and the other set made of dark-colored material. Traps that are open and appear to have no rodent activity are placed in a double set of light-colored or clear bags. Those traps that are closed are assumed to contain rodents (even though some may be empty) and are placed in a double set of dark-colored bags. This practice both segregates rodents and traps that may be contaminated and saves time and cleaning efforts -- traps that have not had any rodent activity can be immediately used again or stored for future use.

a. Personnel picking up traps should wear heavy solvent-resistant gloves (i.e., nitrile). The gloves can be sprayed with disinfectant in the field following trap pickup or bagged and washed with disinfectant at the processing site. If closed traps (suspected to contain rodents) are placed, without opening, directly into the bags, then the collector does not need to wear a respirator. However, traps should always be kept downwind and away from that person's breathing zone.

b. If traps are to be opened during collection, then the following protective equipment should be worn.

(1) Heavy solvent-resistant gloves (i.e., nitrile). The gloves can be disinfected as mentioned above.

(2) A half- or full-face mask fitted with high efficiency particulate air (HEPA) cartridges, or an N100 respirator and goggles (if a full-face respirator is not worn).

(3) A powered air purifying respirator (PAPR) can be worn, but this device usually limits visibility and tends to become uncomfortable when picking up traps, especially in wooded areas.

(4) Soldiers assigned to field preventive medicine units may wear their M-40 gas mask since this device protects against inhalation of virus particles. Although these masks offer good protection, they are unusually hot during summer months and also restrict vision.

NOTE: These procedures are used when trapping and handling field rodents only. When surveillance is being conducted in a cantonment area for house mice and rats, this level of protective equipment is not necessary since commensal rodents are usually not involved with hantaviruses that cause human disease in the Americas (exception - Seoul virus may be found in some port cities). However, if surveillance personnel are not sure what species of rodents they are working with, then protective equipment should be worn until the presence of field rodents is ruled out. Whenever rodents are handled, either during field investigations or when removing dead rodents from traps in the cantonment area, appropriate protective measures must be taken.

See Chapters 5 and 6 for more information about protection when working with commensal rodents. These procedures are also recommended for nonmedical personnel, such as mammalogists or wildlife biologists, who may handle live field rodents.

7. Since visual observation of rodents for diseases, particularly hantaviruses, may not indicate if the animals are infected, blood and/or tissue samples are usually taken from the trapped rodents for further analysis. This will most likely be done by medical personnel involved with trapping the rodents, as stated above. The following precautions should be taken to prevent individuals handling live rodents from acquiring disease.

a. All individuals involved in rodent processing and trap collection must be respirator fit-tested and aware of CDC guidelines involved in rodent trapping and processing for hantavirus (Reference 6). If not fit-tested, individuals must be provided other appropriate protective equipment (e.g., PAPR or supplied air). Documentation of fit test may be required. If personnel do not have documentation, survey participation will be limited to trapping only.

b. The following procedures should be implemented:

(1) A baseline serum sample, preferably drawn at the time of employment, should be available from all persons whose occupations involve frequent rodent contact. The serum sample should be stored at -20^{o}C.

(2) Workers in potentially high-risk settings should be informed about the symptoms of hantavirus and be given detailed guidance on preventive measures. Information should include how to recognize rodent infestations or contamination.

(3) Workers who develop a febrile or respiratory illness within 45 days of the last exposure to rodent-infested or contaminated areas should seek medical attention immediately and inform the attending physician of the potential occupational risk of hantavirus infection.

c. The following personal protective clothing and equipment (Figures 8-1 and 8-2) are required when processing rodents for hantavirus detection:

(1) Surgical scrubs or other suitable garments that can be removed and laundered prior to leaving the processing site.

(2) Surgical gown with long sleeves and cuffs, or Tyvec suit.

(3) Plastic surgical apron (worn over the surgical gown or Tyvec suit).

(4) Surgical shoe covers or, preferably, rubber boots that can be disinfected with chemical foot baths as personnel exit the area. Shoe covers disintegrate when disinfected.

(5) Two pairs of surgical gloves -- one pair fitted under the surgical gown cuffs and the second (outer) pair fitted over the surgical gown cuffs. When a Tyvec suit is worn, the sleeves are taped to the first pair of gloves; the second pair of gloves is fitted over the taped first pair.

(6) PAPR with hood. The inside hood flap is placed under the surgical gown or Tyvec suit, while the outer hood flap is placed on the outside of the gown or suit.

(7) Heavy leather or chain mail gloves (to be worn over the surgical gloves) for handling rodent traps and for performing heart puncture blood collection (if this procedure is done). Gloves may not be needed if animals are sedated or dead.

NOTE: Soldiers in field medical units can get the same level of protection mentioned above by wearing MOPP Level 4 (Figure 8-3). When handling rodents, two sets of surgical gloves, usually available from field hospitals or aid stations, can be substituted if greater dexterity is required. The two-glove system is preferred if animals are sedated or dead. For MOPP suit laundering, follow guidance in Chapter 7.

d. The perimeter of the rodent processing area will be clearly marked by tape. Personnel will be suited up outside the perimeter and will enter to process the rodents. Once the processing has begun, those individuals who wish to leave must undergo thorough decontamination procedures (see Chapter 9).

Figure 8-1. Personal protective clothing and equipment.

Figure 8-2. Heavy gloves are worn when performing heart puncture blood collection.

Figure 8-3. Soldiers wearing MOPP Level 4 suits while processing rodents.

CHAPTER 9

PERSONAL PROTECTION AND DECONTAMINATION OF WORKERS INVOLVED IN PROCESSING RODENTS FOR DISEASES AND CLEANING RODENT-INFESTED BUILDINGS

1. INTRODUCTION.

a. Proper protective equipment must be worn by personnel processing rodents for hantavirus or cleaning up rodent-contaminated buildings. The objective of the decontamination procedures in this chapter is to minimize the risk of exposure to this deadly virus after the processing or cleanup is completed and the individual has taken off their protective clothing. The procedures for decontaminating personnel upon leaving the contaminated area are also addressed.

b. The decontamination process will require the participation of several individuals. This should not be a problem since processing rodents or cleanup of rodent-contaminated buildings usually takes several people.

c. Site conditions may require the use of drinking stations, and work-rest cycles should be employed to mitigate heat-related injuries.

NOTE: Individuals should be fully hydrated before entering rodent processing or cleanup areas. Once the individual is exposed to potential hantavirus contamination, then decontamination must be performed before food or water is consumed.

d. Contaminated wash and rinse solutions and contaminated articles must be disposed of in the proper containers and in compliance with all regulations. See Appendix E for further information.

e. A baseline serum sample, preferably drawn at the time of employment, should be available from all persons whose occupations involve frequent rodent contact. The serum sample should be stored at -20^{o}C.

f. Workers in potentially high-risk settings should be informed about the symptoms of hantavirus and be given detailed guidance on preventive measures. Information should include how to recognize rodent infestations or contamination.

g. Workers who develop a febrile or respiratory illness within 45 days of the last exposure to rodent-infested or contaminated areas should seek medical attention immediately and inform the attending physician of the potential occupational risk of hantavirus infection.

h. Individuals involved in processing rodents or cleaning up contaminated buildings should wear the following personal protective clothing and equipment:

(1) Surgical scrubs or other suitable garments that can be removed and laundered prior to leaving the processing site.

(2) Surgical gown with long sleeves and cuffs, or Tyvec suit.

(3) Plastic surgical apron (worn over the surgical gown or Tyvec suit).

(4) Surgical shoe covers.

(5) Two pairs of surgical gloves -- one pair fitted under the surgical gown's cuffs and the second (outer) pair fitted over the surgical gown cuffs. When a Tyvec suit is worn, the sleeves are taped to the first pair of gloves; the second pair of gloves is fitted over the taped first pair.

(6) PAPR with hood. The inside hood flap is placed under the surgical gown or Tyvec suit, while the outer hood flap is placed on the outside of the gown or suit. The PAPR is recommended over N100, full, or half-face respirators because the PAPR offers head protection from virus particles.

(7) Heavy gloves (to be worn over the surgical gloves) for handling rodent traps and for performing heart puncture blood collection (if this procedure is done).

i. Safety procedures outlined in Appendices C and D should be followed at all times.

2. SITE SET-UP. Four work zones will be established at the processing site:

Hot (Exclusion) Zone
Observation Zone (see Hantavirus work site set-up map)
Warm Zone
Cold Zone

a. For details of the decontamination site, see Figure 9-1. Movement of personnel and equipment through these zones should be minimized and restricted to specific access control points (decon corridor).

b. Hot Zone: A clearly marked outer boundary should delineate this area. The access control point should be located upwind of the contaminated area. This Zone contains Station One, the beginning of the decon corridor. Personnel working in this area should have a full-faced respirator or PAPR, surgical scrubs over shorts and a T-shirt, a surgical gown or Tyvec suit with long sleeves that fit tightly around the wrists (tape if necessary), a plastic apron, two pairs of

surgical gloves (inner gloves may be taped to outer garment sleeves at wrists), and boot covers. The Hot Zone for buildings undergoing decontamination will be the entire structure with an extension, known as the decon corridor, leading away from the entrance.

NOTE: Access to a contaminated building should be limited. Only one entrance/exit should be utilized to prevent unauthorized personnel from entering and to ensure that those involved with the cleanup operation exit through the decon corridor.

c. Observation Zone: This area is located just outside the Hot Zone. A half-face respirator may be worn in this area instead of a PAPR or full-faced respirator. No plastic apron, boots, or outer gloves are needed in this area. Personnel in this area are not allowed to participate in the handling of rodents or contaminated equipment. The recorder may assist in the decon procedures but may not enter the Hot Zone. Station Two is located in the decon corridor just over the Hot Zone boundary of Station One.

d. Warm Zone: A buffer zone between the Hot and Cold Zones where some survey support equipment is located (decon equipment, emergency response equipment, additional processing equipment, personal protective equipment such as batteries for the PAPRs). The decon corridor passes through the Warm Zone and the Third Station is located here.

e. Cold Zone: Personnel may wear regular work clothes within this zone. All administrative and support functions take place in this zone. The site supervisor should be located in the Cold Zone.

3. DECONTAMINATION.

a. One individual is designated the decon helper and makes sure all solutions are ready and all disposal containers are placed at the appropriate locations. Information on disposal of waste can be found in Appendix E.

b. Prior to starting the decontamination procedures, the site supervisor must declare that all rodents for the day have been processed and that all samples are properly stored and the rodent data are correct and complete prior to starting the decontamination procedures. In the case of contaminated building cleanup, the site supervisor will declare that all decontamination procedures have been completed and will verify (by count) that all individuals have cleared the building.

(1) Proceed to Station 1 where the individual is misted completely but lightly by the helper with a dilute disinfectant solution over the entire outer covering of the body, concentrating on the boot area (Figure 9-2). Disinfectant application can best be accomplished using a 1- or 2-gallon compressed sprayer.

(2) Remove the boot covers and plastic apron and dispose of them in the refuse bag

provided.

(3) Wash the outer gloves in dilute disinfectant solution in the bucket; remove the outer gloves and throw them into the medical waste bag at Station 1.

(4) Step across the Hot Zone boundary line to Station 2.

(5) Decon helper will mist entire outer surface of protective clothing, including the PAPR.

(6) Unbuckle the PAPR battery pack unit and hand to helper (Figure 9-3).

(7) Step to Station 3. Remove PAPR hood (Figure 9-4) or respirator and lay it out in the sun. The helper will turn off the unit, plug the HEPA filters, and spray the PAPR unit and hood, being careful not to allow mist to enter the battery connections.

(8) Wash the inner gloves in the decontamination solution. Remove the second pair of gloves and throw them into the refuse bag.

(9) If a worker is wearing a full-face or half-face respirator, place the HEPA or N100 filters in the decontamination solution for 15 min., then throw them into a refuse bag. Wipe down the outside of the respirator with disinfectant.

(10) The helper will cap the filters used with the PAPR, mist the PAPR unit with decontamination solution, and remove the filters, placing them in a plastic bag, labeled with the processors name, to be reused.

(11) Remove the surgical scrubs and have the helper spray them down before placing them in the scrub bag. The scrubs should be laundered as soon as possible. The Tyvec suit should be sprayed with disinfectant and then discarded in a refuse bag.

(12) Step to Station 4.

(13) Wash hands and face with mild soap provided; rinse well.

d. Repeat for all processors. As the decontamination procedures progress, the remaining personnel will decon the last traps and make sure all data forms and equipment are secured for decontamination. All equipment will be decontaminated by spraying or wiping down with dilute disinfectant or appropriate biocide. The biohazard bag must be sealed before removal from the site.

e. The Hot Zone area will not be considered safe until the site supervisor declares it so. The site should be exposed to 30 minutes of direct sunlight, if possible, following decontamination procedures. If a permanent cover is in place, or the site is shaded by trees, then the site should be

left intact for 30 minutes after the last individual has left the site.

Figure 9-2. Individual is completely misted with disinfectant.

Figure 9-3. Unbuckle the PAPR battery pack and hand to the helper.

Figure 9-4. Remove the PAPR hood.

APPENDIX A

REFERENCES

1. FM 8-33, Control of Communicable Diseases Manual. 2004. 18th ed. D. L. Heymann (*ed*.), Amer. Public Health Assn., Washington, DC. 700 pp.

2. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Technical Guide (TG) No. 103, Prevention and Control of Plague, September 1995.

3. USACHPPM TG No. 138, Guide to Commensal Rodent Control, December 1991.

4. Armed Forces Pest Management Board (AFPMB) Technical Guide (TG) No. 36, Personal Protective Techniques Against Insects and Other Arthropods of Military Importance, 18 April 2002.

5. Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), Hantavirus Pulmonary Syndrome - United States: Updated Recommendations for Risk Reduction. Vol. 51, No. RR09;1, 26 July 2002.

6. AFPMB TG No. 40, Methods for Trapping & Sampling Small Mammals for Virologic Testing, CDC, U.S. Department of Health and Human Services, September 1995.

7. MEDCOM Regulation 40-35, Management of Regulated Medical Waste (RMW), 29 July 2008.

APPENDIX B

RESPIRATORY PROTECTION

1. Selection of appropriate respirators should be coordinated with local medical and safety personnel. Most military installations have a selection of respirators that protect workers against locally identified hazards, including pesticide application. All respirators should be fit-tested to the worker by competent medical personnel. All respirators must be approved by the National Institute for Occupational Safety and Health (NIOSH) and/or Mine Safety Health Administration (MSHA) approval.

NOTE: The Pest Management section should contact the appropriate medical office before purchasing any respiratory protective equipment. The following offices have primary responsibility for identifying respiratory equipment requirements at each military installation:

USA: Preventive Medicine Activity.
USN/USMC: Occupational Health/Industrial Hygiene
USAF: Bioenvironmental Engineering.

2. To maintain respiratory protection devices, wash all rubber surfaces with soap and water after each day's use. Follow the manufacturer's instructions on maintenance of the respirator. Store respirators in a cool dark area if storage is to be prolonged. Discard cartridges after 8 hours of actual use, sooner if breathing becomes difficult.

3. Readers are advised to consult personnel knowledgeable in respirator selection and use. Respirators already in use may require only a HEPA prefilter, but proper selection is necessary to ensure component compatibility. Complete respirator assemblies with HEPA prefilters and associated canisters/cartridges also require proper selection. In either case, proper selection of HEPA prefilters, canisters or cartridges and complete assemblies must be made to ensure worker protection and adherence to respirator certification and approval.

APPENDIX C

HEALTH AND SAFETY PLAN
FOR
HANTAVIRUS SURVEYS AND RODENT CLEANUP OPERATIONS

A. Site Information (fill in as appropriate).

Site:
Dates of Survey:
Weather Conditions:

Additional Information:

B. On-Site Organization and Coordination (fill in as appropriate).

Project Team Leader/Site Supervisor:

Scientific Advisor:

Site Safety Officer*:

Public Information Officer*:

Security Officer*:

Recordkeeper:

Field Team Leader:

All personnel arriving on the site should log in and out with the record keeper or site supervisor. Installation personnel (*) should be notified in advance of the survey. Coordination of all facets of the survey should be done prior to rodent processing or cleanup operations.

HEALTH AND SAFETY PLAN CHECKLIST
FOR
HANTAVIRUS SURVEYS AND RODENT CLEANUP OPERATIONS

Done?	Activity
	Field plan for survey
	Hazard recognition
	Documentation
	Reporting procedure
	Safety officer
	Phone numbers
	Training--safety equipment, respirator fit test
	Follow-ups
	Personal protective measures
	Safety guidelines
	CDC - USACHPPM
	Water discipline
	Heat stress
	Site generated wastes
	Worst case scenario
	Personal protective equipment compromised
	Needle stick
	Injuries
	Blood to blood contact

SURVEY/CLEANUP TEAM MEMBERS

Name	Title	Address	DSN/Commercial:

C. On-Site Control.

_____ has been designated as site supervisor to coordinate access control and security on-site. A safe perimeter will be established around the processing/cleanup site. This area will be considered a contaminated area just prior to rodent processing/cleanup and all personnel will wear appropriate personal protective gear. After daily rodent processing, decontamination of area will be completed using an appropriate biocide. The area will be considered decontaminated after spraying down of site and equipment and 30 minutes of sunlight.

Description of processing/cleanup site with exact location and map:

D. Personal Protective Equipment.

All members involved in rodent processing, trap collection, and cleanup operations will be respirator fit-tested and aware of Centers for Disease Control and Prevention guidelines involved in rodent trapping and processing, and protection from hantavirus. If not fit-tested, these team members must be provided other appropriate protective equipment. Documentation of fit test may be required. If personnel do not have documentation, survey participation will be limited to trapping only.

Specific protective equipment needed includes:

Full- or half-face respirators with HEPA filters, N100 respirator, or PAPR
Splash goggles
Latex gloves
Tyvec coveralls or surgical gowns and surgical scrubs
Disinfectable boots and boot covers
Leather or heavy rubber gloves for trap handling and needles
Plastic apron

_____
_____
_____

E. Trapping Rodents.

1. When collecting traps, the proper protective equipment should be worn. This includes gloves to prevent being cut by the traps, and a respirator when checking the traps for rodents. The surveyors tape marking all positive traps will be labeled with the corresponding trap number to enable the return of all released rodents to the area where they were captured. All negative traps should be collected and put in a separate bag. Remove the surveyors tape marking the negative traps at this time. Positive traps will be transported to a previously designated processing area in double black plastic bags (to minimize possible transmission of hantavirus to the collectors). This is to be done in a timely fashion to prevent animal mortality.

