



**DEPARTMENT OF THE NAVY**  
NAVAL FACILITIES ENGINEERING COMMAND  
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IN REPLY REFER TO:  
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06 June 2003

**From:** Commander, Naval Facilities Engineering Command, Engineering and Innovation and Criteria Office  
**To:** Distribution

**Subj:** INTERIM TECHNICAL GUIDANCE (ITG) FY03-4, NAVFAC MOLD RESPONSE MANUAL

**Ref:** (a) OPNAVINST 5100.23 Series, Navy Occupational Safety and Health Program Manual  
(b) U. S. Environmental Protection Agency (EPA), Mold Remediation in Schools And Commercial Buildings, March 2001  
(c) U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Army Facilities Management Information Document on Mold Remediation Issues, USACHPPM TG 177, February 2002

**Encl:** (1) NAVFAC Mold Response Manual, 05 June 2003

1. **Purpose.** The purpose of this guide is to provide basic criteria and information governing the assessment and remediation of mold.

2. **Discussion.** As mold concerns received increased media and legal attention, research revealed that no definitive guidance for mold remediation and abatement actions exist. The current methodologies to clean up mold, strategically sample mold, and train for mold response are varied and may be expensive. Currently, there are no Federal or Navy regulations. Typically, risk assessment and exposure levels for hazardous substances are assessed by applying permissible exposure limits (PEL); however, no PEL exists for mold. Reference (a) addresses mold concerns as an Indoor Air Quality biological contaminant. Enclosure (1) consolidates best industry practices and references (b) and (c) into a consolidated guide.

3. **Coordination:** This guidance has been coordinated within NAVFAC and the Navy Environmental Health Center (NEHC). Address comments and questions on the use of this guidance to the Mold Remediation Program Manager (MRPM).

4. **Action.**

- a.) Use enclosure (1) for the planning, assessment, evaluation and remediation of mold in facilities. The Naval Facilities Engineering Command's Engineering Innovation and Criteria Office (EICO) is currently coordinating with other DoD components to develop this document into Unified Facilities Criteria (UFC) and to develop a Unified Facilities Guide Specification (UFGS) for mold removal. A UFC for Building Envelope Design, also under development, will include a section specific to ensure that moisture intrusion criteria is adequately identified.

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- b.) Personnel involved in mold removal must meet qualifications noted in enclosure (1).
- c.) Activities involved in a Level 3 or Level 4 response action shall notify the MRPM prior to commencement.

5. Point of Contact. For clarification or additional information related to this subject, please contact Ms. Janet Stewart, MRPM, DSN 262-4194, CML 757-322-4194, e-mail [stewartjk@efdlant.navfac.navy.mil](mailto:stewartjk@efdlant.navfac.navy.mil).



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By direction

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# **INTERIM TECHNICAL GUIDANCE**

## **ITG FY 03-4**

### **NAVFAC MOLD RESPONSE MANUAL**



**5 June 2003**

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## CHAPTER 1

### PREVENTION AND ASSESSMENT

1-1 **INTRODUCTION.** This guide provides information to individuals who have little or no experience with mold remediation. It will help those in charge of maintenance to develop or evaluate an in-house remediation plan or evaluate a remediation plan submitted by an outside contractor.

Perform all work following the recommendations presented in this document, Environmental Protection Agency (EPA) Guidelines and/or guidelines of the American Conference of Governmental Industrial Hygienist (ACGIH). Consult Safety and Health professionals and/or Industrial Hygienists prior to any remediation activities.

1-2 **BACKGROUND.** Concern about indoor exposure to mold is increasing as the public becomes more aware that exposure to mold can cause a variety of negative health impacts, including allergic reactions. This document provides the best and most current guidance for remediation of clean water damage (response within 48 hours) and mold contamination (response more than 48 hours).

Mold reproduces with tiny spores. Mold spores float through indoor and outdoor air continually. When mold spores land on a damp spot, they may begin growing and digesting the material's surface in order to survive. Molds can grow on wood, paper, carpet, and foods. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problem remains undiscovered or uncorrected. There is no practical way to eliminate all molds and mold spores in the indoor environment, however the way to control indoor mold growth is to control moisture.

