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UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
PLANT PROTECTION AND QUARANTINE
SCIENTIFIC SERVICES

CONTAINMENT GUIDELINES For Nonindigenous Arthropod Herbivores, Parasitoids and Predators

7.98 (Biocontrol Arthropods and their Parasites and Predators)

CONTAINMENT GUIDELINES FOR NONINDIGENOUS ARTHROPOD HERBIVORES, PARASITOIDS AND PREDATORS

CONTENTS

GUIDELINES FOR CONTAINMENT OF NONINDIGENOUS ARTHROPOD HERBIVORES, PARASITOIDS AND PREDATORS

I. PURPOSE OF THIS DOCUMENT:

These guidelines are a reference to help you (a state, federal researcher, or commercial entity) design, build, maintain, and operate a facility for specific types of organisms--in particular, nonindigenous arthropod herbivores, parasitoids and predators.

These organisms are typically used in biological control efforts for various plant pests or weeds. Field collections of these organisms may be contaminated with described and undescribed organisms such as plants, hyperparasites, plant pathogens, arthropods, etc.

During inspections or reinspections of your facility, USDA, APHIS, PPQ personnel will review these guidelines and any risk mitigation instructions that may accompany your permit. When your facility meets containment standards and risk mitigation instructions, USDA, APHIS, PPQ will approve your facility to receive appropriate permits.

The inspection and permitting procedures of the USDA APHIS PPQ are intended to prevent the release of nonindigenous plant pests to the environment of the United States. Accidental or purposeful release of these organisms is a violation of the FEDERAL PLANT PEST ACT and is subject to civil and/or criminal penalties and loss of permits.

Components of this Document:

To facilitate your permit(s), your containment site must meet the "Standards" listed in grey, shaded boxes. The "**Suggestions**" listed under each Standard are methods or equipment that may help accomplish each standard. This document offers information on construction, equipment, and operational topics that PPQ commonly considers prior to issuing a permit for nonindigenous arthropods used in biocontrol. However you may have alternative solutions to contain these organisms. USDA, APHIS, PPQ welcomes alternatives that are proven to meet or exceed the standards. In addition, the construction and operation of your containment site may vary depending on the organisms you wish to contain and your location. After you review this document, research alternatives, and before you contract or start construction, we suggest that you discuss exact specifications for containment with PPQ's Scientific Services permit group.

II. CONSTRUCTION STANDARDS FOR THE ENTIRE STRUCTURE

CONSTRUCTION STANDARD A: Locate the facility in areas with minimal human, agricultural and environmental risk. Identify the facility as dedicated and secure.

SUGGESTIONS:

1. Insure the facility meets local building codes.
2. Locate the facility in areas relatively free of agricultural zones, environmentally sensitive areas (e.g. areas with endangered species that may be negatively impacted by accidental release), high risk microclimates (e.g. known flood zones) or other high-risk areas.
3. Install a 15 foot-wide strip of gravel, mowed lawn, and/or pavement from the foundation and around the containment building(s).
4. If possible, design the containment facility as a separate, dedicated building. Always design and build the facility to prevent pest escape.
5. At the main entry, post:
   - A copy of the current USDA, APHIS, PPQ inspection notice.
   - A sign stating, "USDA APHIS PPQ Inspected Containment Facility",
   - Emergency telephone numbers.

CONSTRUCTION STANDARD B. Design the FLOOR PLAN to prevent escape of the enclosed oranism(s)

SUGGESTIONS:

1. Install one primary entry/exit.
2. Build a vestibule at the primary entry, or build a shower/restroom to take the place of a vestibule.
3. If OSHA standards allow, install a vestibule at each emergency exit.
4. Design the facility with laboratories and rearing rooms connected to a main laboratory.
5. Build public restrooms outside of containment rooms. However, if restrooms must be built inside a containment room, use the same construction standards as listed for that type of containment room.
6. Build offices outside of containment areas.
7. Install a central closet for cleaning supplies.
S. Install self-closing doors throughout the containment areas.
9. Install exterior doors that lock.
10. Block the windows of the most interior doors leading from the Receiving and Rearing areas with blinds or other covers to prevent organisms from moving toward light, toward the doors and beyond. Another alternative is solid doors.
11. When exterior doors are opened, air should move from the outside environment to the inside containment areas.
12. Air should move from the least to most hazardous rooms (i.e. from Laboratory to Rearing Room).
13. See section III. CONSTRUCTION STANDARDS FOR SPECIALIZED ROOMS for recommended features of the glasshouse, vestibules, and showers/restrooms.

CONSTRUCTION STANDARD C. Construct Walls, Ceilings and Floors that are impenetrable to the enclosed organisms, and withstand repeated cleaning and decontamination.