2. Once the traps have been transported to the processing area, they can be removed from the bags. The area is then considered "hot" and all personnel entering the processing area must wear the proper personal protective equipment. When all trap lines have been checked and all positive traps properly transported, rodent processing can proceed.

F. Processing Rodents.

Procedures will be completed at the designated processing site in the proper personal protective equipment. See Chapters 7 and 8 for proper clothing and equipment.

G. Decontamination.

1. After processing/cleanup is finished, the entire processing bench and all equipment will be decontaminated with the appropriate solutions of disinfectant or biocide. All processing/cleanup equipment will either be soaked in solution or sprayed down and let set in the sun for at least 30 minutes. Comply with all label directions and any recommendations for use and disposal of decontamination solutions. See Chapter 9 for a detailed discussion of decontamination procedures.

2. Personnel will take off their personal protective equipment in the recommended sequence.

top gloves
plastic apron
respirator/PAPR
surgical gown
eye protection
boot covers
second layer of gloves
surgical scrubs or other outer clothing

3. When removing protective gear, a helper should assist by wiping off the respirator with a decontamination solution, then removing the HEPA filters.

4. The respirator should be further wiped down and stored in a plastic bag for use the next day.

5. The HEPA filters should be soaked in decontamination solution, double bagged and properly discarded.

6. All gloves, gowns, and boot covers will be disposed of after each use.

7. If a person needs to leave the "hot" area for any reason, the above procedure will be followed.

APPENDIX D

HANTAVIRUS SAFETY BRIEFING

1. Hazard Recognition. Because hantavirus is a deadly disease, all precautions outlined in this document will be followed.

a. The virus is transmitted by aerosolized particulates.

b. The modes of transmission are through cuts in the skin, eyes, mucus membranes, and inhalation.

c. All injuries, no matter how small, will be reported to the site supervisor, who will fill out an injury report.

d. Does anyone have facial cuts, blemishes, or hand cuts? Additional protection may be needed.

2. Personal Protective Equipment.

a. All survey and cleanup personnel should have proper training and clearance before they can wear a respirator. Has everyone been fit-tested and had a pulmonary function test? Does everyone have medical clearance to wear a respirator or a PAPR?

b. Personal Protective Equipment includes:

(1) Full-faced respirator or PAPRs, each equipped with HEPA filters. (HOT ZONE, all processors!).

(2) Splash goggles and half-face respirator (WARM OR OBSERVATION ZONE ONLY), recorder and observers.

(3) Two pairs of latex gloves (ALL ZONES).

(4) Puncture-resistant leather or mail gloves for live-animal cardiac sticks and injecting rodents with anesthetic; for sedated or dead rodents, two sets of surgical gloves.

(5) Tyvec coveralls or surgical gowns, surgical scrubs, plastic aprons (ALL ZONES).

(6) Boots and boot covers (HOT ZONE ONLY).

(7) Leather or heavy rubber gloves for handling traps or sharp objects.

3. Heat Stress. The possibility of heat injury exists.

a. Use work-rest cycles to mitigate heat stress.

b. Try to limit time of rodent processing or cleanup operations to no more than three hours.

c. All personnel should be well hydrated.

d. Avoid drinking coffee, alcohol, or other dehydrants or diuretics while working.

e. If at any time anyone feels lightheaded, notify the site supervisor so decontamination procedures can be initiated at once.

f. If heat stress occurs during decontamination, remove individual from Hot to Warm Zone and initiate hydration ASAP.

4. Anesthetizing Rodents and Cardiac Puncture.

a. Puncture-resistant glove will be worn on the hand holding the rodent to prevent a needle stick.

b. Blood vials will be placed in a rack while rodent sera are injected from the syringe.

c. All needles will be disposed of in a sharps container.

5. Sharps Disposal.

a. Two sharps containers will be provided at the processing site:

(1) One at the Anesthetizing area.

(2) One at the Cardiac Puncture area.

b. The sharps containers will be secured each day after processing and not filled more than 3/4 full before discarding.

c. If at any time a syringe with needle is dropped, notify all processors to stop work, pick up the needle and place it into the sharps container prior to resuming rodent processing.

d. After the survey is completed, appropriate installation medical personnel (usually Preventive Medicine) will transport the containers to be properly disposed.

6. Decontamination.

a. There are three areas of decontamination:

(1) Traps.

(2) Processing/cleanup equipment.

(3) Personnel with protective clothing.

b. Traps.

(1) After removing rodents from traps, dump remaining grain, cotton balls and rodent excreta into a Red Bag (Regulated Medical Waste).

(2) Place traps in the first decontamination solution for 10 min.

(3) Wear heavy rubber gloves when removing traps from the first solution. Unfold traps and wash them with a brush in the second decontamination solution, removing all debris.

(4) Rinse the traps with disinfectant and lay them out in the sun in the observation zone.

(5) Once the traps are placed in the observation zone, they are not to be touched by a potentially contaminated worker.

c. Personal Protective Equipment.

(1) Proceed to Station 1 where the individual is misted completely but lightly by the helper with a dilute disinfectant solution over the entire outer covering of the body, concentrating on the boot area (Figure 9-2). Disinfectant application can best be accomplished using a 1- or 2-gallon compressed sprayer.

(2) Remove the boot covers and plastic apron and dispose of them in the refuse bag provided.

(3) Wash the outer gloves in dilute disinfectant solution in the bucket; remove the outer gloves and throw them into the medical waste bag at Station 1.

(4) Step across the Hot Zone boundary line to Station 2.

(5) Helper will mist entire outer surface of protective clothing, including the PAPR.

(6) Unbuckle the PAPR battery pack unit and hand to helper (Figure 9-3).

(7) Step to Station 3. Remove PAPR hood (Figure 9-4) or respirator and lay it out in the sun. The helper will turn off the unit, plug the HEPA filters, and spray the PAPR unit and hood, being careful to not allow mist to enter the battery connections.

(8) Wash the inner gloves in the decontamination solution. Remove the second pair of gloves and throw them into the refuse bag.

(9) If a worker is wearing a full-face or half-face respirator, place the HEPA filters in the decontamination solution for 15 min., then throw them into a refuse bag. Wipe down the outside of the respirator with disinfectant.

(10) The helper will cap the HEPA filters used with the PAPR, mist the PAPR unit with decontamination solution, and remove the HEPA filters, placing them in a plastic bag, labeled with the processors name, to be reused.

(11) Remove the surgical scrubs and have the helper spray them down with disinfectant before placing them in the scrub bag. The scrubs should be laundered between 15 minutes and ½ hour after being sprayed with disinfectant. The Tyvec suit should be sprayed with disinfectant and then discarded in a refuse bag.

(12) Step to Station 4.

(13) Wash hands and face with mild soap provided; rinse well.

d. Processing Equipment.

(1) All equipment will be sprayed until saturated with the decontamination solution before declaring the area cold. This includes all tables, chairs, coolers, shovels, and other items. Items containing organic materials or with many crevices are almost impossible to disinfect using the spray method; it is better to soak these in a bucket or discard them as contaminated waste.

(2) Expose all surfaces of equipment being decontaminated to direct sunlight for 30 minutes, if possible.

We, the undersigned, have been briefed and have read this document, and we agree to comply with the aforementioned procedures.

Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature
Printed Name	Date	Signature

APPENDIX E

DISPOSAL OF WASTE GENERATED DURING HANTAVIRUS SURVEYS

1. Hazardous Waste: None generated.

2. Regulated Medical Waste (RMW):

a. The following will be treated as regulated medical waste:

Sharps. All sharps, including capillary tubes and other objects that could puncture skin, as well as opened but unused needles. Do not recap, bend, cut, or break sharps prior to disposal.

Gloves. Gloves used in handling potentially infected rodents.

Carcasses. Any potentially contaminated carcasses.

b. Handling/On-Site Storage.

Sharps are placed in impervious, rigid, and puncture-resistant lidded RMW containers. Once a sharp is in, it stays in.

All other RMW is placed in durable tear-resistant RMW bags (Red Bags - garbage bags are never acceptable).

3/4 full is as full as these containers get.

Once an object is placed in a RMW bag, it stays there. Do not rummage through the bag!

c. Transportation.

Transport in a closed government vehicle (not a rental car or POV) in a compartment separate from the passenger compartment.

d. Disposal.

Turn over to appropriate installation personnel (medical people typically). If medical personnel are not available on the installation, work with the installation to secure the material and find an approved disposal facility in the local area.

NOTE: Carcasses are stored in a refrigerated area with other pathological waste.

e. General. All other applicable federal, state and local regulations regarding waste generated on site should be followed. The MEDCOM Regulation on Managing Regulated Medical Waste (Reference 7) is a useful resource.

3. Solid Waste.

a. Dilute Disinfectant Solution. Most diluted disinfectant solutions can be disposed of directly in the sanitary sewer, when convenient. When this is impractical, they can be released to the ground in small volumes. Keep in mind that many disinfectants will kill plants if enough is dumped in one place. Disinfectant labels and installation environmental personnel should provide adequate information on disposal methods.

b. All Other Personal Protective Equipment.

Materials should be double bagged using non-RMW bags (plastic garbage bags are suitable). HEPA filters should be immersed in disinfectant prior to placement in the bags.

The insides of the bags, along with their contents, are to be thoroughly sprayed with an appropriate disinfectant.

Bags containing thoroughly disinfected materials may be disposed of as regular garbage in sanitary landfills.

APPENDIX F

HANTAVIRUS PREVENTION: CLEANUP OF RODENT CONTAMINATION

Hantaviruses in the Americas may cause human disease involving the lungs, hence the name "hantavirus pulmonary syndrome" (HPS). Since May 1993, a total of 465 HPS cases (as of 26 March 2007) have been confirmed by the Centers for Disease Control and Prevention (CDC) in residents of 32 states, with 39 of these cases identified retrospectively with onset of illness prior to May 1993. One hundred and sixty five (35%) of the HPS cases have had a fatal outcome. Sin Nombre virus (SNV) has been responsible for over 90% of the human hantavirus cases in the United States in the last nine years. *Peromyscus maniculatus*, the deer mouse, is the primary reservoir for SNV. This has also been confirmed by USAPHC-West surveillance at 44 military installations, mostly in the western half of the United States, where 12% of the *P. maniculatus* sampled have been positive for SNV. The deer mouse is found in most of North America and frequently lives in buildings, including those on military installations. Hantaviruses that cause illness in humans are also found in other rodents, but the number of cases stemming from these hantaviruses is small when compared to SNV. Hantavirus is shed in rodent urine and feces. The primary route of infection, inhalation of airborne particles containing virus, is almost always associated with indoor environments.

Removal of rodent contamination from indoor areas will reduce the risk of personnel acquiring hantavirus infection. The level of contamination, the type of activity in the facility, and the type of personnel performing the cleanup operations will dictate the methods used and the personal protective measures to be taken. The goal of any cleanup operation is to remove rodent contaminants without exposing cleaning personnel to hantavirus-laden particles in the air or on their hands and bodies. The risk of coming into contact with hantavirus increases with the amount of contamination present and the type of cleanup required. Obviously, it is easier to clean up rodent droppings from a hard-surfaced floor than from carpet.

Figure 1. Stacked insulation.

Figure 2. Mouse urine and feces on insulation.

It is also easier to clean up droppings from the floor than from contaminated furniture or other equipment. For example, the rodent-contaminated stacks of insulation shown in Figures 1 and 2 will have to be moved out of the building for disposal. The handling and movement of this material will increase the airborne virus hazard as well as contact with the hands. For this reason, additional precautions will have to be taken when cleaning up this building.

Since hantavirus infection is acquired primarily by inhaling rodent contaminants, protection of the individual's breathing zone is the first line of defense against disease. Wearing a respirator with N100 (HEPA) cartridges will stop particulates containing virus from entering the airway. However, not everyone should be fit-tested for a respirator when cleaning up rodent contamination. For example, light infestations that can be sprayed and cleaned up without otherwise disturbing the droppings should not pose an airborne hazard. However, cleanup of larger amounts of contaminants that will most likely be aerosolized during the cleanup operation requires respirator use.

The second route of infection is through ingestion. This happens when virus particles from rodent urine or feces enter the mouth. Rubber or plastic gloves should be worn on the hands of all individuals cleaning up rodent contamination, even when only disposing of a mouse caught in a trap. When the cleanup is finished, the gloves can be washed with disinfectant or soap and water. The gloves may be reused or discarded in the trash, but only after they have been disinfected on the outside. Wash hands with soap and water when cleanup is finished. For cleanup operations that are likely to result in rodent contaminants contacting the body, coveralls should be worn. These may be disposable or washable. All coveralls should be sprayed with disinfectant before removal from the cleanup site to prevent contamination of vehicles, offices, or other areas where the coveralls are kept. Coveralls should be taped to the gloves at the cuffs and to the legs at the ankles in order to prevent contaminants from entering sleeve or leg openings.

<u>The procedures listed below should be followed when cleaning up rodent contamination.</u>

All personnel involved in cleaning should wear protective clothing and equipment. Depending on the level of contamination, this may include fit-tested respirators with N-100 (HEPA) cartridges, goggles, solvent-resistant gloves, coveralls, and boots.

Spray the floors and those portions of the building's walls that show evidence of rodent activity with a general-purpose disinfectant solution. Special attention must be given to dead rodents, rodent nests, droppings, food, or other items that have been contaminated by rodents; thoroughly soak these items with the disinfectant, and place them into a plastic bag. Use double bags when heavy rodent contamination is encountered. Depending on the amount of contamination, use a wet paper towel, mop, or shovel to remove the soaked material. Seal the plastic bags(s) when full or when the cleanup is completed, and spray the outside of the bags with disinfectant. For light to moderate rodent contamination, small bags containing disinfected materials may be wrapped in newspaper and then placed in a dumpster. Follow local installation

disposal procedures, but generally, larger double bags of contaminated material may also be placed in a dumpster or other approved waste receptacle. Do not attempt to remove dry contaminated materials by sweeping or with a vacuum unless it is equipped with a HEPA filter.

Mop all hard-surfaced floors with water containing a general-purpose disinfectant and detergent. Spray dirt floors with a general-purpose disinfectant and wait 30 minutes before use. Clean carpets and upholstered furniture with commercial-grade cleaning equipment. Remove rodent nests from furniture or equipment and decontaminate. Materials that cannot be decontaminated should be disposed of by burning or burying in accordance with the installation's medical practices. A special note about carpet: Light rodent contamination can be sprayed with disinfectant and cleaned up with a wet paper towel. The area should then be resprayed with disinfectant and air-dried. For heavier contamination, the droppings should first be sprayed with disinfectant and removed with a shovel or mop, after which the carpet should be cleaned with a carpet-cleaning machine containing hot water and disinfectant.

Disinfect all work surfaces, storage cabinets, and drawers by washing them with a solution of water containing a general-purpose disinfectant and a detergent, followed by an additional wiping-down with disinfectant.

Launder contaminated clothing and bedding in hot water and detergent. Items that cannot be laundered may be dry cleaned.

The various cleanup scenarios presented in the following text boxes illustrate the level of contamination, the cleanup methods, and the personal protection required. This information should be used as a general guide, subject to modification or change by Public Health personnel. Examples of light and heavy rodent contamination are shown in Figures 3 and 4.

Figure 3. Light rodent contamination.

Figure 4. Heavy rodent contamination.

METHODS FOR CLEANUP OF RODENT CONTAMINATION

The methods described below address some of the more common scenarios involving rodent contamination on military installations. If questions arise when considering any of these scenarios, or if the cleanup operation does not fit into any of the listed categories, local Public Health personnel should be contacted for advice. Public Health should also be consulted whenever any major cleanup operation is undertaken.

Personnel Involved: All personnel. **1**

Level of Rodent Contamination: Dead mouse in trap.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, 1-gal size plastic bag, newspaper, and rubber or plastic gloves (optional).

Cleanup Method: Spray the mouse and trap with disinfectant until wet. Turn the bag inside out. With the hand inside the bag, pick up the mouse and trap together. Invert the bag over the hand and seal the bag. Wrap the bag in newspaper and place it in a dumpster or garbage can. Spray the area where the trap was removed with a light amount of disinfectant and let dry. If gloves were worn to pick up the trap, spray the outside of the gloves with disinfectant. Remove gloves and wash hands with soap and water.

Personnel Involved: Family Housing and Barracks Occupants. **2**

Level of Rodent Contamination: Light to moderate. Rodent droppings found inside home or barracks room are only along walls, not in traffic areas. Number of droppings per square foot should not exceed 20.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, rubber or plastic gloves, paper towels, plastic bag, and newspaper.

Cleanup Method: Put on the gloves. Open windows and doors in the rodent-contaminated room and air out for 10 minutes. Spray disinfectant on the area containing rodent droppings until wet, whether hard surface or carpet. Wet a paper towel and wipe up the droppings. Place the wet towels and droppings into the plastic bag. Seal the bag, wrap in newspaper, and place in a dumpster or garbage can. Respray the contaminated area with a light amount of disinfectant and let dry. Spray the outside of the gloves with disinfectant. Remove gloves and wash hands with soap and water.

Personnel Involved: Family Housing and Barracks Occupants. **3**

Level of Rodent Contamination: Heavy contamination. Rodent droppings found throughout the room or storage area. Furniture, boxes, and other items contaminated with droppings or urine.

Protective Clothing and Equipment: See instructions in Box 11.

Cleanup Method: Call Public Health for onsite evaluation. Cleanup will require trained, fully protected workers.

Personnel Involved: Workers in bunkers, warehouses, motor pools, ranges, or other industrial buildings. **4**

Level of Rodent Contamination: Light to moderate. Rodent droppings found only along walls, not in traffic areas. Number of droppings per square foot should not exceed 20.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, rubber or plastic gloves, paper towels, plastic bag, and newspaper.

Cleanup Method: Put on the gloves. Open windows and doors in the rodent-contaminated room and air out for 10 minutes. Spray disinfectant on the area containing rodent droppings until wet. Wet a paper towel and wipe up the droppings. Place the wet towels and droppings into the plastic bag. Seal the bag, wrap in newspaper, and discard in a dumpster or garbage can. Respray the contaminated area with a light amount of disinfectant and let dry. Spray the outside of the gloves with disinfectant. Remove gloves and wash hands with soap and water.