Common indoor molds are:

- Cladosporium
- Penicillium
- Alternaria
- Aspergillus
- Mucor

**In all situations, the underlying cause of water accumulation must be rectified or mold growth will recur.** Stop initial water infiltration and begin clean up immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. Ensure proper repairs of the building infrastructure so that water damage and moisture buildup does not recur.

## 1-3 HEALTH EFFECTS.

1-3.1 **Biological Air Pollutants.** Biological air pollutants are found to some degree in every home, school, and workplace. Sources include outdoor air, human occupants who shed viruses and bacteria, animals (e.g., insects and mammals) that shed allergens, indoor surfaces, and water reservoirs where fungi and bacteria can grow, such as in humidifiers. A number of factors allow biological agents to grow and be released into the air. Especially important is high relative humidity, which encourages house dust mite populations to increase and allows fungal growth on damp surfaces. Note that mold can grow on “dry” surfaces in areas prone to high humidity levels (80% or more). Mite and fungus contamination can be caused by flooding, continually damp carpet (which may occur when carpet is installed on poorly ventilated concrete floors), inadequate exhaust of bathrooms, or kitchen-generated moisture. Appliances such as humidifiers, dehumidifiers, air conditioners, and drip pans under cooling coils (as in refrigerators) support the growth of bacteria and fungi.

1-3.1.1 **Reactions.** Certain individuals may react to mold exposure more severely and quickly than others. These individuals include:

- Infants and children
- Elderly men and women
- Pregnant women
- Individuals with respiratory conditions, allergies or asthma
- Persons with weakened immune systems (i.e. persons with HIV infection, chemotherapy patients, organ/bone marrow transplant recipients, persons with autoimmune diseases)

While only a small number of molds and fungi (see definitions on page 26) are considered toxic and allergenic, species such as *Stachybotrys atra* (*S. atra*), “**Black Mold**,” gained public notoriety during the early 1990’s when it was linked by the Center for Disease and Control (CDC) to 10 cases of lung disorder in infants and 100 other cases. In 1993, there were a number of cases of acute pulmonary hemorrhage in nearly 30 infants after homes were flooded. The CDC does not completely know the specific cause of these deaths. However, they eventually concluded that significant exposure to *Stachybotrys atra* (*S. atra*), in addition to other molds, played a significant role in the development of this severe and fatal lung disease. Other fungi that cause infection include *Coccidioides*, *Histoplasma*, and *Blastomyces*. However, these fungi are rarely found indoors, growing instead in soil and dirt. Human contact is usually due to contact with animals. **Note: not all black mold is *Stachybotrys*.**

1-3.1.2 **Common Health Effects.** Although mold affects individuals differently and to different degrees, the following are some of the most common adverse health effects:

- Respiratory problems---wheezing, difficulty in breathing
- Nasal and sinus congestion
- Eyes-burning, watery, reddened, blurry vision, light sensitivity
- Dry, hacking cough
- Sore throat
- Nose and throat irritation
- Shortness of breath and lung disease
- Chronic fatigue
- Skin irritation
- Central nervous system (headaches, loss of memory, and mood changes)
- Aches and pains
- Fever
- Headaches
- Diarrhea
- Immunity suppression

1-3.2 **Mycotoxins.** Mycotoxins are toxic compounds made by many fungi as metabolic side products. Presence and amount of mycotoxins depend on the species of fungus and a variety of growth factors. The detection of a mold does not necessarily indicate the presence of mycotoxins. Mycotoxins are common in our grain-based food supply, and ingestion is the major source of exposure. Although mycotoxins have been considered as potential causes of the myriad non-allergic symptoms often found in patients with indoor air related complaints, research to date has been scant, and the issue remains controversial. Mycotoxins are considered relatively non-volatile and unlikely to be released into the air in sufficient quantities to cause disease.

1-3.3 **Categories of Ill Effects.** The ill effects of molds generally break down into four categories that include:

- allergies,
- infections,
- irritations, and
- toxicities.

1-3.3.1 **Allergies.** Allergies are probably the most common reaction to contact with molds. According to the American Academy of Allergy, Asthma and Immunology (AAAAAI) an estimated 50 million Americans suffer from allergies.

Teamwork with the installation industrial hygienist, facilities management and safety and occupational health staff in evaluating patient complaints relevant to the work area is critical to solving the problem. If symptoms suggest an allergy to a substance in the work environment, a careful search for a source of this allergen should be made. Fungi are not the only

source of allergens in the indoor environment. Many people are allergic to dust mites, insect parts, etc.