SUGGESTIONS:

1. Construct the walls and ceilings from building materials that resist moisture and withstand repeated decontaminations with Clorox or other caustic solutions. Wood floors and suspended ceilings are not acceptable.
2. Paint the ceilings and walls with a light-colored, washable paint.
3. Install floors that are impenetrable to the organism and withstand repeated cleanings. Monolithic (in one-piece) floors, e.g. poured concrete, asphalt tile, chemically resistant paint etc. are desirable.
4. Consider the installation of floor drains to collect liquid wastes for sterilization.
5. Seal junctions, holes or penetrations of walls, ceilings, and floors with plaster, caulk, or equivalent materials.

CONSTRUCTION STANDARD D. Install Windows impenetrable to the enclosed organisms.

SUGGESTIONS:

1. Install glazing (double-paned glass, Plexiglas, etc.) in windows to resist breakage,
2. Install windows that do not open.
3. Seal joints between the windowsills, frames, etc. and walls with appropriate materials.
4. Store extra glass or other panels nearby for emergency use.

CONSTRUCTION STANDARD E. install Doors that contribute to the security of the facility

SUGGESTIONS:

1. Install self-closing doors throughout the containment structure(s).
2. Install exterior doors that lock.
3. Block windows in doors leading to most hazardous rooms, with blinds or other covers to prevent organisms from moving toward light (toward the doors and beyond).
4. Install thresholds and gaskets that seal all doors with their frames.
5. Emergency doors
   - Post signs on the exterior and interior of emergency exits stating USDA, APHIS Containment Facility - Emergency Exit Only.
   - Install audible alarms that activate when emergency exit doors are opened.

CONSTRUCTION STANDARD F. Design and install an HVAC System (Heating, Ventilation and Air Conditioning) that prevents escape of the contained organisms.

SUGGESTIONS:

1. If possible, install an HVAC system dedicated to the containment areas. If not possible, then take actions to prevent organism escape from an HVAC connected to other areas or buildings.
2. Install metallic mesh or screen over the following air sources:
   - Internal exhaust vent--80 mesh
   - External exhaust vent--HEPA filter
   - External air intake--size of screen is determined by size of organism the researcher wishes to exclude,
   - Internal air delivery--screen of appropriate size to prevent contained organism from escaping into air system if air flows in wrong direction. If contained organism is a pathogen, a HEPA filter is necessary.
3. To slow the clogging of the HEPA filters and the subsequent reduction in HVAC efficiency, dust filters of 80-85% efficiency, may be placed in front of the HEPA filters.
4. When exterior doors are opened, air should move from the outside environment to inside the containment areas.
5. Air must move from the least to most hazardous rooms (i.e. from laboratory to Receiving and Rearing Room). Install equipment to measure the airflow direction.
6. Seal connections in air ducts, vents, plenums, etc. with caulk or an equivalent material.
7. Install filters and screens in the HVAC system so they are easy to clean, decontaminate and replace.
8. Install tandem or other filter configurations that allow one side of the ventilation ductwork and its filter to be decontaminated while the other side supplies air,

CONSTRUCTION STANDARD G. Design and install an Electrical System that maintains containment features under normal and emergency situations and is impenetrable to the contained organisms.

SUGGESTIONS:

1. Install an alarm to indicate power failure.
2. Install an alternative power source (generator, battery bank, etc.) for use when normal power is lost or interrupted.
3. Install weatherproof electrical boxes, receptacles, light fixtures, switches, etc.
4. Seal electrical boxes, lighting, switches, wiring, conduit, etc, with appropriate materials (caulk, foam, etc,) that are impenetrable to the contained organisms and withstand repeated decontaminations with Clorox or other caustic solutions

CONSTRUCTION STANDARD H. Design and install a Plumbing System to contain the organisms and remove liquid wastes.

SUGGESTIONS;

1. Install a sink in the containment area for clearing.
2. Treat effluents from sinks, floor drains, etc with heat or chemicals before releasing them into the sewer system.

CONSTRUCTION STANDARD I. Install Vacuum Systems that prevent the escape of the contained organisms.

SUGGESTIONS:
1. If needed, install built-in vacuum lines for aspiration that prevent pest escape.
2. Install a vacuum cleaning system or appliance that prevents pest escape.
3. Use vacuum appliance only in facility.
4. Autoclave or treat vacuum waste before disposal.

CONSTRUCTION STANDARD J. Install Communication System that allows communication between the interior and exterior of the facility and prevents organism escape.

SUGGESTIONS:
1. Install a telephone(s) or intercom system.
2. Install a computer (LAN, modem, etc.) or Fax machine to allow for communication and data transfer to and from the containment facility.

III. CONSTRUCTION STANDARDS FOR SPECIALIZED ROOMS.

CONSTRUCTION STANDARDS FOR SPEIALIZED ROOMS A. Build Glasshouses with security and containment features.