Note: These types of buildings do not usually contain carpet. However, if carpet is contaminated, the same procedures mentioned above should be followed as long as the contamination is limited. These procedures are for cleanup of **light to moderate** contamination only. If equipment, boxes, or materials other than floor space are contaminated, or the floor (including carpet) is heavily contaminated, then cleanup will require trained, fully protected workers**.** See instructions in Box 11 and call Public Health for onsite evaluation.

Personnel Involved: Workers in offices, break areas, and other administrative buildings. **5**

Level of Rodent Contamination: Light to moderate. Rodent droppings found only along walls, not in traffic areas. Number of droppings per square foot should not exceed 20.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, rubber or plastic gloves, paper towels, plastic bag, and newspaper.

Cleanup Method: Open windows and doors in the rodent-contaminated room and air out for 10 minutes. Spray disinfectant on the area containing rodent droppings until wet, whether hard surface or carpet. Put on the gloves. Wet a paper towel and wipe up the droppings. Place the wet towels and droppings into the plastic bag. Seal the bag, wrap in newspaper, and place in a dumpster or garbage can. Respray the contaminated area with a light amount of disinfectant and let dry. Spray the outside of the gloves with disinfectant. Remove gloves and wash hands with soap and water.

Note: These procedures are for cleanup of **light to moderate** contamination only. If equipment, boxes, or materials other than floor space are contaminated, or the floor is heavily contaminated, then cleanup will require trained, fully protected workers**.** See instructions in Box 11 and call Public Health for onsite evaluation.

Personnel Involved: Electricians servicing utility boxes. **6**

Level of Rodent Contamination: Light to moderate. Most rodent droppings found in bottom of utility box. Less than 20 droppings found on tops of panels in box.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, half-face respirator with N-100 cartridges, and rubber or plastic gloves.

Cleanup Method: Put on the respirator and rubber or plastic gloves before opening the doors to the utility box. Leave the doors open for 5-10 minutes. Disconnect power to the box. Spray any rodent droppings, urine, or nesting materials until wet. Spray the outside of the gloves with disinfectant. At this point, the respirator and the rubber or plastic gloves may be removed and work gloves may be put on. Complete work and close the box.

Personnel Involved: Personnel cleaning out electrical utility boxes. **7**

Level of Rodent Contamination: Heavy contamination. Rodent droppings found throughout the box. Nesting materials and numerous droppings in the bottom of the box.

Protective Clothing and Equipment: Half-face respirator with N-100 cartridges or PAPR, coveralls, rubber or plastic gloves taped to the coveralls at the wrists, non-vented eye goggles, and rubber or plastic boots.

Cleanup Method: Put on all protective equipment before opening the doors to the box. Leave the doors open for at least 10 minutes. Disconnect power to the box. Spray the contaminated surfaces until wet with disinfectant using a 2-gallon sprayer or other device that minimizes dust. Use scrapers or wet cloth to remove the contaminants. Place contaminants into a plastic bag. Respray the box a second time with disinfectant and air dry. Remember to dispose of the contaminated cloth wipes in the same manner as the cleaned up contaminants. More detailed guidance on decontamination of workers following cleanup can be obtained from the local Public Health office.

Personnel Involved: Stables personnel. **8**

Level of Rodent Contamination: Light to moderate. Rodent droppings found inside tack rooms and storage rooms are only along walls, not in traffic areas. Number of droppings per square foot should not exceed 20.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, rubber or plastic gloves, paper towels, plastic bag, and newspaper.

Cleanup Method: Put on the gloves. Open windows and doors in the rodent-contaminated room and air out for 10 minutes. Spray disinfectant on the area containing rodent droppings until wet. Wet a paper towel and wipe up the droppings. Place the wet towels and droppings into the plastic bag. Seal the bag, wrap in newspaper, and discard in a dumpster or garbage can. Respray the contaminated area with a light amount of disinfectant and let dry. Spray the outside of the gloves with disinfectant. Remove gloves and wash hands with soap and water.

Personnel Involved: Stables personnel. **9**

Level of Rodent Contamination: Heavy contamination. Rodent droppings found throughout the tack room or storage area. Boxes and other items contaminated with droppings or urine.

Protective Clothing and Equipment: See instructions in Box 11.

Cleanup Method: Call Public Health for onsite evaluation. Cleanup will require trained, fully protected workers.

Personnel Involved: Vehicle maintenance personnel. **10**

Level of Rodent Contamination: Light to moderate contamination. Rodent droppings or nesting materials present on seats and floors in the cabs, in heater vents and glove boxes, and on engine blocks. No more than 10 droppings per square foot.

Protective Clothing and Equipment: 1 can or spray bottle of disinfectant, rubber or plastic gloves, paper towels, plastic bag, and newspaper.

Cleanup Method: Put on the gloves. Open all external doors and windows to the cab; open the engine compartment and air out for 10 minutes. Spray disinfectant on the area containing rodent droppings until wet. Wet a paper towel and wipe up the droppings. Place the wet towels and droppings into the plastic bag. Seal the bag, wrap in newspaper, and discard in a dumpster or garbage can. Respray the contaminated area with a light amount of disinfectant and let dry. Spray the outside of the gloves with disinfectant. Remove gloves and wash hands with soap and water. If rodent droppings are found in the heater vents, spray those portions of the vents accessible from the cab. When cleanup is over, start the engine, turn the heater on to low, and, from the outside of the vehicle, spray the disinfectant into the heater vent intake for 30 seconds. Shut off the heater vent and engine and leave the vehicle doors and windows open for 30 minutes.

Note: When heavy rodent contamination is encountered, call Public Health for onsite evaluation. Cleanup will require trained, fully protected workers.

Personnel Involved: Rodent cleanup team members. **11**

Level of Rodent Contamination: Heavy contamination. Rodent droppings, urine, or nesting materials present throughout the area. Area to be cleaned may be hard surfaced or carpeted.

Protective Clothing and Equipment: Half-face respirator with N-100 cartridges or PAPR, coveralls, rubber or plastic gloves taped to coveralls at the wrists, non-vented eye goggles, and rubber or plastic boots.

Cleanup Method: Put on all protective clothing and equipment. Open all external doors and windows. Spray the contaminated surfaces until wet with disinfectant using a 2-gallon sprayer or other device that minimizes dust. Use a shovel or wet mop to remove the contaminants -- never use a broom. Place contaminants into a plastic bag. Mop the floor a second time with disinfectant and air dry. Carpet should be cleaned with a carpet cleaning machine containing hot water and disinfectant. Remember to dispose of the mop head(s) in the same manner as the cleaned up contaminants. More detailed guidance on decontamination of workers following cleanup can be obtained from the local Public Health office.

Note: This is a brief overview of cleanup procedures for substantial amounts of rodent contamination. Detailed instructions and safety briefings will be coordinated with Public Health prior to the time cleanup operations commence.

APPENDIX J. ENDANGERED, THREATENED, AND PROTECTED SPECIES AND SENSITIVE HABITATS

ENDANGERED, THREATENED, AND PROTECTED SPECIES

AND SENSITIVE HABITATS

1. Endangered, threatened, and protected species (special-status species) data and sensitive habitat information are on file at the 63D RSC Environmental Division.
2. Pest management activities with regard to special-status species management on facilities leased by 63D RSC will be conducted by the owner of the installation.
3. It is not anticipated that special-status species of plants or animals will be impacted by pest management activities, since nearly all pest control is limited to corrective action inside or directly outside facility buildings. At those centers where grounds maintenance is performed, the 63D RSC Installation Pest Management Coordinator will review pesticide treatments prior to application to preclude environmental damage.
4. Information regarding special-status species that may be found on lands managed by the 63D RSC is maintained by the Environmental Division and is included in this appendix. Maps of sensitive areas are maintained at the Environmental Division and are provided in this appendix.
5. CA007 – PFC Bacciglieri Armed Forces Reserve Center, Concord, California

    a. **Special-status species.** Surveys for the federally threatened California red-legged frog (*Rana aurora draytonii*) and state sensitive northwestern pond turtle (*Clemmys marmorata marmorata*) and Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*) were conducted along Holbrook Channel at the PFC Bacciglieri Armed Forces Reserve Center (AFRC) in 1997, 1999, 2002, and 2003 (Jones & Stokes 1997 and 1999; USAR 2002 and 2003); none of these species were observed. The 2003 survey for the red-legged frog followed the U.S. Fish and Wildlife Service (USFWS) survey protocol (USFWS 1997). Personnel from the USFWS reviewed and commented on the red-legged frog site assessment report (USAR 2003) and determined that focused surveys for this species were unnecessary because the habitat along Holbrook Channel is marginal at best for the red-legged frog (Nepstad 2003). Additional special-status species surveys occurred in 2006 through 2009 for the snowy egret (*Egretta thula*), Cooper's hawk (*Accipiter cooperii*), burrowing owl (*Athene cunicularia*) and the loggerhead shrike (*Lanius ludovicianus*) (USAR 2006, 2007, 2008, and 2009). The Cooper's hawk (a state listed sensitive species) was observed on and near the PFC Bacciglieri AFRC from 2006 through 2009, and snowy egrets (federally listed sensitive species) were observed in 2006 and 2007 foraging in Holbrook Channel both on and near the AFRC. Even though burrowing owls and loggerhead shrikes have been recorded in the past from the Concord Naval Weapons Station (DON 2002 and 2006) just north of AFRC, neither of these two species have been recorded of the PFC Bacciglieri AFRC during special-status species surveys. The absence of a sighting of these two species is likely due to a lack of viable open habitat on the facility. Given this lack of open habitat on the AFRC, the probability of burrowing owls or loggerhead shrikes nesting on the facility is low, though these species can use the facility grounds for foraging.

b. Sensitive habitats. Approximately 0.3 mile of Holbrook Channel traverses the southern and western boundary of the PFC Bacciglieri AFRC, and it supports wetland and riparian habitats. Three hundred forty-five linear feet is dominated by cattail (*Typha latifolia*); 730 linear feet is bordered by open riparian habitat with various wetland and riparian shrubs, trees, and herbaceous plants; and 358 linear feet consist of dense to moderate riparian vegetation dominated by riparian tree and shrub species (USAR 2003). Holbrook Channel supports one federal (snowy egret) and one state sensitive species (Cooper's hawk), as indicated above. The channel also supports aquatic plants; aquatic invertebrates such as the water strider (*Gerris* sp.); Western mosquitofish (*Gambusia affinis*); and birds associated with aquatic environments such as the mallard (*Anas platyrhynchos*), green heron (*Butorides virescens*), and belted kingfisher (Megac*eryle alcyon*) (Jones & Stokes 1999; USAR 2002 and 2003).

c. Pest management. The wetland and riparian habitats along Holbrook Channel on the PFC Bacciglieri AFRC should be avoided from pest management practices that could potentially have negative impacts on those habitats. Although most pest management practices take place in and around the buildings on the facility, control of pests or invasive vegetation in landscaped areas and on other open land on the facility could affect Holbrook Channel. For example, control measures for Botta's pocket gophers (*Thomomys bottae*) and California ground squirrels (*Spermophilus beecheyi*) could potentially impact the area through pesticide run-off into the watershed. No chemicals should be used to control these or other pest species next to or in a 50-foot buffer zone on either side of Holbrook Channel on the Concord USAR Center. The buffer zone is from the upper edge of the incised channel and extends 50 feet at a right angle away from the channel (Figure H-1). If the control of gophers, California ground squirrels, or other mammals near Holbrook Channel is required, mechanical measures such as traps should be used.

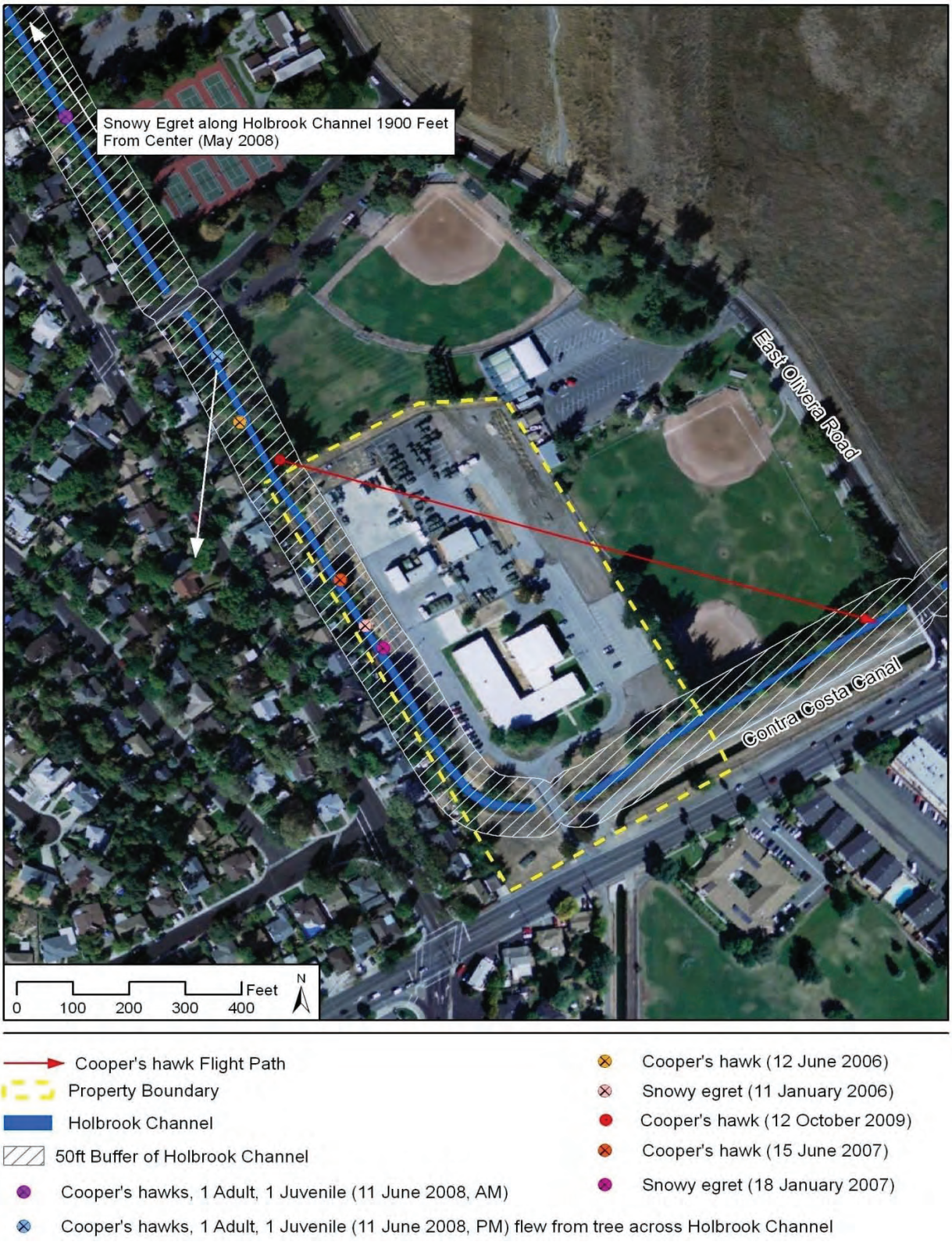


Figure H-1. Special-Status Species and Sensitive Habitats on and near the PFC Bacciglieri AFRC in Concord, California

d. References

DON (Department of the Navy). 2002. Integrated Natural Resources Management Plan and Environmental Assessment Naval Weapons Station Seal Beach, Detachment Concord, California. Prepared for Commanding Office, Naval Weapons Station, Seal Beach, California.

DON (Department of the Navy). 2006. Final Environmental Condition of Property Report for the Naval Weapons Station Seal Beach Detachment Concord, Concord, California. Department of the Navy, Base Realignment and Closure Program Management Office, San Diego, California.

Jones & Stokes. 1997. Evaluation of Natural Resources at U.S. Army Reserve Facilities 63D Regional Support Command California. Prepared for the 63rd Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

Jones & Stokes. 1999. Results of Flora, Fauna, and Habitat Surveys at Baccigleiri U.S. Army Reserve Center, Concord, California. Prepared for the U.S. Army Corps of Engineers, Sacramento, California.

Nepstad, M. 2003. Biologist, USFWS, Sacramento, California. Personal communication with Mike Collins, Principal with Vernadero Consulting, Scottsdale, Arizona. Dated 6 June 2003.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003. California Red-legged Frog Site Assessment PFC Baccigleiri Armed Forces Reserve Center Concord, California 63D Regional Support Command Facility CA007. U.S. Army Reserve, 63D Regional Support Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the Concord U.S. Army Reserve AFRC, Concord, California, 63D Regional Support Command Facility CA007. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007. 2007 Natural Resource Survey at the Concord U. S. Army Armed Forces Reserve AFRC, Concord, California, 63D Regional Support Command Facility CA007.Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008. 2008 Natural Resource Survey at the Concord Armed Forces Reserve Center, Concord, California, 63D Regional Support Command Facility CA007. Environmental Division 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2009. 2009 Natural Resource Survey at the Concord Armed Forces Reserve Center, Concord, California, 63D Regional Support

Command Facility CA007. Environmental Division 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

USFWS (U.S. Fish and Wildlife Service). 1997. Guidance on Site Assessment and Field Surveys for California Red-legged Frogs (*Rana aurora draytonii*), U.S. Fish and Wildlife Service.

1. CA012 – Fort Ord USAR Center, Marina, CA

a. Special-status species. Annual surveys for federal and state special-status species took place on the Fort Ord USAR Center between 1997-1999 and 2002-2009 (Jones & Stokes 1997 and 1999; USAR 2002, 2003, 2004, 2005, 2006, 2007, 2008b, and 2009b). Surveys in 1999 resulted in the observation of the federally threatened Monterey spineflower (*Chorizanthe pungens* var. *pungens*) and state sensitive wedgeleaf horkelia (*Horkelia cuneata* ssp. *sericea*) and sandmat manzanita (*Arctostaphylos pumila*) but did not detect the state sensitive California legless lizard (*Anniella pulchra*) (Jones & Stokes 1999). Biological field surveys for special-status plants followed the USFWS protocol (USFWS 2000); surveys for the legless lizard were conducted by a permitted legless lizard expert in 2003, 2006, 2007, 2008, and 2009. The Monterey spineflower was observed in 2005 through 2008 but not observed during the 2009 survey, likely due to the timing of the survey. The wedgeleaf horkelia and sandmat manzanita were both observed in 2003 through 2009. In addition, the legless lizard was not detected on the facility during intensive surveys in 2003 or 2006 through 2009 (USAR 2003, 2006, 2007, 2008b, and 2009b).