Appropriate treatment of allergic symptoms due to exposure to fungal allergens includes removal of the source of the allergy. This means abatement of visible mold where identified, correction of water incursion problems, and searching the air handling systems in the work area to ensure that any mold is removed. In cases of serious allergic conditions such as hypersensitivity pneumonitis and asthma suspected due to work exposure, consider removal from the work area pending abatement.

1-4           **MOLD PREVENTION TIPS.** The EPA Publication *Mold Remediation in Schools and Commercial Buildings* provides recommendations to prevent mold, such as:

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in the air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilating, and air-conditioning (HVAC) system drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building and HVAC inspections and maintenance as scheduled.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide adequate drainage and slope the ground away from the foundation.

- Repair rainwater leaks through walls, at windows, and at roofs as they are frequently the most significant contributors of moisture. Also, houseplants and any source of standing water (such as aquariums and sumps) can contribute significant moisture to the air.

1-5 **WORKPLACE ASSESSMENT.** According to OPNAVINST 5100.23F *Navy Occupational Safety and Health Manual*, individuals working in buildings with indications of poor indoor air quality (IAQ) should report the problem(s) to their immediate supervisors. If the Navy maintains the building, the appropriate supervisor coordinates all contact with the designated facilities maintenance activity (e.g., Public Works Center (PWC,) Public Works Lead Activity (PWLA), or first lieutenant) and the activity Navy Occupational Safety and Health (NAVOSH) Manager. The supervisor, facility manager and servicing safety office will perform an assessment and investigation as shown in paragraphs 1-3.2 to determine the cause(s) of poor indoor air quality. If the activity is unable to determine the cause of the problem, the NAVOSH manager must request the cognizant industrial hygiene service to initiate an IAQ investigation.

The Chief, Bureau of Medicine and Surgery (BUMED) Consultative Assistance Team (CAT) assists in IAQ investigations beyond the scope of the cognizant industrial hygiene service. BUMED determines whether the problem is primarily health-related, engineering related, or both, and will request assistance from appropriate sources as needed (e.g., NAVFACENGCOM).

If the building contains Navy personnel, but is maintained by a private enterprise, report the problem(s) to the appropriate facilities maintenance organization. If there is no solution, contact the NAVOSH manager.

**To solve the problem, it is critical to cooperate with the installation's industrial hygienist and facilities management team when evaluating complaints relevant to the work area.**

1-5.1 **Reasons for Complaints.** Indoor air quality complaints may arise as a result of many things, including, but not limited to, the following:

- Construction
- Renovation
- Office design
- Furnishings
- Housekeeping
- Maintenance practices

1-5.2 **Investigation.** Investigators may conduct interviews, if appropriate, with employees, building or facility managers, occupational safety and health staff, facility engineers and public works personnel.

Once information is gathered from affected employees, a complete inspection and assessment of the suspect area must be made by the facility manager, supervisor and, if needed, servicing safety and health office. To assist with this assessment, a Facility Assessment Checklist, Appendix C is provided for your use.

1-5.3 **Assessment.** Multiple causes of poor IAQ exist, any one of which could decrease the quality of the work environment. Some examples are:

- Unacceptable Humidity Ranges. Low humidity may lead to dryness and irritation of the nose, throat, skin and eyes. High humidity aids in the growth of certain molds.
- Insufficient Ventilation. Lack of sufficient fresh air leads to high carbon dioxide concentrations in workspaces. Lack of fresh air may cause fatigue, drowsiness, poor concentration and the sensation of temperature extremes without actual temperature changes. Increased CO<sub>2</sub> levels are an indicator of poor ventilation.
- Off-gas Chemicals. Many modern office furnishings and equipment emit chemicals. Adhesives, carpeting, upholstery, manufactured wood products, copy machines, pesticides and cleaning agents are examples of items that emit gas.
- Tobacco Smoke
- Biological Contamination. Biological contaminants such as bacteria, molds, pollen and viruses may be present in stagnant water, air ducts, humidifiers and drain pans. Water damaged material and insect and bird droppings contribute to biological contamination. Biological contaminants can trigger allergic reactions and some types of asthma and can cause some common infectious diseases.
- Combustion Products. Combustion products, such as carbon monoxide and nitrogen oxides can be released by vehicle exhaust, improperly burning furnaces, appliances and environmental tobacco smoke.