SUGGESTIONS:
1. Build the glasshouse at ground level, not on top of a building.
2. Construct the foundation of concrete, concrete block, brick, or similar material.
3. Extend the foundation below the soil line to insure a permanent and stable structure. Build the foundation at least 3 ft. above the soil line.
4. Construct glasshouse floors of materials that are impervious to the contained organisms and can withstand repeated disinfecting with caustic liquids.
5. Install one or more floor drains to collect liquid for sterilization.
6. Install a frame strong enough to support the translucent walls and ceilings.
   - Install translucent wall and ceiling materials strong enough to guarantee the security of the facility. Plexiglas, lumite, lexon, safety glass, and wire-reinforced glass are acceptable. Polyethylene, vinyl or plastic sheeting are NOT acceptable.
   - Seal the translucent panels to the frame with caulk or appropriate materials on the inside and outside surfaces.
   - Consider the installation of screens over the roof to protect it from hail.
   - Install an alarm system to detect breakage due to sound, motion, or pressure.
7. Seal joints between the glasshouse and other containment rooms with caulk or other suitable material.
8. If containment glasshouse is a detached structure used to rear permitted organisms, install a vestibule at each door. (See specialized room section on **Vestibules**.)
9. Install doors between the glasshouse and the rest of the facility that close completely, and seal to their frames. Use doors that are windowless or have windows covered by blinds.

10. If arthropod vectors are reared in glasshouse, install air curtains above glasshouse exit doors.
11. Insure the HVAC system can be turned off to allow glasshouse fumigation.
12. Cover ventilation ducts with metallic, 80-mesh screen.
13. Install windbreaks (trees, hedges, fences, etc.) around the glasshouse.

CONSTRUCTION STANDARDS FOR SPECIALIZED ROOMS B. Vestibules

SUGGESTIONS:

1. Install a vestibule in front of each entry and/or exit.
2. Shower rooms can count as a vestibule for an entrance (see restroom construction).
3. Build each vestibule at least 6 feet long from door threshold to door threshold.
4. Install a light in the vestibule such that the lights turn on only when any vestibule door is opened and turn off only when both vestibule doors are fully closed. This hinders arthropods from moving toward bright areas near doors.
5. Insure that unoccupied vestibules are darker than adjacent rooms.
6. Insure vestibule doors interlock so that only one door can be opened at a time.
7. Install thresholds and gaskets that completely seal the exterior and interior doors with their frames and thresholds. Insure the vestibule door opening is no bigger than 50% of the interior plane or wall on which the door is installed. Center the vestibule door on base of the interior plane
8. Keep black lights or traps out of the vestibule. (?)
9. Consider installing an air curtain for each vestibule. Air curtains are fans placed across the top of the interior doors of the vestibule. The fans are set at an angle and blow airborne organisms back into the containment areas when doors are opened. Fans should produce a maximum air speed of 3000 cu.ft/hour and a maximum volume of 4000 cu.ft /minute at the nozzle.

CONSTRUCTION STANDARDS FOR SPECIALIZED ROOMS C. Install Showers and Restrooms to prevent organism escape.

SUGGESTIONS:

1. If installed in the containment area, place showers/restrooms near lower risk rooms.
2. Insure thresholds and gaskets of restroom doors seal completely to their frames.

IV. EQUIPMENT STANDARDS

EQUIPMENT STANDARD A. Use Benches, Tables and Other Furniture that are easy to inspect and clean.

SUGGESTIONS.

1. Install work surfaces and laboratory furniture (bench tops, cabinets, tables, etc.) that are water resistant, impervious to arthropods, and resistant to caustic chemicals and heat.
2. Insure spaces between benches, wall cabinets, and equipment are easy to clean and inspect.

3. Dedicate cleaning equipment (mops, brooms, buckets, etc.) for use only in the containment area, and store it in the containment area.

EQUIPMENT STANDARD B. Use equipment to Sterilize or Decontaminate solid waste (contained organisms, soil, plant material, solid waste, and contaminated or infested articles) before removing it from the facility.

SUGGESTIONS:

1. Install an autoclave in the containment area. A double-door pass-through model is recommended. Conduct tests to evaluate effectiveness of autoclave.
2. Install a gas sterilizer in the containment area for articles that would be damaged by steam A double-door pass-through model is recommended.
3. Incinerate combustible materials. An incinerator within or adjacent to the facility is recommended. Exterior incinerators need special vents to bring in external air to the combustion chamber.???What type of special vent??
4. Stock the facility with appropriate sterilizing materials; insect killing jars, 70% alcohol, and/or bleach.
5. A freezer or microwave may be used to kill organisms, but is not approved to sterilize or decontaminate materials, including dead organisms.

EQUIPMENT STANDARD C. Use Cages and Containers to confine arthropods.

SUGGESTIONS.