All special-status plants observed since 2003 were marked by a stake with a day glow orange painted top. A map from the 2009 Fort Ord USAR natural resource survey report (USAR 2009b) showing the most current recorded locations for Monterey spineflower, wedgeleaf horkelia, and sandmat manzanita on the Fort Ord USAR Center has been reproduced for this appendix (Figure H-2).

b. Sensitive habitats. Coastal live oak *(Quercus agrifolia*) woodlands occur in patches near the western boundary and in the southern portion of the facility. Various state agencies and other entities have identified the conservation and management of oak woodlands as a priority due to losses from agricultural and urban development, fire wood collecting, and grazing (CalPIF 2002).

c. Pest management. Ice plant (*Carpobrotus chilensis*), French broom (*Genista monspessulana*), pampas grass (*Cortaderia selloana*), poison hemlock (*Conium maculatum*), and sweet fennel (Foeniculum *vulgare)* are invasive weeds that have been recorded as spreading into portions of the native plant community on the Fort Ord USAR Center. Since 2004, an annual invasive plant species removal program has been conducted on this facility (USAR 2004, 2005, 2006, 2007, 2008a, 2009a). Any invasive plants observed growing near a special-status plant species are hand-pulled and disposed of. The mechanical removal of coastal live oak or any alteration of the coastal live oak habitat on the Fort Ord USAR Center should be avoided.

Figure H-2. Special-Status Species on and near Fort Ord USAR Center, Marina, California

d. References

CalPIF (California Partner's-in-Flight). 2002. Version 2.0. The Oak Woodland Bird Conservation Plan: A Strategy for Protecting and Managing Oak Woodland Habitats and Associated Birds in California (S. Zack, Lead Author). Point Reyes Bird Observatory, Stinson Brach, California. Online at http://www.prbo.org/calpif/plans.html. Accessed 14 January 2010.

Jones & Stokes. 1997. Evaluation of Natural Resources at U.S. Army Reserve Facilities 63D Regional Support Command California. Prepared for the 63D Regional Support Command, U S. Army Reserve, Los Alamitos, California.

Jones & Stokes. 1999. Results of Flora, Fauna, and Habitat Surveys at the Fort Ord U.S. Army Reserve Center, City of Marina, California. Prepared for the U.S. Army Corps of Engineers, Sacramento District, Sacramento, California.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003. Special-Status Species Survey Marina USAR Center and Sub AMSA 85 (G), Marina, California, 63D Regional Readiness Command Facility CA012. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2004. Special-Status Species Surveys-2004 Annual Report Marina USAR Center and Sub AMSA 85 (G), Marina, California, 63D Regional Readiness Command Facility CA012. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005. Special-Status Species Surveys-2005 Annual Report Marina USAR Center and Sub AMSA 85 (G), Marina, California, 63D Regional Readiness Command Facility CA012. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the Marina U.S. Army Reserve Center and Sub AMSA 85 (G) Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007. 2007 Natural Resource Survey at the Marina U.S. Army Reserve Center and Sub AMSA 85 (G) Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Invasive Plant Species Removal at the Fort Ord U.S. Army Reserve Center and Sub AMSA 85(G), Marina, California, 63D

Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. 2008 Natural Resource Survey at the Marina U.S. Army Reserve Center and Sub AMSA 85 (G) Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2009a. 2009 Invasive Plant Species Removal at the Fort Ord U.S. Army Reserve Center, Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Moffett Field, California.

USAR (U.S. Army Reserve). 2009b. 2009 Natural Resource Survey at the Fort Ord U.S. Army Reserve Center, Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Moffett Field, California.

USFWS (U.S. Fish and Wildlife Service). 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants. U.S. Fish and Wildlife Service, Ventura Field Office, Ventura, California.

7. CA 062 – B.T. Collins USAR Center, Sacramento, CA

a. Special-status species. Surveys for special-status species took place at the B.T. Collins USAR Center and surrounding area in 1995, 1996, 2002, 2003, 2005, 2006, 2007, 2008, and 2010 (FWEC 1995 and 1996; USAR 2002, 2003, 2005a,b,c, 2006, 2007, 2008a, and 2010). Initially these surveys focused on the temporary wetlands on the facility, the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*), and the state and federal sensitive California linderiella (*Linderiella occidentalis*). Sensitive plant species, California red-legged frogs (*Rana aurora draytonii*), and California tiger salamanders (*Ambystoma californiense*) were not observed during these surveys. The fairy shrimp habitat was eliminated during construction of new facilities, but a new one-acre seasonal wetland was created during this time. Surveys of this pond for the fairy shrimp and the California tiger salamander took place in 2003 through 2007 (USAR 2004, 2005b, 2006, 2007, 2008a, 2010); no California tiger salamanders have ever been observed. The California linderiella was first detected in the 1-acre pond during the 30 March 2006 survey (USAR 2006) and was detected during the 2007 and 2009 surveys. In all three surveys within the one-acre wetland, the California linderiella was observed to occur at a low abundance (0-4 individuals per 4 cubic feet) (USAR 2006, 2007, and 2010). Special-status plant species surveys were conducted throughout the USAR Center from 2004 through 2009 (USAR 2005b, 2006, 2007, 2008a, and 2010), and no special-status plant species have been observed.

The burrowing owl (*Athene cunicularia*) was first recorded on the B.T. Collins USAR Center in 1995 (FWEC 1996). Active burrows of this species of owl were observed within

the USAR Center boundaries during protocol burrowing owl surveys (TCBOC 1993) from 2004 through 2009 (USAR 2005a,c, 2006, 2007, 2008a, 2010). In 2003, no active burrowing owl burrows were detected on the USAR Center, but five active burrows were observed within a 500-foot buffer zone around the BT Collins USAR Center (USAR 2003). A marked decline in burrowing owl populations has been observed beginning in 2008, presumably due to development and habitat loss on the adjacent properties (USAR 2008b).

Other special-status species observed during the burrowing owl surveys were the loggerhead shrike (*Lanius ludovicianus*), Cooper's hawk (*Accipiter cooperii*), snowy egret (*Egretta thula*), and the white-tailed kite (*Elanus leucurus*). The snowy egret was observed during the 2009 -2010 natural resources survey, along Morrison Creek northeast of the B.T. Collins USAR Center (USAR 2010). A Cooper's hawk was observed during a special-status species survey, in the non-native grassland north of the USAR Center in 2007 (USAR 2007). The white-tailed kite has been observed on the USAR Center only in 2008 (USAR 2008a), but was observed during special-status species surveys on lands adjacent to the USAR Center in 2003 through 2007, and in 2009 (USAR 2003, 2005a,c, 2006, 2007, 2008a, 2010). The white-tailed kite was also observed nesting within the California National Guard property adjacent to the USAR Center in 2003 and 2006 (USAR 2003 and 2006). Loggerhead shrikes were observed on the USAR Center during special-status species surveys in 2003, 2005, and 2006 (USAR 2003, 2005a, 2006) and were recorded nesting on the USAR Center in 2003 and 2005 (USAR 2003 and 2005b). Loggerhead shrikes were also observed on lands adjacent to the USAR Center in 2006, 2007, and 2008 (USAR 2006, 2007, 2008a). All historical loggerhead shrike and white-tailed kite nest locations and 2009 - 2010 observations of special-status species on or near the USAR Center are presented in Figure H-3.

b. Sensitive habitats. Two jurisdictional seasonal wetlands (Figure H-4) occur on the B.T. Collins USAR Center, they include the one-acre seasonal pond along the southern border of the USAR Center and a small wetland along the northern fence line (USAR 2005b). Three other isolated seasonal wetlands (Figure H-4) occur on the facility (two in the southeast corner and one north of the main vehicle entrance gate) (USAR 2005b). The one-acre seasonal pond supports the California linderiella shrimp (a state/federal sensitive species), aquatic invertebrates and plants, as well as the bullfrog (*Rana catesbeiana*) and Pacific chorus frog (*Hyla regilla*) (USAR 2004, 2005b, 2006, 2007, 2008a, and 2010).

c. Pest management. Wetlands at the seasonal pond and elsewhere on the B.T. Collins USAR Center should be avoided during pest management practices that could potentially have adverse impacts on those ecosystems. Although most pest management practices take place in and around the buildings on the facility, control of pests or invasive species, for example the Botta's pocket gophers (*Thomomys bottae*) and California ground squirrels (*Spermophilus beecheyi*), in landscaped or open land could also take place. No chemicals should be used to control these or other pest species next to or within a 50-foot buffer zone around any seasonal wetland (Figure H-4).

Figure H-3. Special-Status Species on and near B.T. Collins USAR Center, Sacramento, California

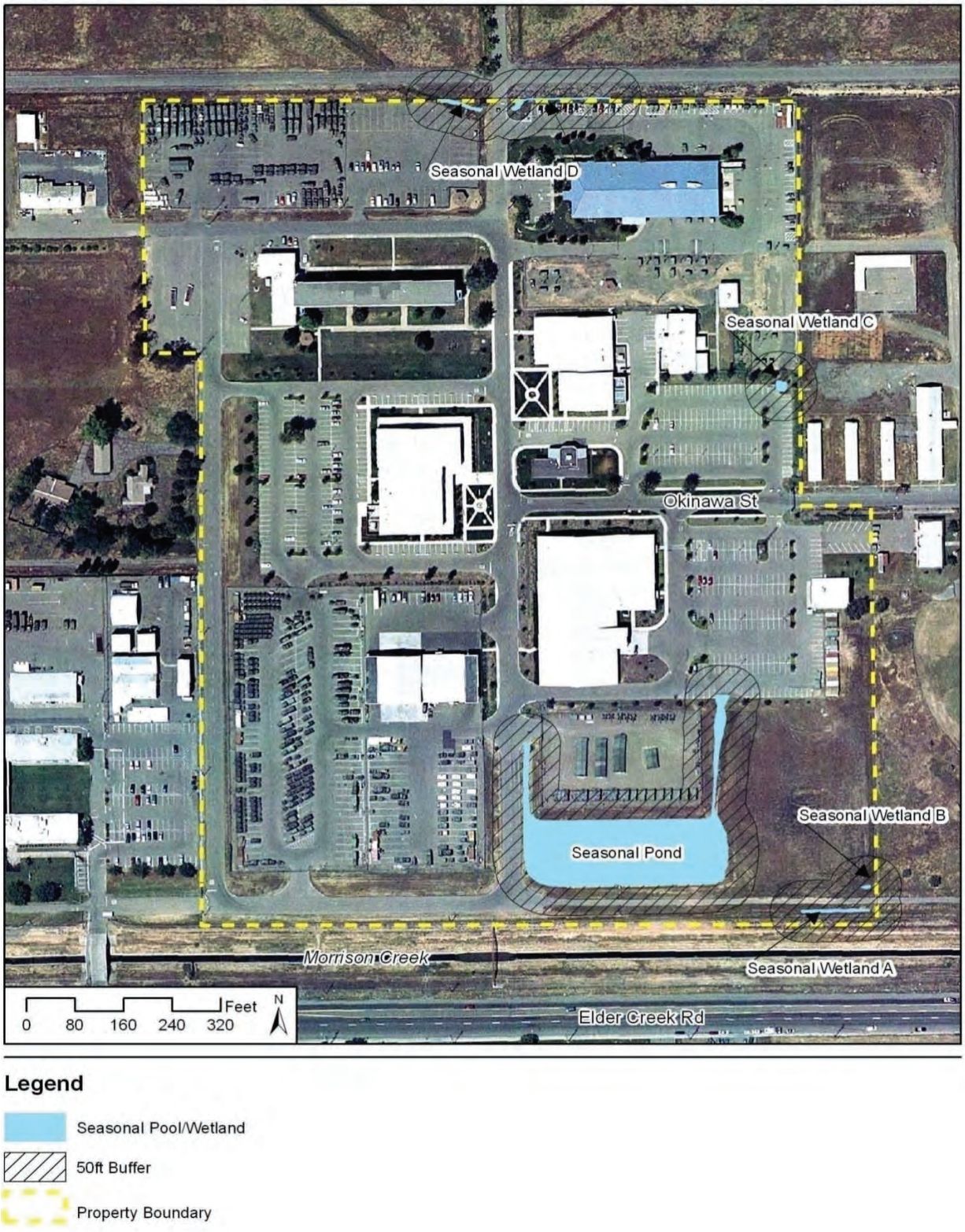


Figure H-4. Seasonal Wetland Locations on B.T. Collins USAR Center, Sacramento, California

If control efforts for gophers, California ground squirrels, or other mammals near a seasonal wetland are required, mechanical measures such as traps are recommended. In addition, any California ground squirrel control activities will need to consider potential effects on the burrowing owl. Chemical or mechanical control measures for the ground squirrels could have an adverse effect on the burrowing owl if control measures impact burrows occupied by these owls. Proposals to conduct California ground squirrel control should not take place until it is determined whether the burrowing owl inhabits the treatment area and if the activity would violate the Migratory Bird Treaty Act, under which this bird species is protected. Such a determination should be made by a biologist who is familiar with burrowing owl ecology. Pest control measures are not expected to affect the loggerhead shrike or the white-tailed kite, but this determination should also be made by a biologist familiar with the ecology of those two species.

The stinkwort (*Dittrichia graveolens*), a new potentially invasive plant species identified by the Sacramento Weed Management Area, occurs scattered throughout the B.T. Collins USAR Center. It is highly recommended that the stinkwort be controlled on this facility. The preferred method of control is removal of plant by hand, bagging the pulled plants, and disposing of the bag in a landfill. If hand removal techniques fail to control stinkwort on the USAR Center, then spot application of the herbicide glyphosate in a formulation registered for aquatic use (i.e. Rodeo®) can be used. Weeding or herbicide application should occur before the blooming stage for the plant (generally August) (USAR 2010).

d. References

FWEC (Forest Wheeler Environmental Corporation). 1995. Wetland Delineation Report B. T. Collins Army Reserve Training Center Sacramento, California. Prepared for the U.S. Army Corps of Engineers, Sacramento, California.

FWEC (Forest Wheeler Environmental Corporation). 1996. Biological Assessment for the B. T. Collins Army Reserve Training Center. Prepared for the U.S. Army Corps of Engineers, Sacramento, California.

TCBOC (The California Burrowing Owl Consortium). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. California Department of Fish and Game, Sacramento, California.

USAR (U.S. Army Reserve). 2003. Burrowing Owl Habitat Assessment, Burrow Survey and Census B. T. Collins USAR Center and AMSA 98(G) Sacramento, California 63D Regional Readiness Command Facility CA062. U.S. Army Reserve, 63D Regional Readiness Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2004. Wetland and Special-Status Species Surveys, B.T. Collins Army Reserve Center and AMSA 98 (G), Sacramento, California (CA 062), 63D Regional Readiness Command U.S. Army Reserve. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005a. Spring and Summer 2005 Breeding Season Burrowing Owl Surveys, B.T. Collins USAR Center and AMSA 98(G) Sacramento,

California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005b. Wetland & Special-Status Species Survey B.T. Collins USAR Center and AMSA 98(G) Sacramento, California (CA062), 63D Regional Readiness Command, U.S. Army Reserve. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California. USAR (U.S. Army Reserve).

USAR (U.S. Army Reserve). 2005c. Wintering Burrowing Owl Habitat Survey B.T. Collins USAR Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey B.T. Collins USAR Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007. 2007 Natural Resource Survey at the B.T. Collins U.S. Army Reserve Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Natural Resource Survey at the B.T. Collins U.S. Army Reserve Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. Cumulative Impact Analysis of Habitat Loss and Fragmentation on a Burrowing Owl Population On and Near the B.T. Collins U. S. Army Reserve Center and AMSA 98(G) Sacramento, California 63D Regional Support Command Facility CA062. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2010. 2009 Natural Resource Survey at the B.T. Collins U.S. Army Reserve Center and AMSA 98 (G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

8. CA150 – Mare Island USAR Center, Vallejo, CA

a. Special-status species. Assessments of the potential for special-status species to occur at the Mare Island USAR Center took place in 1997, 2002, 2004, 2006, 2007, 2008, and 2009 (Jones & Stokes 1997; USAR 2002, 2004, 2006, 2007b, 2008b, and 2009a). A special-status species that has the potential to occur on the Mare Island USAR Center is the monarch butterfly (*Danaus plexippus*). A winter roost location for monarch butterflies occurs in a eucalyptus grove at St. Peters Chapel on Captain's Row

on Mare Island, not far from the USAR Center, as well as in eucalyptus trees between Highway 29 and Mare Island Strait (CNDDB 2000). Monarch butterfly surveys took place on and near the facility during February 2004, 2007, and 2008 to determine if a winter roost occurs in the bluegum eucalyptus (*Eucalyptus globulus*) grove just west of the Mare Island USAR Center (USAR 2004, 2007a, 2008a). Only one butterfly was observed on the USAR Center in 2008 and a few were recorded in an open eucalyptus grove on top of a hill above the USAR Center (USAR 2008a). No monarch butterflies were recorded in the eucalyptus grove west and adjacent to the USAR Center. Even if this area supports a winter concentration of monarch butterflies in the future, it is far enough from the USAR Center that activities on the Center would unlikely effect the monarch wintering grounds (USAR 2008c).

Special-status fish species such as the winter-run Chinook salmon (*Oncorhynchus tshawytscha*), North American green sturgeon (*Acipenser medirostris*), and delta smelt (*Hypomesus transpacificus*) occur occasionally in the Mare Island Strait (USAR 1999; ECORP 2009). In November 2009, critical habitat for the North American green sturgeon was designated throughout San Pablo Bay by the National Marine Fisheries Service (NMFS) (USAR 2008c); however, the NMFS determined that the waters within the boundaries of the Mare Island USAR Center between and around Piers 22 and 23 are excluded from being designated green sturgeon critical habitat based on impacts to national security (USAR 2009b).