When performing facility assessments, the above factors must be evaluated in addition to obvious mold contamination. During the assessment and remediation of mold, the following precautions should be followed:

- Do not touch moldy items with your bare hands
- Do not get mold in your eyes
- Wash your hands and face when leaving the site
- Do not eat, drink or smoke in the area
- Do not breathe in mold or mold spores

During this assessment, determine response levels and remediation (see Chapter 2.) Non-porous (e.g. metal, glass and hard plastics) and semi porous (e.g. wood and concrete) materials that are structurally sound can be cleaned and reused.

Take care to identify all sources of mold contamination. In some cases, mold growth may not be obvious or visible. Areas that may be potentially contaminated are:

- Back side of dry wall
- Back side of wallpaper
- Back side of paneling
- Top of ceiling tiles
- Underside of rugs and/or tile
- Pipe chases/utility tunnels
- Equipment drain pans
- Behind furniture/equipment

Facilities managers, with the assistance of public works personnel, engineers, etc. should ensure that assessments include a cost analysis to identify the potential for replacement of the contaminated items versus remediation.

## 1-6 **SAMPLING.**

1-6.1 **Bulk or Surface Sampling.** Bulk or surface sampling is not required or recommended prior to remediation activities. Generally, it is not necessary to identify the species of mold growing in a particular area and the Centers for Disease Control and Prevention (CDC) does not recommend routine sampling for mold. Sampling may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with mold exposure (e.g., aspergillosis) and the occupational health physician or medical practitioner desires to confirm the causative agent. Sampling for this purpose should only be conducted under the technical direction and guidance of the servicing Industrial Hygienist.

1-6.2 **Pre- and Post –Remediation Air Sampling.** Pre- and post-remediation air sampling may be necessary if there is evidence from a visual

inspection or bulk sampling that the ventilation systems are contaminated. The purpose of such sampling is to assess the extent of contamination throughout a building and to confirm adequate remediation.

Air sampling may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of this sampling is to determine the location and degree of contamination.

When air sampling is deemed necessary and is performed, collect outdoor air samples at the same time at the fresh air intake, which serves the suspected area. Compare the values obtained. The indoor and outdoor air samples should be similar in kinds and concentrations of mold to what is found locally in the outdoor air.

1-6.2.1 Personnel conducting the sampling should be trained in proper air sampling methods for microbial contaminants. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists', *Bioaerosols: Assessment and Control*.

Only laboratories that are proficient in the American Industrial Hygienist Association (AIHA) Environmental Microbiology Proficiency Analytical Testing (EMPAT) program should perform sample analysis.

## CHAPTER 2

### REMEDIATION REQUIREMENTS

2-1 **RESPONSE ACTIONS.** As adapted by the New York City Department of Health, *Guidelines on Assessment and Remediation of Fungi in Indoor Environments and EPA Guidelines*, response actions may be broken down into separate and distinct categories as shown below:

|         |   |
|---------|---|
| Level 1 | Small Isolated Areas<br>10 sq. feet or less                               |
| Level 2 | Mid Size Isolated Areas<br>10 – 100 sq. feet                              |
| Level 3 | Extensive Contamination<br>Greater than 100 contiguous sq. ft. in an area |
| Level 4 | Contaminated HVAC   |

Response guidelines for water damage within 24-48 hours are shown in Table 2-1. Use these guidelines in conjunction with the Level 1 through Level 4 response actions identified in Table 2-2.

2-1.1 **Books and Papers:** Consult activities regarding the preservation of documents. It may be cost prohibitive and labor intensive to attempt to dry and clean a large area of books and papers. Small quantities may be vacuumed, damp wiped and placed in a clean area to dry with the use of heat and fans.

Note: Consult Industrial Hygienist and/or servicing Safety and Health Staff for cleaning of materials contaminated with “dirty” (e.g., gray or black) water.