1. Construct cages from glass, Plexiglas, polycarbonate, etc, to prevent escape by arthropods chewing holes in cages.
2. Equip the cages with sleeves to manipulate arthropods inside the cage.
3. Cover cage ventilation areas with at least 60 (or 80?)-mesh metallic screen.
4. Insure cages are easy to clean and disinfect.

EQUIPMENT STANDARD D. Use a Biosafety cabinet to work with organisms.

SUGGESTIONS:

Install a Biosafety cabinet, type A/B3, Class II, with laminar airflow to open packages from foreign countries.

V. OPERATIONAL STANDARDS

OPERATIONAL STANDARD A. A Containment Officer or Director is responsible for the daily operation of the facility and its physical integrity.

SUGGESTIONS:

A Containment Office or Director is responsible for the organisms contained in the facility.

He/she also maintains a copy of the Standard Operating Procedures (SOP) Manual for the facility. SOPs contain directions for normal use, maintenance, testing, and disinfections of the facility and it's equipment.

SOPs also describe procedures for
- Handling an organism(s) escape.
- Responding to a typical emergency event (power outage, fire, glass breaks in containment area, flood, etc.).
- Replacement of translucent panels in glasshouse.
- Monitoring of visitors.

Containment Office or Director,
- Implements the SOPs
- Trains employees and or authorized personnel in the SOPs.
- Updates copies of construction records (blueprints) for the facility.
- Maintains daily, weekly and monthly maintenance records of the facility.

- **And the Containment Officer or Director updates these lists:**
- The Names and phone numbers of people to call during emergencies, as changes occur.
- The plant species in facility, as changes occur.
- Authorized personnel, as changes occur.
- Incoming and outgoing shipments of permitted organisms, including dead or destroyed incoming organisms, by January 31 of each year.

SOPs also describe procedures related to all operating standards listed below:

OPERATIONAL STANDARD B. Only Authorized Personnel have routine access to the facility.

SUGGESTIONS:
1. Lock exterior doors at all times.
2. Train authorized personnel in the SOPs.
3. List the personnel authorized to enter the facility.
4. Require visitors to sign a logbook.
5. Insure emergency exit doors are not used routinely as an entrance.

OPERATIONAL STANDARD C. Wear, sterilize, and handle personal Apparel to minimize the risk of organism escape.

SUGGESTIONS:
1. Insure visitors and employees wear laboratory coat in the containment area. And remove it prior to leaving the containment area.
2. Discourage entry of overcoats, hats, purses, etc. into the containment areas, as these articles may allow an organism to hide and escape,

OPERATIONAL STANDARD D. Use Personal Cleanliness to contain organisms.

SUGGESTIONS:
Insure people wash their hands and check for hitchhiking arthropods before exiting the facility.

OPERATIONAL STANDARD E. Clean and Disinfect the interior of the facility and its equipment regularly.

SUGGESTIONS:
1. Clean and disinfect the facility, its furniture, and its equipment regularly with bleach or a similar disinfectant.
2. Consider a program to eliminate undesired pests and pathogens (e.g., cockroaches, and rodents) from the facility.
3. Autoclave or sterilize solid wastes (cultures, plant materials, soil, trash, etc.) prior to disposal,

OPERATIONAL STANDARD F. Open and Handle packages of permitted organisms to prevent organism release.

SUGGESTIONS:
1. Establish one area to open packages received from foreign sources.
2. Place foreign source packages in a sleeve cage or Biosafety cabinet before opening.
3. Autoclave or incinerate packing materials immediately after the removal of specimens and cultures.

OPERATIONAL STANDARD G. Start, grow, and store cultures with as few exotic contaminants as possible.

SUGGESTIONS:
1. List all nonindigenous plant materials used to rear herbivores, update as changes occur.
2. Confine all arthropods in cages that prevent escape.
3. Sterilize/destroy all packing materials from shipments and contaminates shortly after receipt.
4. Autoclave, incinerate or decontaminate old feeding media used to rear organisms before removing it from the facility.
5. Store microbial cultures in unbreakable, screw top vials or equivalent.
6. Destroy contaminate organisms as soon as detected.

OPERATIONAL STANDARD J. Follow all PPQ Regulatory Requirements for organisms received reared in or released from the facility.

SUGGESTIONS:
1. Met all PPQ requirements as listed in permits for organisms kept in the facility.
2. Send SOP and blueprints, to USDA, APHIS, PPQ Scientific Services.
3. Obtain permission from PPQ prior to shipping organisms outside of the facility.
4. Maintain a list of all organisms described in PPQ permits that enter and leave the facility.
5. Submit the above list to USDA APHIS PPQ by January 31 of every year.

6. Maintain voucher specimens for each organism shipped from the facility.
7. Notify PPQ if facility closes temporarily or permanently.
8. Notify PPQ of any structural or containment changes prior to the development of blueprints, signing of construction contracts, or start of construction.