Surveys have been conducted for bats on the Mare Island USAR Center and the only species recorded was the Brazilian free-tailed bat (*Tadarida brasiliensis*), which is not a special-status species (USAR 1999). However, there is the potential for sensitive bat species to occur in the buildings of the USAR Center. Bat surveys were conducted by a biologist in 2004 and 2006 through 2009; no sensitive bat species have been detected (USAR 2004, 2006, 2007b, 2008b, and 2009a).

b. Sensitive habitats. There are no sensitive habitats on the Mare Island USAR Center, but critical habitat for North American green sturgeon has been assigned to the waters of San Pablo Bay beyond the boundaries of the USAR Center (FigureH-5).

c. Pest management. Guidelines outlined in 63D RSC Integrated Natural Resources Management Plan with the December 2009 Addendum (USAR 2009b) should be followed when conducting pest management activities on the Mare Island USAR Center. Any pest management activities that occur on the USAR Center that have the potential to affect the critical habitat (defined by the NMFS) adjacent to the USAR Center for North American green sturgeon, should be reviewed by a biologist familiar with these issues. All physical control measures for French broom, sweet fennel, Himalayan blackberry, ivy, and Spanish broom should not affect terrestrial special-status species or sensitive habitats, since none have been recorded occurring within the USAR Center. Chemical control of these species should be used as a last resort, and preventive measures shall be conducted to minimize any run-off of herbicides entering the San Pablo Bay.

Figure H-5. Special-Status Species on and near Mare Island USAR Center, Vallejo, California

d. References

CNDDB (California Natural Diversity Data Base). 2000. Rare Find 2, Version 2.1.2. California Department of Fish and Game, Sacramento, California.

ECORP Consulting Inc. (ECORP). 2009. Report of 2007 and 2008 Findings: Juvenile Salmonid Tracking Project, Mare Island US Army Reserve Center (CA 150), Mare Island Strait, Solano County, California.

Jones & Stokes. 1997. Evaluation of Natural resources at U.S. Army Reserve Facilities 63D Regional Support Command California. Prepared for the 63rd Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 1999. Final Environmental Assessment, Proposed USAR Military Construction/Training Related Actions, Mare Island USARC. U.S. Army Reserve, 63D Regional Support Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2004. Bat and Monarch Butterfly Surveys, Mare Island USAR Center and AMSA 13, Vallejo, California, 63D Regional Support Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the Mare Island U. S. Army Reserve Center, Vallejo California, 63D Regional Readiness Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007a. 2007 Monarch Butterfly Surveys at the Concord Armed Forces Reserve Center, Mare Island U. S. Army Reserve Center, and Marina U.S. Army Reserve Center. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007b. 2007 Natural Resource Survey at the Mare Island U. S. Army Reserve Center, Vallejo California, 63D Regional Readiness Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Monarch Butterfly Surveys at the Mare Island U. S. Army Reserve Center, Vallejo California, 63D regional Readiness Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. 2008 Natural Resource Survey at the Mare Island U.S. Army Reserve Center and AMSA 13, Vallejo, California, 63D Regional Support

Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008c. 63D Regional Support Command Integrated Natural Resource Management Plan for USAR Property in Arizona, California, and Nevada, FY 08 – FY 12. 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2009a. 2009 Natural Resource Survey at the Mare Island U.S. Army Reserve Center and AMSA 13, Vallejo, California, 63D Regional Support Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

USAR (U.S. Army Reserve). 2009b. 63D Regional Support Command Integrated Natural Resource Management Plan for USAR Property in Arizona, California, and Nevada, FY 08 – FY 12, Addendum December 2009. 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

9. CA151 – March Armed Forces Reserve Center, Riverside, CA

a. Special-status species. Prior to 2008, the U.S. Army Reserve owned and occupied buildings on Parcels B-2a, B-2b, B-2c, and B-2d (collectively known as the March USAR Center) on the former March Air Force Base (Figure H-6). In 2008, the USAR began building a new facility called the Moreno Valley AFRC on parcels E-2 and K-5, which are located across Riverside Drive to the west of the B-2 parcels, and transferred ownership of all B-2 parcels to the Joint Powers Authority (JPA). The USAR has leased back all the buildings and property on Parcels B-2a through B-2d and will occupy those properties until construction at the Moreno Valley AFRC is completed.

From 2002 to 2010, special-status species surveys have been conducted on the March USAR Center. The burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*) and Cooper's hawk (*Accipiter cooperii*) are the only special-status species that have been recorded (Figure H-7) during these surveys (USAR 2002; 2003a,b; 2005a,b; 2006; 2007a; 2008b; 2010). Active burrowing owl burrows have been recorded within Parcel B-2a from 2002-2010 and east of that parcel in 2002, 2006, 2007a, 2009, and 2010 (USAR 2003b, 2005a,b; 2006; 2007a; 2008b; 2010). Active burrowing owl burrows were also recorded south of Parcel B-2a in 2007 and north of Parcel B-2d in the winter 2004 - 2005 and in the 2006 breeding season (USAR 2006 and 2007). Cooper's hawks have been recorded north of Parcel B-2b in 2007 and on Parcel B-2c in 2009 (USAR 2007a and 2010). A Cooper's hawk nest was recorded approximately 2,500 feet south of the March USAR Center in 2008 (USAR 2008a). All active burrowing owl burrows and Cooper's hawk locations recorded during the 2009 - 2010 special-status species surveys are presented in Figure H-7.

Figure H-6. Property Boundaries for the March USAR Center and the Moreno Valley AFRC, Riverside, California

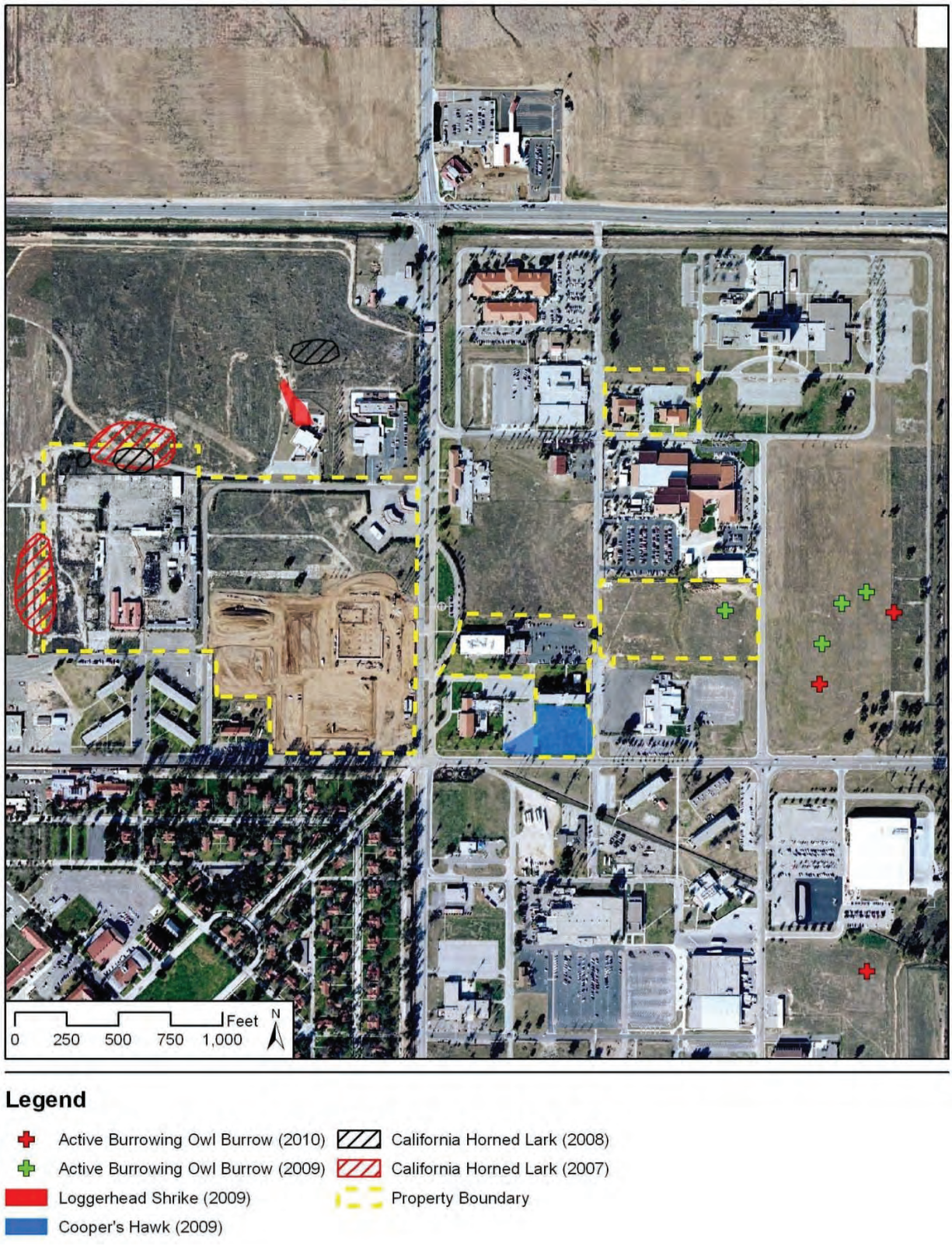


Figure H-7. Special-Status Species on or near the March USAR Center and Moreno Valley AFRC, Riverside, California

Special-status species were also assessed at and near the Moreno Valley AFRC in 2003 and from 2005 to 2010. Burrowing owls have not been observed during surveys that followed the burrowing owl survey protocol (TCBOC 1993) on the Moreno Valley AFRC between 2002 to 2010, though two active nests were recorded north of Parcel E-2 in 2006 (USAR 2003a, 2003b, 2005a,b, 2006, 2007a, 2007b, 2008c, 2008b, and 2010). The only other special-status species recorded on or near the land being used to construct the Moreno Valley AFRC were the state sensitive coastal western whiptail lizard (*Cnemidophorus tigris multiscutatus*), the loggerhead shrike which is a federal and state species of concern, and the Cooper's hawk and the California horned lark (*Eremophila alpestris actia*) which are state species of concern. The coastal western whiptail was observed 100 feet north of Parcel E-2 in 2003 (USAR 2003), while the Cooper's hawk was observed perched on a pole within Parcel E-2 in 2005 (USAR 2005a). Loggerhead shrikes were recorded on or north of the Parcel E-2 northern fence in 2003, 2007, and 2009 (USAR 2003, 2007a, 2010). California horned larks were recorded within the Moreno Valley AFRC property in 2007, 2008, and 2009 (USAR 2007a, 2008a, 2009). All loggerhead shrike and California horned lark locations recorded during the 2009 - 2010 special-status species surveys are presented in Figure H-7.

The federally endangered Stephens' kangaroo rat (*Dipodomys stephensi*) occurs on the former March Air Force Base, but neither this species nor signs of this species were observed on either USAR properties; it was concluded that it is highly unlikely that this species occurs on or near any land administered by the USAR on the former March Air Force Base (USAR 2003a).

b. Sensitive habitats. There are no sensitive habitats on the March USAR Center or the Moreno Valley USAR Center.

c. Pest management. Although burrowing owl nests were not observed on or adjacent to the Moreno Valley AFRC property in 2003 and 2005 through 2010, it does occur nearby and on March USAR Center property. Potential nest sites (abandoned California ground squirrel burrows) are on both facilities and could be used by the burrowing owl in the future. Chemical and/or mechanical control measures for the ground squirrel could have an adverse effect on the burrowing owl if such measures affect burrows occupied by these owls. Therefore, any proposal for California ground squirrel pest control measures should not take place until it is determined whether burrowing owls inhabit the treatment area. Such a determination should be made by a biologist who is familiar with burrowing owl ecology. Pest control measures are not expected to affect the loggerhead shrike or coastal western whiptail lizard.

d. References

TCBOC (The California Burrowing Owl Consortium). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. California Department of Fish and Game, Sacramento, California.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003a. Biological assessment for the Construction and Operation March USAR Center and AMSA 19 Riverside County, California 63D Regional Readiness Command Facility CA152. U.S. Army Reserve, 63D Regional Readiness Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003b. Burrowing Owl Habitat Assessment, Burrow Survey and Census March USAR Center and AMSA 19 Riverside County, California 63D Regional Readiness Command Facility CA152. U.S. Army Reserve, 63D Regional Readiness Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005a. Summer 2005 Breeding Season Burrowing Owl Surveys, March USAR Center Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005b. Wintering Burrowing Owl Surveys March USAR Center and AMSA 19 Riverside County, California, 63D Regional Readiness Command Facility CA152. 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the March U.S. Army Reserve Center Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007a. 2007 Natural Resource Survey at the March U.S. Army Reserve Center Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007b. 63D Regional Readiness Command Integrated Natural Resource Management Plan FY 2008 – FY 2013. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Natural Resource Survey at the March U.S. Army Reserve Centers, Riverside County, California, 63D Regional Support Command Facility CA152. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. Burrowing Owl Management Plan for the March U.S. Army Reserve Center and Armed Forces Reserve Center in Riverside County, California, 63D Regional Support Command Facility CA152. Environmental

Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008c. Cumulative Impact Analysis of Habitat Loss and Fragmentation on a Burrowing Owl Population On and Near the March U.S. Army Reserve Center and Armed Forces Reserve Center in Riverside County, California, 63D Regional Support Command Facility CA152. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2010. 2009 Natural Resources Survey at the March U.S. Army Reserve Center and at the Moreno Valley U.S. Army Reserve Center in Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

APPENDIX J. ENDANGERED, THREATENED, AND PROTECTED SPECIES AND SENSITIVE HABITATS

ENDANGERED, THREATENED, AND PROTECTED SPECIES AND SENSITIVE HABITATS

- Endangered, threatened, and protected species (special-status species) data, maps and sensitive habitat information for CA007, CA012, CA062, CA150, CA151, and CA187 are on file at the 63D RD Environmental Division.
- Information and maps regarding special-status species that may be found on lands managed by the 63D RD is maintained by the Environmental Division and is included in this appendix. Maps of sensitive areas are maintained at the Environmental Division and are provided in this appendix.
- Pest management activities with regard to special-status species management on facilities leased by 63D RD will be conducted by the owner of the installation.
- It is not anticipated that special-status species of plants or animals will be impacted by pest management activities, since nearly all pest control is limited to corrective action inside or directly outside facility buildings. At those centers where grounds maintenance is performed, the 63D RD Installation Pest Management Coordinator will review pesticide treatments prior to application to preclude environmental damage.

1. CA007 – PFC Bacciglieri Armed Forces Reserve Center, Concord, California

a. Special-status species. Surveys for the federally threatened California red-legged frog (*Rana aurora draytonii*) and state sensitive northwestern pond turtle (*Clemmys marmorata marmorata*) and Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*) were conducted along Holbrook Channel at the PFC Bacciglieri Armed Forces Reserve Center (AFRC) in 1997, 1999, 2002, and 2003 (Jones & Stokes 1997 and 1999; USAR 2002 and 2003); none of these species were observed. The 2003 survey for the red-legged frog followed the U.S. Fish and Wildlife Service (USFWS) survey protocol (USFWS 1997). Personnel from the USFWS reviewed and commented on the red-legged frog site assessment report (USAR 2003) and determined that focused surveys for this species were unnecessary because the habitat along Holbrook Channel is marginal at best for the red-legged frog (Nepstad 2003). Additional special-status species surveys occurred in 2006 through 2009 for the snowy egret (*Egretta thula*), Cooper's hawk (*Accipiter cooperii*), burrowing owl (*Athene cunicularia*) and the loggerhead shrike (*Lanius ludovicianus*) (USAR 2006, 2007, 2008, and 2009). The Cooper's hawk (a state listed sensitive species) was observed on and near the PFC Bacciglieri AFRC from 2006 through 2009, and snowy egrets (federally listed sensitive species) were observed in 2006 and 2007 foraging in Holbrook Channel both on and near the AFRC. Even though burrowing owls and loggerhead shrikes have been recorded in the past from the Concord Naval Weapons Station (DON 2002 and 2006) just north of AFRC, neither of these two species have been recorded of the PFC Bacciglieri AFRC during special-status species surveys. The absence of a sighting of these two species is likely due to a lack of viable open habitat on the facility. Given this lack of open habitat on the AFRC, the probability of burrowing owls or loggerhead

shrikes nesting on the facility is low, though these species can use the facility grounds for foraging.

b. **Sensitive habitats.** Approximately 0.3 mile of Holbrook Channel traverses the southern and western boundary of the PFC Bacciglieri AFRC, and it supports wetland and riparian habitats. Three hundred forty-five linear feet is dominated by cattail (*Typha latifolia*); 730 linear feet is bordered by open riparian habitat with various wetland and riparian shrubs, trees, and herbaceous plants; and 358 linear feet consist of dense to moderate riparian vegetation dominated by riparian tree and shrub species (USAR 2003). Holbrook Channel supports one federal (snowy egret) and one state sensitive species (Cooper's hawk), as indicated above. The channel also supports aquatic plants; aquatic invertebrates such as the water strider (*Gerris* sp.); Western mosquitofish (*Gambusia affinis*); and birds associated with aquatic environments such as the mallard (*Anas platyrhynchos*), green heron (*Butorides virescens*), and belted kingfisher (Megac*eryle alcyon*) (Jones & Stokes 1999; USAR 2002 and 2003).

c. **Pest management.** The wetland and riparian habitats along Holbrook Channel on the PFC Bacciglieri AFRC should be avoided from pest management practices that could potentially have negative impacts on those habitats. Although most pest management practices take place in and around the buildings on the facility, control of pests or invasive vegetation in landscaped areas and on other open land on the facility could affect Holbrook Channel. For example, control measures for Botta's pocket gophers (*Thomomys bottae*) and California ground squirrels (*Spermophilus beecheyi*) could potentially impact the area through pesticide run-off into the watershed. No chemicals should be used to control these or other pest species next to or in a 50-foot buffer zone on either side of Holbrook Channel on the Concord USAR Center. The buffer zone is from the upper edge of the incised channel and extends 50 feet at a right angle away from the channel (Figure H-1). If the control of gophers, California ground squirrels, or other mammals near Holbrook Channel is required, mechanical measures such as traps should be used.