**Table 2-1 RESPONSE GUIDELINES FOR WATER DAMAGE  
WITHIN 24- 48 HOURS**

| WATER DAMAGED MATERIAL  | RESPONSE ACTION   |
|---|---|
| Books and Paper (see note below)                              | <ul style="list-style-type: none"> <li>• Discard non valuable items</li> <li>• Photocopy valuable items and discard originals</li> </ul>  |
| Carpet and Backing – dry within 24-48 hours                   | <ul style="list-style-type: none"> <li>• Remove water with water extraction vacuum</li> <li>• Reduce humidity levels with dehumidifier</li> <li>• Accelerate drying process with fans</li> </ul>  |
| Ceiling Tiles   | <ul style="list-style-type: none"> <li>• Discard and replace</li> </ul>   |
| Cellulose insulation  | <ul style="list-style-type: none"> <li>• Discard and replace</li> </ul>   |
| Concrete or cinder block                                      | <ul style="list-style-type: none"> <li>• Remove water with water extraction vacuum</li> <li>• Accelerate drying process with dehumidifiers, fans and/or heaters</li> </ul>  |
| Fiberglass insulation   | <ul style="list-style-type: none"> <li>• Discard and replace</li> </ul>   |
| Hard surface, porous flooring (linoleum, ceramic tile, vinyl) | <ul style="list-style-type: none"> <li>• HEPA vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.</li> <li>• Check to make sure under flooring is dry, and dry if necessary.</li> </ul>   |
| Non-porous, hard surfaces (plastics, metals)                  | <ul style="list-style-type: none"> <li>• HEPA vacuum and damp wipe with water and mild detergent and allow to dry; scrub if necessary</li> </ul>  |
| Upholstered Furniture   | <ul style="list-style-type: none"> <li>• Remove water with water extraction vacuum</li> <li>• Accelerate drying process with dehumidifiers, fans and/or heaters</li> <li>• If valuable and unable to dry within 48 hours restoration/water damage professional should be consulted.</li> </ul>                      |
| Wallboard (Drywall and gypsum board)                          | <ul style="list-style-type: none"> <li>• Dry in place if there is not obvious swelling and seams are intact. If not, remove, discard and replace.</li> <li>• Ventilate wall cavity.</li> </ul>  |
| Window drapes   | <ul style="list-style-type: none"> <li>• Follow laundering or cleaning instructions recommended by the manufacturer.</li> </ul>   |
| Wood surfaces   | <ul style="list-style-type: none"> <li>• Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors).</li> <li>• Treated or finished wood surfaces may be cleaned with a mild detergent and clean water and allowed to dry.</li> </ul> |
| Wood Paneling   | <ul style="list-style-type: none"> <li>• Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying.</li> <li>• Wet paneling should be pried away from the wall for drying.</li> </ul>   |

**Table 2-2 RESPONSE ACTIONS**

| <b>LEVEL</b> | <b>DESCRIPTION</b>  | <b>RESPONSE ACTIONS</b>  |
|--------------|---|--|
| Level 1      | (10 ft <sup>2</sup> or less)<br>Small isolated areas (i.e. Ceiling tiles, small areas on walls, etc.) | Regular building maintenance staff can conduct remediation. Provide training to maintenance staff on proper clean up methods, personal protective equipment requirements and potential health hazards. Training can be performed as part of the program to comply with the requirements of OSHA 29 CFR 1910.1200, <i>Hazard Communication Standard</i> . This training should be under the technical direction of the servicing Industrial Hygienists and/or Occupational Safety and Health Staff. For additional information see the Training Section of this document. |
|              |   | Personnel conducting remediation are required to wear the Personal Protective Equipment (PPE) for the specific level response action. See Chapter 2 for specific requirements.   |
|              |   | <p><b>The work area should be unoccupied.</b> Vacating people from spaces adjacent to the work area is not necessary but is recommended for:</p> <ul style="list-style-type: none"> <li>▪ Infants (less than 12 months old)</li> <li>▪ Persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung disease (severe allergies, asthma, hypersensitivity pneumonitis)</li> </ul>  |
|              |   | Perform work operations, to the extent feasible, after normal occupancy hours.   |
|              |   | Containment of the area is not necessary.  |
|              |   | Use dust suppression methods, such as High Efficiency Particulate Air (HEPA) vacuuming area to minimize disturbance of spores and/or misting (not soaking) of surfaces prior to remediation.   |
|              |   | Contaminated materials that cannot be cleaned shall be placed in a heavy-duty plastic bag or other suitable impermeable container for disposal in an approved sanitary landfill.   |
|              |   | Work area utilized by remediation workers should be cleaned with a damp cloth and/or mop with a detergent solution.  |
|              |   | All areas should be left dry and visibly free from contamination and debris.   |