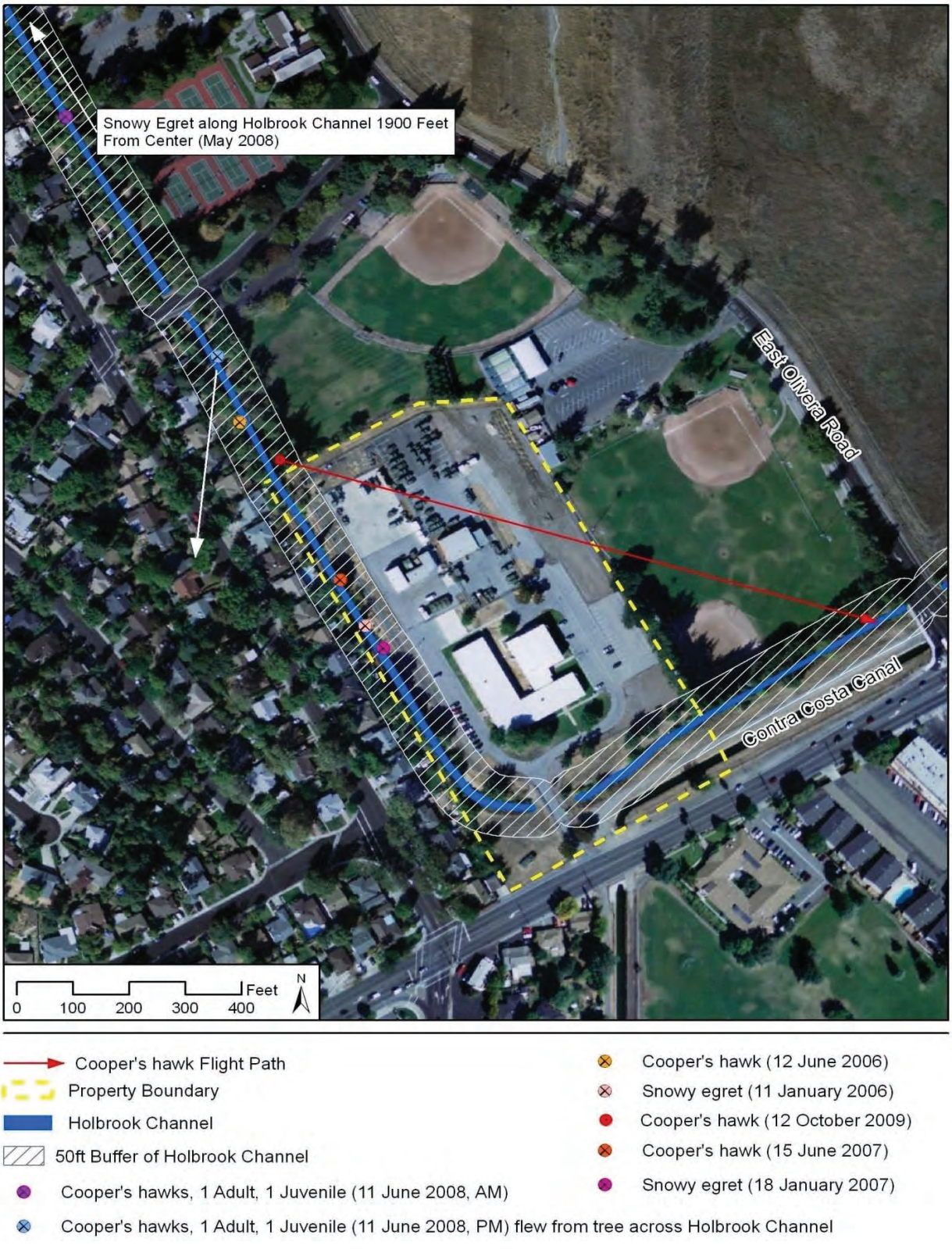


Figure H-1. Special-Status Species and Sensitive Habitats on and near the PFC Bacciglieri AFRC in Concord, California

d. References

DON (Department of the Navy). 2002. Integrated Natural Resources Management Plan and Environmental Assessment Naval Weapons Station Seal Beach, Detachment Concord, California. Prepared for Commanding Office, Naval Weapons Station, Seal Beach, California.

DON (Department of the Navy). 2006. Final Environmental Condition of Property Report for the Naval Weapons Station Seal Beach Detachment Concord, Concord, California. Department of the Navy, Base Realignment and Closure Program Management Office, San Diego, California.

Jones & Stokes. 1997. Evaluation of Natural Resources at U.S. Army Reserve Facilities 63D Regional Support Command California. Prepared for the 63rd Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

Jones & Stokes. 1999. Results of Flora, Fauna, and Habitat Surveys at Baccigleiri U.S. Army Reserve Center, Concord, California. Prepared for the U.S. Army Corps of Engineers, Sacramento, California.

Nepstad, M. 2003. Biologist, USFWS, Sacramento, California. Personal communication with Mike Collins, Principal with Vernadero Consulting, Scottsdale, Arizona. Dated 6 June 2003.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003. California Red-legged Frog Site Assessment PFC Baccigleiri Armed Forces Reserve Center Concord, California 63D Regional Support Command Facility CA007. U.S. Army Reserve, 63D Regional Support Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the Concord U.S. Army Reserve AFRC, Concord, California, 63D Regional Support Command Facility CA007. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007. 2007 Natural Resource Survey at the Concord U. S. Army Armed Forces Reserve AFRC, Concord, California, 63D Regional Support Command Facility CA007.Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008. 2008 Natural Resource Survey at the Concord Armed Forces Reserve Center, Concord, California, 63D Regional Support Command Facility CA007. Environmental Division 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2009. 2009 Natural Resource Survey at the Concord Armed Forces Reserve Center, Concord, California, 63D Regional Support

Command Facility CA007. Environmental Division 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

USFWS (U.S. Fish and Wildlife Service). 1997. Guidance on Site Assessment and Field Surveys for California Red-legged Frogs (*Rana aurora draytonii*), U.S. Fish and Wildlife Service.

2. CA012 – Fort Ord USAR Center, Marina, CA

a. **Special-status species.** Annual surveys for federal and state special-status species took place on the Fort Ord USAR Center between 1997-1999 and 2002-2009 (Jones & Stokes 1997 and 1999; USAR 2002, 2003, 2004, 2005, 2006, 2007, 2008b, and 2009b). Surveys in 1999 resulted in the observation of the federally threatened Monterey spineflower (*Chorizanthe pungens* var. *pungens*) and state sensitive wedgeleaf horkelia (*Horkelia cuneata* ssp. *sericea*) and sandmat manzanita (*Arctostaphylos pumila*) but did not detect the state sensitive California legless lizard (*Anniella pulchra*) (Jones & Stokes 1999). Biological field surveys for special-status plants followed the USFWS protocol (USFWS 2000); surveys for the legless lizard were conducted by a permitted legless lizard expert in 2003, 2006, 2007, 2008, and 2009. The Monterey spineflower was observed in 2005 through 2008 but not observed during the 2009 survey, likely due to the timing of the survey. The wedgeleaf horkelia and sandmat manzanita were both observed in 2003 through 2009. In addition, the legless lizard was not detected on the facility during intensive surveys in 2003 or 2006 through 2009 (USAR 2003, 2006, 2007, 2008b, and 2009b).

All special-status plants observed since 2003 were marked by a stake with a day glow orange painted top. A map from the 2009 Fort Ord USAR natural resource survey report (USAR 2009b) showing the most current recorded locations for Monterey spineflower, wedgeleaf horkelia, and sandmat manzanita on the Fort Ord USAR Center has been reproduced for this appendix (Figure H-2).

b. **Sensitive habitats.** Coastal live oak *(Quercus agrifolia*) woodlands occur in patches near the western boundary and in the southern portion of the facility. Various state agencies and other entities have identified the conservation and management of oak woodlands as a priority due to losses from agricultural and urban development, fire wood collecting, and grazing (CalPIF 2002).

c. **Pest management.** Ice plant (*Carpobrotus chilensis*), French broom (*Genista monspessulana*), pampas grass (*Cortaderia selloana*), poison hemlock (*Conium maculatum*), and sweet fennel (Foeniculum *vulgare)* are invasive weeds that have been recorded as spreading into portions of the native plant community on the Fort Ord USAR Center. Since 2004, an annual invasive plant species removal program has been conducted on this facility (USAR 2004, 2005, 2006, 2007, 2008a, 2009a). Any invasive plants observed growing near a special-status plant species are hand-pulled and disposed of. The mechanical removal of coastal live oak or any alteration of the coastal live oak habitat on the Fort Ord USAR Center should be avoided.

Figure H-2. Special-Status Species on and near Fort Ord USAR Center, Marina, California

d. References

CalPIF (California Partner's-in-Flight). 2002. Version 2.0. The Oak Woodland Bird Conservation Plan: A Strategy for Protecting and Managing Oak Woodland Habitats and Associated Birds in California (S. Zack, Lead Author). Point Reyes Bird Observatory, Stinson Brach, California. Online at http://www.prbo.org/calpif/plans.html. Accessed 14 January 2010.

Jones & Stokes. 1997. Evaluation of Natural Resources at U.S. Army Reserve Facilities 63D Regional Support Command California. Prepared for the 63D Regional Support Command, U S. Army Reserve, Los Alamitos, California.

Jones & Stokes. 1999. Results of Flora, Fauna, and Habitat Surveys at the Fort Ord U.S. Army Reserve Center, City of Marina, California. Prepared for the U.S. Army Corps of Engineers, Sacramento District, Sacramento, California.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003. Special-Status Species Survey Marina USAR Center and Sub AMSA 85 (G), Marina, California, 63D Regional Readiness Command Facility CA012. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2004. Special-Status Species Surveys-2004 Annual Report Marina USAR Center and Sub AMSA 85 (G), Marina, California, 63D Regional Readiness Command Facility CA012. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005. Special-Status Species Surveys-2005 Annual Report Marina USAR Center and Sub AMSA 85 (G), Marina, California, 63D Regional Readiness Command Facility CA012. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the Marina U.S. Army Reserve Center and Sub AMSA 85 (G) Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007. 2007 Natural Resource Survey at the Marina U.S. Army Reserve Center and Sub AMSA 85 (G) Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Invasive Plant Species Removal at the Fort Ord U.S. Army Reserve Center and Sub AMSA 85(G), Marina, California, 63D

Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. 2008 Natural Resource Survey at the Marina U.S. Army Reserve Center and Sub AMSA 85 (G) Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2009a. 2009 Invasive Plant Species Removal at the Fort Ord U.S. Army Reserve Center, Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Moffett Field, California.

USAR (U.S. Army Reserve). 2009b. 2009 Natural Resource Survey at the Fort Ord U.S. Army Reserve Center, Marina, California, 63D Regional Readiness Command Facility CA012. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Moffett Field, California.

USFWS (U.S. Fish and Wildlife Service). 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants. U.S. Fish and Wildlife Service, Ventura Field Office, Ventura, California.

3. CA 062 – B.T. Collins USAR Center, Sacramento, CA

a. **Special-status species.** Surveys for special-status species took place at the B.T. Collins USAR Center and surrounding area in 1995, 1996, 2002, 2003, 2005, 2006, 2007, 2008, and 2010 (FWEC 1995 and 1996; USAR 2002, 2003, 2005a,b,c, 2006, 2007, 2008a, and 2010). Initially these surveys focused on the temporary wetlands on the facility, the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*), and the state and federal sensitive California linderiella (*Linderiella occidentalis*). Sensitive plant species, California red-legged frogs (*Rana aurora draytonii*), and California tiger salamanders (*Ambystoma californiense*) were not observed during these surveys. The fairy shrimp habitat was eliminated during construction of new facilities, but a new one-acre seasonal wetland was created during this time. Surveys of this pond for the fairy shrimp and the California tiger salamander took place in 2003 through 2007 (USAR 2004, 2005b, 2006, 2007, 2008a, 2010); no California tiger salamanders have ever been observed. The California linderiella was first detected in the 1-acre pond during the 30 March 2006 survey (USAR 2006) and was detected during the 2007 and 2009 surveys. In all three surveys within the one-acre wetland, the California linderiella was observed to occur at a low abundance (0-4 individuals per 4 cubic feet) (USAR 2006, 2007, and 2010). Special-status plant species surveys were conducted throughout the USAR Center from 2004 through 2009 (USAR 2005b, 2006, 2007, 2008a, and 2010), and no special-status plant species have been observed.

The burrowing owl (*Athene cunicularia*) was first recorded on the B.T. Collins USAR Center in 1995 (FWEC 1996). Active burrows of this species of owl were observed within

the USAR Center boundaries during protocol burrowing owl surveys (TCBOC 1993) from 2004 through 2009 (USAR 2005a,c, 2006, 2007, 2008a, 2010). In 2003, no active burrowing owl burrows were detected on the USAR Center, but five active burrows were observed within a 500-foot buffer zone around the BT Collins USAR Center (USAR 2003). A marked decline in burrowing owl populations has been observed beginning in 2008, presumably due to development and habitat loss on the adjacent properties (USAR 2008b).

Other special-status species observed during the burrowing owl surveys were the loggerhead shrike (*Lanius ludovicianus*), Cooper's hawk (*Accipiter cooperii*), snowy egret (*Egretta thula*), and the white-tailed kite (*Elanus leucurus*). The snowy egret was observed during the 2009 -2010 natural resources survey, along Morrison Creek northeast of the B.T. Collins USAR Center (USAR 2010). A Cooper's hawk was observed during a special-status species survey, in the non-native grassland north of the USAR Center in 2007 (USAR 2007). The white-tailed kite has been observed on the USAR Center only in 2008 (USAR 2008a), but was observed during special-status species surveys on lands adjacent to the USAR Center in 2003 through 2007, and in 2009 (USAR 2003, 2005a,c, 2006, 2007, 2008a, 2010). The white-tailed kite was also observed nesting within the California National Guard property adjacent to the USAR Center in 2003 and 2006 (USAR 2003 and 2006). Loggerhead shrikes were observed on the USAR Center during special-status species surveys in 2003, 2005, and 2006 (USAR 2003, 2005a, 2006) and were recorded nesting on the USAR Center in 2003 and 2005 (USAR 2003 and 2005b). Loggerhead shrikes were also observed on lands adjacent to the USAR Center in 2006, 2007, and 2008 (USAR 2006, 2007, 2008a). All historical loggerhead shrike and white-tailed kite nest locations and 2009 - 2010 observations of special-status species on or near the USAR Center are presented in Figure H-3.

b. **Sensitive habitats.** Two jurisdictional seasonal wetlands (Figure H-4) occur on the B.T. Collins USAR Center, they include the one-acre seasonal pond along the southern border of the USAR Center and a small wetland along the northern fence line (USAR 2005b). Three other isolated seasonal wetlands (Figure H-4) occur on the facility (two in the southeast corner and one north of the main vehicle entrance gate) (USAR 2005b). The one-acre seasonal pond supports the California linderiella shrimp (a state/federal sensitive species), aquatic invertebrates and plants, as well as the bullfrog (*Rana catesbeiana*) and Pacific chorus frog (*Hyla regilla*) (USAR 2004, 2005b, 2006, 2007, 2008a, and 2010).

c. **Pest management.** Wetlands at the seasonal pond and elsewhere on the B.T. Collins USAR Center should be avoided during pest management practices that could potentially have adverse impacts on those ecosystems. Although most pest management practices take place in and around the buildings on the facility, control of pests or invasive species, for example the Botta's pocket gophers (*Thomomys bottae*) and California ground squirrels (*Spermophilus beecheyi*), in landscaped or open land could also take place. No chemicals should be used to control these or other pest species next to or within a 50-foot buffer zone around any seasonal wetland (Figure H-4).

Figure H-3. Special-Status Species on and near B.T. Collins USAR Center, Sacramento, California

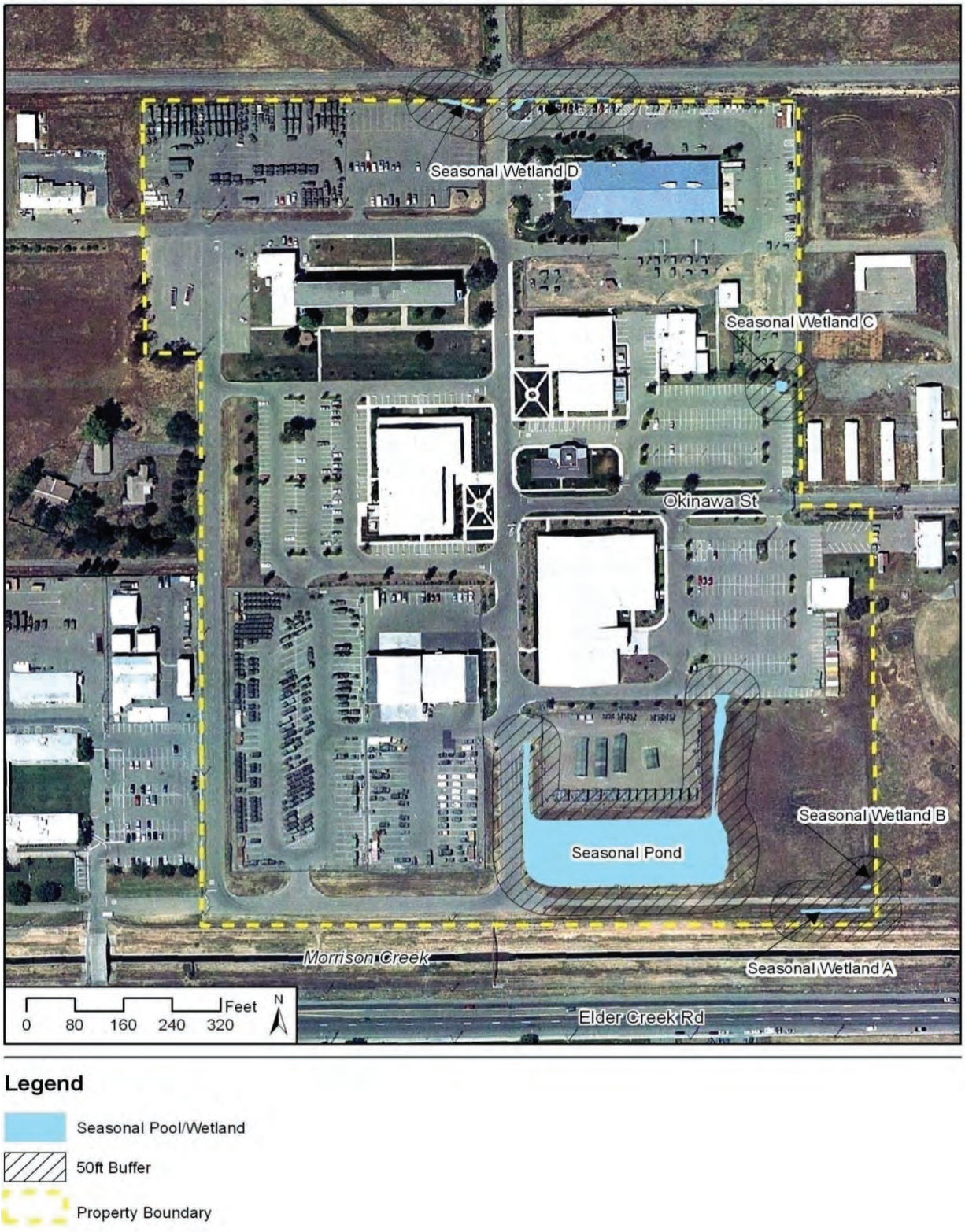


Figure H-4. Seasonal Wetland Locations on B.T. Collins USAR Center, Sacramento, California

If control efforts for gophers, California ground squirrels, or other mammals near a seasonal wetland are required, mechanical measures such as traps are recommended. In addition, any California ground squirrel control activities will need to consider potential effects on the burrowing owl. Chemical or mechanical control measures for the ground squirrels could have an adverse effect on the burrowing owl if control measures impact burrows occupied by these owls. Proposals to conduct California ground squirrel control should not take place until it is determined whether the burrowing owl inhabits the treatment area and if the activity would violate the Migratory Bird Treaty Act, under which this bird species is protected. Such a determination should be made by a biologist who is familiar with burrowing owl ecology. Pest control measures are not expected to affect the loggerhead shrike or the white-tailed kite, but this determination should also be made by a biologist familiar with the ecology of those two species.