|                       |   |  |
|-----------------------|---|--|
| <p><b>Level 2</b></p> | <p><b>(10 - 100 Sq. Ft) Mid-Sized Isolated Areas (i.e. individual wallboard panels)</b></p> | <p>Only trained/certified personnel such as asbestos or lead abatement personnel may perform Level 2 – 4 remediation activities as the removal/clean up methods for mold mirror that of lead and asbestos. Provide additional training on proper clean up methods, personal protective equipment requirements and potential health hazards. Training can be performed as part of the program to comply with the requirements of OSHA 29 CFR 1910.1200, <i>Hazard Communication Standard</i>. This training should be under the technical direction of the servicing Industrial Hygienists and/or Occupational Safety and Health Staff. For additional information see the Training Section of this document.</p> |
|                       |   | <p>Personnel conducting remediation will be required to wear the Personal Protective Equipment (PPE) for the specific level response action. See Chapter 2 for specific requirements.</p> <p><b>The work area should be unoccupied.</b> Vacating people from spaces adjacent to the work area is not necessary but is recommended for:</p> <ul style="list-style-type: none"> <li>▪ Infants (less than 12 months old)</li> <li>▪ Persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung disease (severe allergies, asthma, hypersensitivity pneumonitis)</li> </ul>  |
|                       |   | <p>Perform work operations, to the extent feasible, after normal occupancy hours.</p> <p>Remediation should be accomplished in a mini-enclosure or with larger areas, full enclosure. The work area should be covered with a 6 mil. Polyethylene sheeting from floor to ceiling around the affected area, sealed with tape, with a slit entry and covering flap, before remediation, to contain dust/debris. Area should be maintained under negative pressure using a HEPA filtered fan. Supply and return air vents inside the mini enclosure should also be sealed.</p>   |
|                       |   | <p>Use dust suppression methods, such as High Efficiency Particulate Air (HEPA) vacuuming area to minimize disturbance of spores and/or misting (not soaking) of surfaces prior to remediation.</p> <p>Contaminated materials that cannot be cleaned shall be placed in a heavy-duty plastic bag or other suitable impermeable container for disposal in an approved sanitary landfill.</p> <p>The work area and areas used by remediation workers for egress should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution.</p> <p>All areas should be left dry and visibly free from contamination and debris.</p>  |

|                       |  |  |
|-----------------------|--|--|
| <p><b>Level 3</b></p> | <p>(&gt; 100 Sq. Ft)<br/><b>Large Isolated Areas (i.e. several wallboard panels)</b></p> | <p>Only trained/certified personnel such as asbestos or lead abatement personnel may perform Level 2 – 4 remediation activities as the removal/clean up methods for mold mirror that of lead and asbestos. Provide additional training on proper clean up methods, personal protective equipment requirements and potential health hazards. Training can be performed as part of the program to comply with the requirements of OSHA 29 CFR 1910.1200, <i>Hazard Communication Standard</i>. This training should be under the technical direction of the servicing Industrial Hygienists and/or Occupational Safety and Health Staff. For additional information see the Training Section of this document.</p> |
|                       |  | <p>Personnel conducting remediation will be required to wear the Personal Protective Equipment (PPE) for the specific level response action. See Chapter 2 for specific requirements.</p> <p><b>The work area should be unoccupied.</b> Vacating people from spaces adjacent to the work area is not necessary but is recommended for:</p> <ul style="list-style-type: none"> <li>▪ Infants (less than 12 months old)</li> <li>▪ Persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung disease (severe allergies, asthma, hypersensitivity pneumonitis)</li> </ul>  |
|                       |  | <p>Perform work operations, to the extent feasible, after normal occupancy hours.</p>  |
|                       |  | <p>Prior to work operations the contaminated area must be completely isolated from occupied spaces using plastic sheeting sealed with duct tape. Ventilation ducts/grills, fixtures and any other openings shall also be sealed. For specific information regarding the construction of this area, see the Containment section of this document. HVAC systems shall be secured.</p>  |
|                       |  | <p>Prior to work beginning, negative pressure shall be established in the work area. See the Establishing Negative Pressure section of this document for additional information.</p>   |
|                       |  | <p>Perform work operations, to the extent feasible, during the second or third shifts or on weekends and holidays.</p>   |
|                       |  | <p>Use dust suppression methods, such as High Efficiency Particulate Air (HEPA) vacuuming area to minimize disturbance of spores and/or misting (not soaking) of surfaces prior to remediation.</p>  |
|                       |  | <p>Contaminated materials that cannot be cleaned shall be placed in a heavy-duty plastic bag or other suitable impermeable container for disposal in an approved sanitary landfill. The outside of the bags should be cleaned with a damp cloth and detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to the uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.</p>  |