The stinkwort (*Dittrichia graveolens*), a new potentially invasive plant species identified by the Sacramento Weed Management Area, occurs scattered throughout the B.T. Collins USAR Center. It is highly recommended that the stinkwort be controlled on this facility. The preferred method of control is removal of plant by hand, bagging the pulled plants, and disposing of the bag in a landfill. If hand removal techniques fail to control stinkwort on the USAR Center, then spot application of the herbicide glyphosate in a formulation registered for aquatic use (i.e. Rodeo®) can be used. Weeding or herbicide application should occur before the blooming stage for the plant (generally August) (USAR 2010).

d. References

FWEC (Forest Wheeler Environmental Corporation). 1995. Wetland Delineation Report B. T. Collins Army Reserve Training Center Sacramento, California. Prepared for the U.S. Army Corps of Engineers, Sacramento, California.

FWEC (Forest Wheeler Environmental Corporation). 1996. Biological Assessment for the B. T. Collins Army Reserve Training Center. Prepared for the U.S. Army Corps of Engineers, Sacramento, California.

TCBOC (The California Burrowing Owl Consortium). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. California Department of Fish and Game, Sacramento, California.

USAR (U.S. Army Reserve). 2003. Burrowing Owl Habitat Assessment, Burrow Survey and Census B. T. Collins USAR Center and AMSA 98(G) Sacramento, California 63D Regional Readiness Command Facility CA062. U.S. Army Reserve, 63D Regional Readiness Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2004. Wetland and Special-Status Species Surveys, B.T. Collins Army Reserve Center and AMSA 98 (G), Sacramento, California (CA 062), 63D Regional Readiness Command U.S. Army Reserve. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005a. Spring and Summer 2005 Breeding Season Burrowing Owl Surveys, B.T. Collins USAR Center and AMSA 98(G) Sacramento,

California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005b. Wetland & Special-Status Species Survey B.T. Collins USAR Center and AMSA 98(G) Sacramento, California (CA062), 63D Regional Readiness Command, U.S. Army Reserve. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California. USAR (U.S. Army Reserve).

USAR (U.S. Army Reserve). 2005c. Wintering Burrowing Owl Habitat Survey B.T. Collins USAR Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey B.T. Collins USAR Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007. 2007 Natural Resource Survey at the B.T. Collins U.S. Army Reserve Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Natural Resource Survey at the B.T. Collins U.S. Army Reserve Center and AMSA 98(G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. Cumulative Impact Analysis of Habitat Loss and Fragmentation on a Burrowing Owl Population On and Near the B.T. Collins U. S. Army Reserve Center and AMSA 98(G) Sacramento, California 63D Regional Support Command Facility CA062. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2010. 2009 Natural Resource Survey at the B.T. Collins U.S. Army Reserve Center and AMSA 98 (G) Sacramento, California, 63D Regional Readiness Command Facility CA062. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

4. CA150 – Mare Island USAR Center, Vallejo, CA

a. **Special-status species.** Assessments of the potential for special-status species to occur at the Mare Island USAR Center took place in 1997, 2002, 2004, 2006, 2007, 2008, and 2009 (Jones & Stokes 1997; USAR 2002, 2004, 2006, 2007b, 2008b, and 2009a). A special-status species that has the potential to occur on the Mare Island USAR Center is the monarch butterfly (*Danaus plexippus*). A winter roost location for monarch butterflies occurs in a eucalyptus grove at St. Peters Chapel on Captain's Row

on Mare Island, not far from the USAR Center, as well as in eucalyptus trees between Highway 29 and Mare Island Strait (CNDDB 2000). Monarch butterfly surveys took place on and near the facility during February 2004, 2007, and 2008 to determine if a winter roost occurs in the bluegum eucalyptus (*Eucalyptus globulus*) grove just west of the Mare Island USAR Center (USAR 2004, 2007a, 2008a). Only one butterfly was observed on the USAR Center in 2008 and a few were recorded in an open eucalyptus grove on top of a hill above the USAR Center (USAR 2008a). No monarch butterflies were recorded in the eucalyptus grove west and adjacent to the USAR Center. Even if this area supports a winter concentration of monarch butterflies in the future, it is far enough from the USAR Center that activities on the Center would unlikely effect the monarch wintering grounds (USAR 2008c).

Special-status fish species such as the winter-run Chinook salmon (*Oncorhynchus tshawytscha*), North American green sturgeon (*Acipenser medirostris*), and delta smelt (*Hypomesus transpacificus*) occur occasionally in the Mare Island Strait (USAR 1999; ECORP 2009). In November 2009, critical habitat for the North American green sturgeon was designated throughout San Pablo Bay by the National Marine Fisheries Service (NMFS) (USAR 2008c); however, the NMFS determined that the waters within the boundaries of the Mare Island USAR Center between and around Piers 22 and 23 are excluded from being designated green sturgeon critical habitat based on impacts to national security (USAR 2009b).

Surveys have been conducted for bats on the Mare Island USAR Center and the only species recorded was the Brazilian free-tailed bat (*Tadarida brasiliensis*), which is not a special-status species (USAR 1999). However, there is the potential for sensitive bat species to occur in the buildings of the USAR Center. Bat surveys were conducted by a biologist in 2004 and 2006 through 2009; no sensitive bat species have been detected (USAR 2004, 2006, 2007b, 2008b, and 2009a).

b. **Sensitive habitats.** There are no sensitive habitats on the Mare Island USAR Center, but critical habitat for North American green sturgeon has been assigned to the waters of San Pablo Bay beyond the boundaries of the USAR Center (FigureH-5).

c. **Pest management.** Guidelines outlined in 63D RD Integrated Natural Resources Management Plan with the December 2009 Addendum (USAR 2009b) should be followed when conducting pest management activities on the Mare Island USAR Center. Any pest management activities that occur on the USAR Center that have the potential to affect the critical habitat (defined by the NMFS) adjacent to the USAR Center for North American green sturgeon, should be reviewed by a biologist familiar with these issues. All physical control measures for French broom, sweet fennel, Himalayan blackberry, ivy, and Spanish broom should not affect terrestrial special-status species or sensitive habitats, since none have been recorded occurring within the USAR Center. Chemical control of these species should be used as a last resort, and preventive measures shall be conducted to minimize any run-off of herbicides entering the San Pablo Bay.

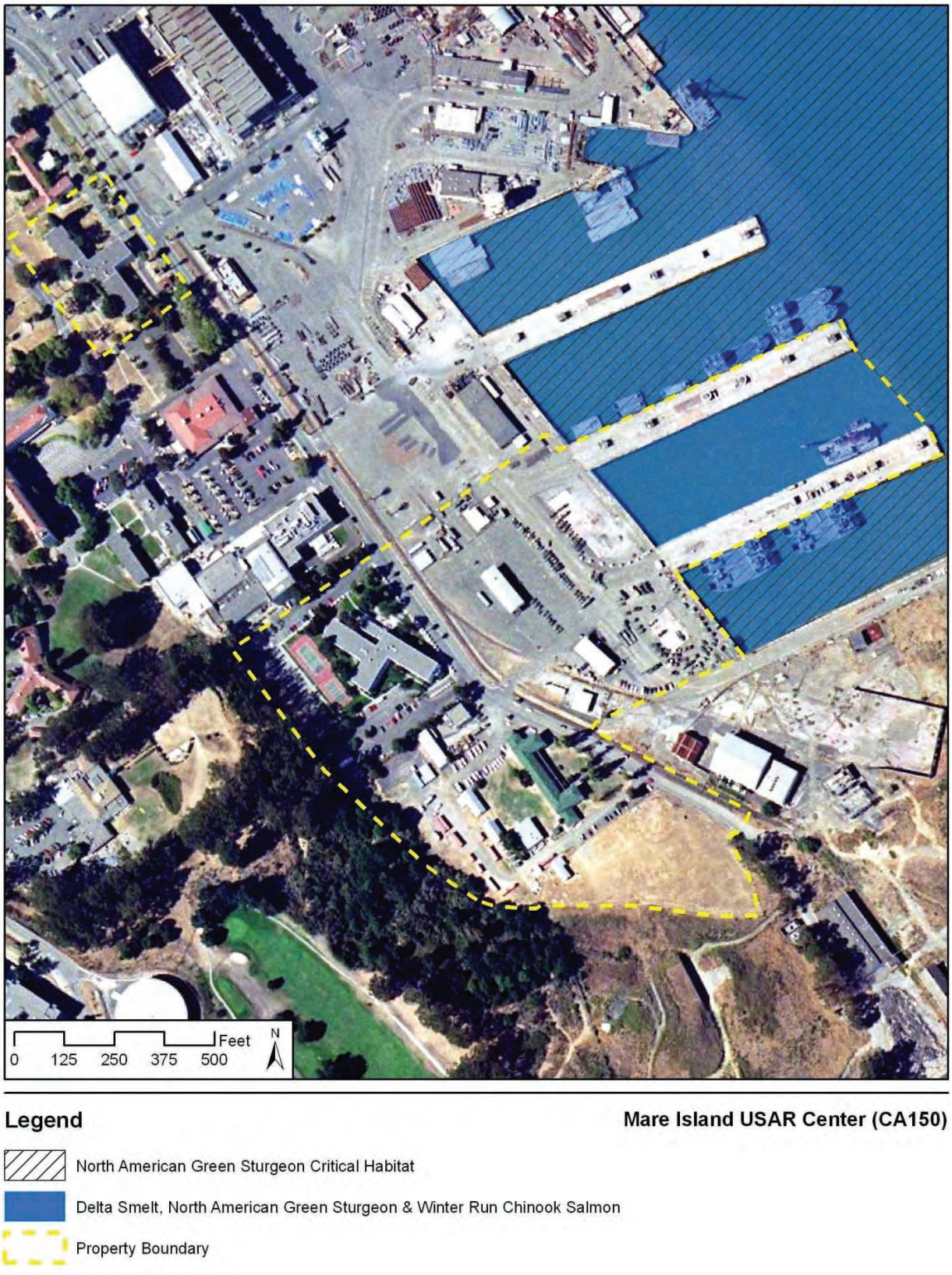


Figure H-5. Special-Status Species on and near Mare Island USAR Center, Vallejo, California

d. References

CNDDB (California Natural Diversity Data Base). 2000. Rare Find 2, Version 2.1.2. California Department of Fish and Game, Sacramento, California.

ECORP Consulting Inc. (ECORP). 2009. Report of 2007 and 2008 Findings: Juvenile Salmonid Tracking Project, Mare Island US Army Reserve Center (CA 150), Mare Island Strait, Solano County, California.

Jones & Stokes. 1997. Evaluation of Natural resources at U.S. Army Reserve Facilities 63D Regional Support Command California. Prepared for the 63rd Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 1999. Final Environmental Assessment, Proposed USAR Military Construction/Training Related Actions, Mare Island USARC. U.S. Army Reserve, 63D Regional Support Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2004. Bat and Monarch Butterfly Surveys, Mare Island USAR Center and AMSA 13, Vallejo, California, 63D Regional Support Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the Mare Island U. S. Army Reserve Center, Vallejo California, 63D Regional Readiness Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007a. 2007 Monarch Butterfly Surveys at the Concord Armed Forces Reserve Center, Mare Island U. S. Army Reserve Center, and Marina U.S. Army Reserve Center. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007b. 2007 Natural Resource Survey at the Mare Island U. S. Army Reserve Center, Vallejo California, 63D Regional Readiness Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Monarch Butterfly Surveys at the Mare Island U. S. Army Reserve Center, Vallejo California, 63D regional Readiness Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. 2008 Natural Resource Survey at the Mare Island U.S. Army Reserve Center and AMSA 13, Vallejo, California, 63D Regional Support

Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008c. 63D Regional Support Command Integrated Natural Resource Management Plan for USAR Property in Arizona, California, and Nevada, FY 08 – FY 12. 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2009a. 2009 Natural Resource Survey at the Mare Island U.S. Army Reserve Center and AMSA 13, Vallejo, California, 63D Regional Support Command Facility CA150. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

USAR (U.S. Army Reserve). 2009b. 63D Regional Support Command Integrated Natural Resource Management Plan for USAR Property in Arizona, California, and Nevada, FY 08 – FY 12, Addendum December 2009. 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

5. CA151 – March Armed Forces Reserve Center, Riverside, CA

a. **Special-status species.** Prior to 2008, the U.S. Army Reserve owned and occupied buildings on Parcels B-2a, B-2b, B-2c, and B-2d (collectively known as the March USAR Center) on the former March Air Force Base (Figure H-6). In 2008, the USAR began building a new facility called the Moreno Valley AFRC on parcels E-2 and K-5, which are located across Riverside Drive to the west of the B-2 parcels, and transferred ownership of all B-2 parcels to the Joint Powers Authority (JPA). The USAR has leased back all the buildings and property on Parcels B-2a through B-2d and will occupy those properties until construction at the Moreno Valley AFRC is completed.

From 2002 to 2010, special-status species surveys have been conducted on the March USAR Center. The burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*) and Cooper's hawk (*Accipiter cooperii*) are the only special-status species that have been recorded (Figure H-7) during these surveys (USAR 2002; 2003a,b; 2005a,b; 2006; 2007a; 2008b; 2010). Active burrowing owl burrows have been recorded within Parcel B-2a from 2002-2010 and east of that parcel in 2002, 2006, 2007a, 2009, and 2010 (USAR 2003b, 2005a,b; 2006; 2007a; 2008b; 2010). Active burrowing owl burrows were also recorded south of Parcel B-2a in 2007 and north of Parcel B-2d in the winter 2004 - 2005 and in the 2006 breeding season (USAR 2006 and 2007). Cooper's hawks have been recorded north of Parcel B-2b in 2007 and on Parcel B-2c in 2009 (USAR 2007a and 2010). A Cooper's hawk nest was recorded approximately 2,500 feet south of the March USAR Center in 2008 (USAR 2008a). All active burrowing owl burrows and Cooper's hawk locations recorded during the 2009 - 2010 special-status species surveys are presented in Figure H-7.

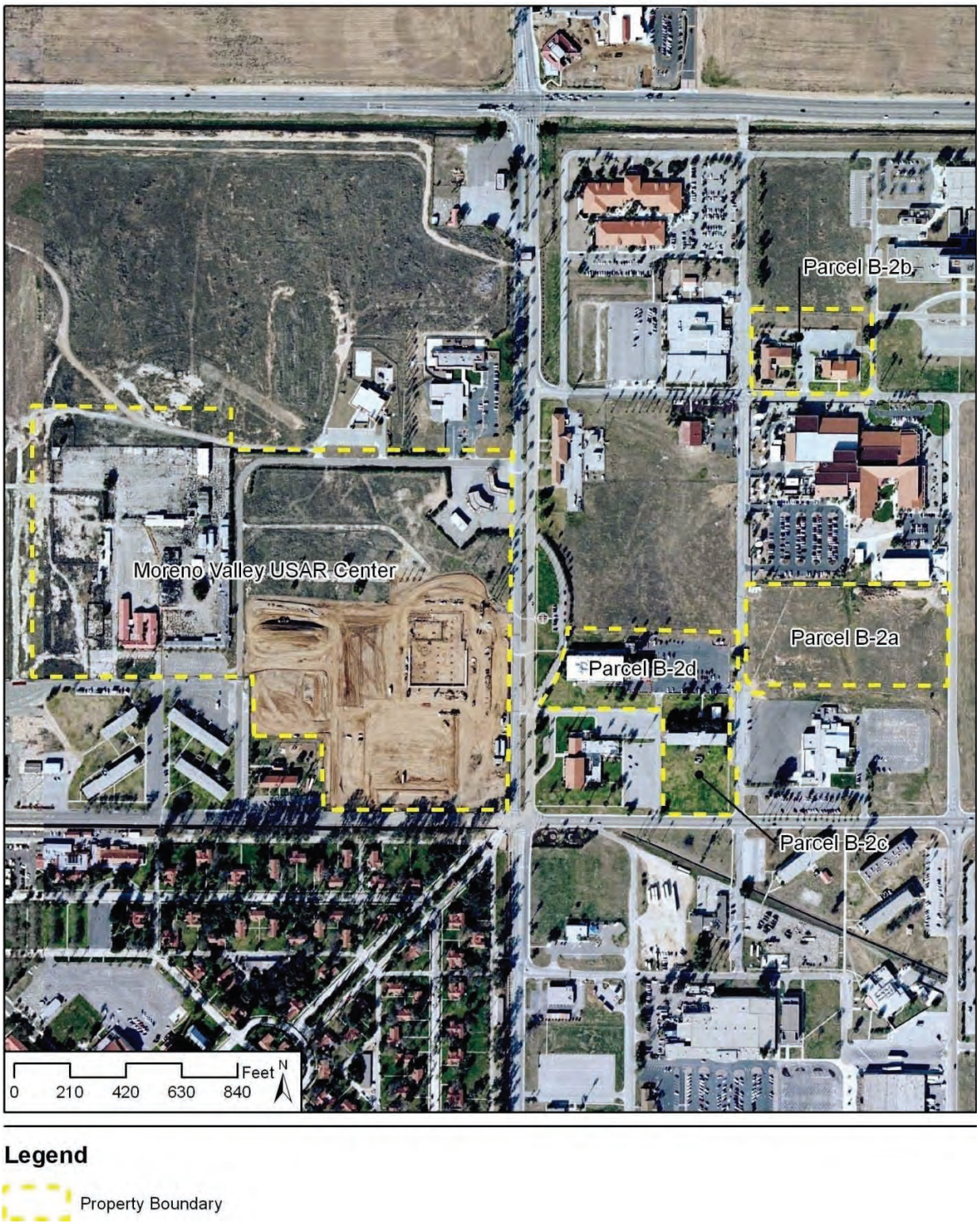


Figure H-6. Property Boundaries for the March USAR Center and the Moreno Valley AFRC, Riverside, California

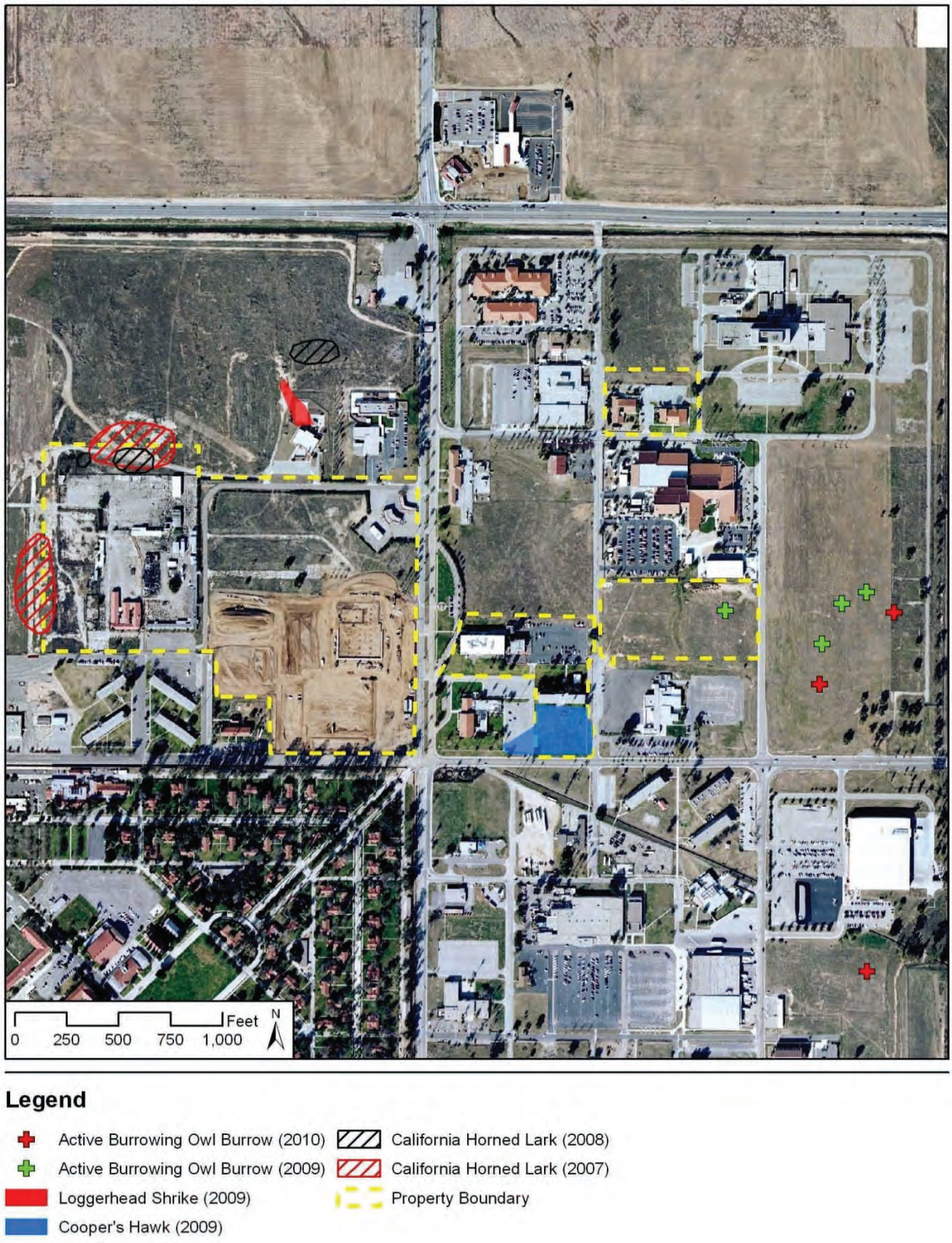


Figure H-7. Special-Status Species on or near the March USAR Center and Moreno Valley AFRC, Riverside, California

Special-status species were also assessed at and near the Moreno Valley AFRC in 2003 and from 2005 to 2010. Burrowing owls have not been observed during surveys that followed the burrowing owl survey protocol (TCBOC 1993) on the Moreno Valley AFRC between 2002 to 2010, though two active nests were recorded north of Parcel E-2 in 2006 (USAR 2003a, 2003b, 2005a,b, 2006, 2007a, 2007b, 2008c, 2008b, and 2010). The only other special-status species recorded on or near the land being used to construct the Moreno Valley AFRC were the state sensitive coastal western whiptail lizard (*Cnemidophorus tigris multiscutatus*), the loggerhead shrike which is a federal and state species of concern, and the Cooper's hawk and the California horned lark (*Eremophila alpestris actia*) which are state species of concern. The coastal western whiptail was observed 100 feet north of Parcel E-2 in 2003 (USAR 2003), while the Cooper's hawk was observed perched on a pole within Parcel E-2 in 2005 (USAR 2005a). Loggerhead shrikes were recorded on or north of the Parcel E-2 northern fence in 2003, 2007, and 2009 (USAR 2003, 2007a, 2010). California horned larks were recorded within the Moreno Valley AFRC property in 2007, 2008, and 2009 (USAR 2007a, 2008a, 2009). All loggerhead shrike and California horned lark locations recorded during the 2009 - 2010 special-status species surveys are presented in Figure H-7.

The federally endangered Stephens' kangaroo rat (*Dipodomys stephensi*) occurs on the former March Air Force Base, but neither this species nor signs of this species were observed on either USAR properties; it was concluded that it is highly unlikely that this species occurs on or near any land administered by the USAR on the former March Air Force Base (USAR 2003a).

b. **Sensitive habitats.** There are no sensitive habitats on the March USAR Center or the Moreno Valley USAR Center.

c. **Pest management.** Although burrowing owl nests were not observed on or adjacent to the Moreno Valley AFRC property in 2003 and 2005 through 2010, it does occur nearby and on March USAR Center property. Potential nest sites (abandoned California ground squirrel burrows) are on both facilities and could be used by the burrowing owl in the future. Chemical and/or mechanical control measures for the ground squirrel could have an adverse effect on the burrowing owl if such measures affect burrows occupied by these owls. Therefore, any proposal for California ground squirrel pest control measures should not take place until it is determined whether burrowing owls inhabit the treatment area. Such a determination should be made by a biologist who is familiar with burrowing owl ecology. Pest control measures are not expected to affect the loggerhead shrike or coastal western whiptail lizard.

d. References

TCBOC (The California Burrowing Owl Consortium). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. California Department of Fish and Game, Sacramento, California.

USAR (U.S. Army Reserve). 2002. Natural Resources Evaluation Summary Report for 38 U.S. Army Reserve Sites in CA, AZ, and NV. 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003a. Biological assessment for the Construction and Operation March USAR Center and AMSA 19 Riverside County, California 63D Regional Readiness Command Facility CA152. U.S. Army Reserve, 63D Regional Readiness Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2003b. Burrowing Owl Habitat Assessment, Burrow Survey and Census March USAR Center and AMSA 19 Riverside County, California 63D Regional Readiness Command Facility CA152. U.S. Army Reserve, 63D Regional Readiness Command, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005a. Summer 2005 Breeding Season Burrowing Owl Surveys, March USAR Center Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2005b. Wintering Burrowing Owl Surveys March USAR Center and AMSA 19 Riverside County, California, 63D Regional Readiness Command Facility CA152. 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2006. 2006 Natural Resource Survey at the March U.S. Army Reserve Center Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007a. 2007 Natural Resource Survey at the March U.S. Army Reserve Center Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2007b. 63D Regional Readiness Command Integrated Natural Resource Management Plan FY 2008 – FY 2013. U.S. Army Reserve. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008a. 2008 Natural Resource Survey at the March U.S. Army Reserve Centers, Riverside County, California, 63D Regional Support Command Facility CA152. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008b. Burrowing Owl Management Plan for the March U.S. Army Reserve Center and Armed Forces Reserve Center in Riverside County, California, 63D Regional Support Command Facility CA152. Environmental

Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2008c. Cumulative Impact Analysis of Habitat Loss and Fragmentation on a Burrowing Owl Population On and Near the March U.S. Army Reserve Center and Armed Forces Reserve Center in Riverside County, California, 63D Regional Support Command Facility CA152. Environmental Division, 63D Regional Support Command, U.S. Army Reserve, Los Alamitos, California.

USAR (U.S. Army Reserve). 2010. 2009 Natural Resources Survey at the March U.S. Army Reserve Center and at the Moreno Valley U.S. Army Reserve Center in Riverside County, California, 63D Regional Readiness Command Facility CA152. Environmental Division, 63D Regional Readiness Command, U.S. Army Reserve, Moffett Field, California.

6. CA187 – James Witkowski Armed Forces Reserve Center (AFRC), Mountain View, CA

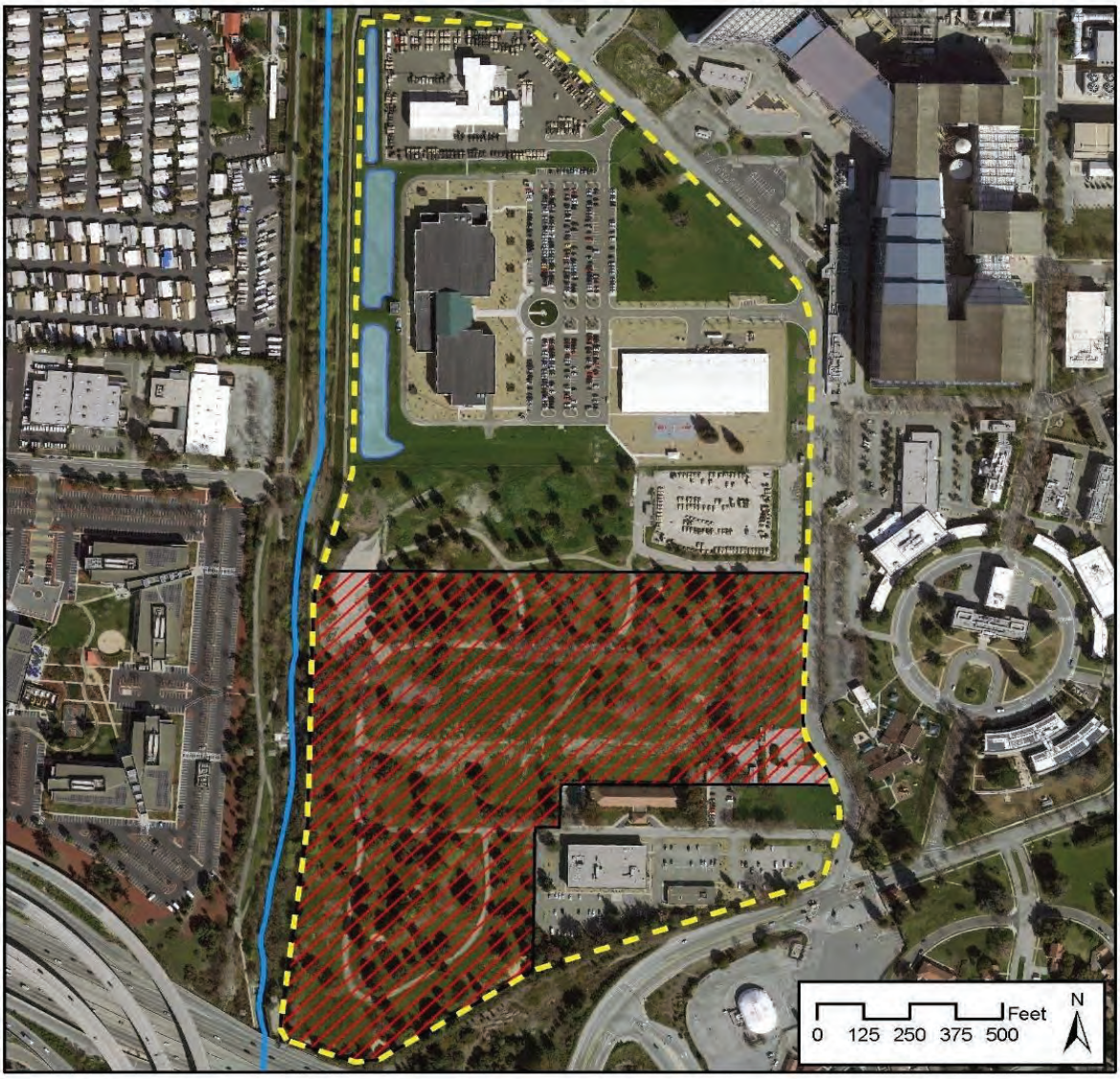
a. Special status species. The federally threatened and endangered Steelhead Trout (*Oncorhynchus mykiss),* exists in Stevens Creek, adjacent to CA187, and critical habitat is designated in that water body for this species (NOAA fisheries critical habitat maps, 2020). Critical habitat is legally designated under Title 50 Chapter 2, Subchapter C, §226.211. Steelhead habitat is separated from the Army Reserve Center by a flood control levee. The Code of Federal Regulations defines the steelhead's critical habitat to include "the stream channels (Stevens Creek) horizontally, and laterally by the ordinary high-water line", and encompasses vegetation along the streambank that lies within the levees (INRMP, 2019). A biological resources report in 2019 concurred that steelhead habitat was present within Stevens Creek, but outside the boundary of the AFRC (H.T. Harvey and Associates, 2019). There is no appropriate habitat for additional federally-listed or sensitive species, as confirmed during a biological survey in 2011, though some are present further downstream along Stevens Creek, where it forms an estuary and ultimately flows into the San Francisco Bay. These include the California Clapper Rail, and the Salt Marsh Harvest Mouse. While these occur well away from the confines of CA187, pesticides entering Stevens Creek could potentially flow downstream and affect these species. Estuarine habitats are not present within at least .43 miles of the reserve center, according to the FWS Wetlands Mapper (USFWS, 2020). The Western Pond Turtle is listed as a state species of special concern. It does not have habitat within the boundaries of CA187, but may visit Stevens Creek adjacent to it (INRMP, 2019; H.T. Harvey and Associates, 2019 biological resources report).

b. Sensitive habitats. No sensitive habitats are present within the current boundary of CA187 Mountain View. Landscape at this site consists of ornamental grasses and tree plantings, with grasses occupying 13.8 acres and the ornamental woodland occupying 35.75 acres. Wooded areas close to the creek could be considered riparian habitat (INRMP, 2019). Three storm water retention ponds are located along the western AFRC property boundary that fronts Stevens Creek. Along the eastern boundary of the AFRC, storm drains run onto the NASA property across the street, where they run into NASA’s storm water system (INRMP, 2019; NASA storm water drainage map, 2020).

c. Pest management.

Due to the presence of the Steelhead and its critical habitat, the following restrictions apply: Products labelled “Fish Safe” are the only products that can be used for pest management at the facility.

Do not use other ground application methods within 20 yards of Stevens creek. Do not apply bromoxynil, carbaryl, or chlorpyrifos on the ground or in granular form, within 20 yards of Stevens Creek, and these chemicals must not be applied aerially in other forms within 100 yards of the creek. Likewise, do not apply diazonin, methomyl, metalachlor, prometryn or Malathion either on the ground or in granular form within 20 yards of Stevens Creek, or in any other form aerially within 100 yards of the creek (epa.gov/endangered-species/salmon-mapper).



Legend

- Stevens Creek (Critical Habitat for Steelhead Trout)
- Storm Water Basin
- Enhanced Use Lease Area
- Property Boundary

Figure H-8: Sensitive Habitats on and near the James Witkowski AFRC, Mountain View, California

d. References

Environmental Protection Agency, 2020. “Salmon Mapper”- Pesticide Use Limitations in California, Oregon and Washington State. Website: https://www.epa.gov/endangered-species/salmon-mapper, retrieved July 10, 2020.

H.T. Harvey and Associates, 2019. Army Enhanced Use Lease Project, Biological Resources Report (HTH #4360-04). Mountain View, California. Prepared for Todd Schultz, Google LLC, Mountain View, California. Dated December 18, 2019.

NASA, 2020. Moffett Field Storm Drainage Maps, 2020. Retrieved by Tim Underwood, United States Army Reserve 63d Readiness Division, April 15, 2020. National Space and Aeronautics Administration, Mountain View, California.

NOAA Fisheries, 2020. Critical Habitat- Salmon and Steelhead (all West Coast). National Oceanic and Atmospheric Administration, 2020. Website: https://www.fisheries.noaa.gov/resource/map/critical-habitat-salmon-and-steelhead-all-west-coast, retrieved July 9, 2020.

USAR (United States Army Reserve) 2019. 2015-19 United States Army Reserve 63d Readiness Division INRMP (Integrated Natural Resources Management Plan), 2019 annual update. 63d Readiness Division Environmental Division, United States Army Reserve, Mountain View, California.

USFWS (United States Fish and Wildlife Service), 2020. National Wetlands Inventory Wetlands Mapper. Website: https://www.fws.gov/wetlands/Data/Mapper.html, retrieved August 24, 2020.