|                |                     |   |
|----------------|---------------------|---|
|                |                     | The contained work area and areas used by remediation workers for egress should be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution.  |
|                |                     | All areas should be left dry and visibly free from contamination and debris prior to removal of the isolation barriers.   |
| <b>Level 4</b> | <b>HVAC Systems</b> | <p>Only trained/certified personnel such as asbestos or lead abatement personnel may perform this level of remediation as the removal/clean up methods for mold mirror that of lead and asbestos. Additional training shall be provided to these workers on proper clean up methods, personal protective equipment requirements and potential health hazards. Training can be performed as part of the program to comply with the requirements of OSHA 29 CFR 1910.1200, Hazard Communication Standard. This training should be under the technical direction of the servicing Industrial Hygienists and/or Occupational Safety and Health Staff. For additional information see the Training Section of this document.</p> <p>Personnel conducting remediation will be required to wear the Personal Protective Equipment (PPE) for the specific level response action. See Chapter 2 for specific requirements.</p> <p>The HVAC system should be shut down prior to any remediation activities.</p> <p>For small isolated areas of contamination, follow the Level 2 response actions and personal protective equipment identified herein.</p> <p>For large areas of contamination (greater than 100-sq. ft.), follow the Level 3 response actions and personal protective equipment identified herein.</p> <p>Inspection should include possible contamination of the fiber duct and/or fiber duct wrap. Should contamination spread to these areas, consideration should be given to the total replacement of the duct and duct wrap.</p> |

2-2 **MEDICAL QUALIFICATIONS.** Personnel performing remediation activities must be medically qualified and capable to perform their duties and wear appropriate personal protective equipment.

Certain individuals are at greater risk when assigned to perform mold remediation activities. These individuals include but are not limited to those employees with:

- Immune suppression
- Hypersensitivity pneumonitis
- Sinusitis
- Other chronic inflammatory lung diseases
- Individuals with respiratory conditions, allergies or asthma
- Persons with weakened immune systems (i.e. persons with HIV infection, chemotherapy patients, organ/bone marrow transplant recipients, persons with autoimmune diseases)

2-3 **TRAINING.** Currently, no national training or certification standards exist and references to training are general. For example, NYC Department of Health (DOH) notes that building maintenance personnel who conduct remediation should “receive training on proper clean up methods, personal protection, and potential health hazards.” NYC DOH indicates that training for building maintenance personnel can be performed as part of a program to comply with the requirements of the Occupational Safety and Health Administration (OSHA) *Hazard Communication Standard* (29 CFR 1910.1200). The hazard communication standard, however, addresses hazardous chemicals in the workplace but does not offer guidance on the types of training needed for handling mold or other biological agents.

For areas of heavier contamination, NYC DOH recommends that personnel doing the remediation work be trained “in the handling of hazardous materials and equipped with respiratory protection in accordance with the OSHA respiratory protection standard (29 CFR 1910.134).” The training must include information on possible hazards; effective strategies to protect building occupants and remediation/response actions; and reminders to wear appropriate PPE.

Regular building staff, with appropriate Mold Awareness Training, may perform Level 1 responses actions.

Commands providing mold remediation services for Level 2 – 4 response actions must utilize the services of trained and certified asbestos and lead workers or hazardous waste emergency responders. These trained employees are knowledgeable in the abatement techniques utilized when performing mold remediation. The servicing Safety and Health Office or local

Industrial Hygienist should provide additional “in-house” training specific to mold remediation, including:

- Workplace evaluations
- Health Effects
- Medical Qualifications
- Personal Protective Equipment Requirements
- Sampling
- Clearance Criteria

In the absence of national training or certification standards, there are many private companies, colleges and universities, and professional organizations that provide three-day Mold Remediation Certification Courses. Activities and Commands providing mold remediation services should ensure that supervisors and inspectors of mold remediation attend one of these three-day courses. Contact the local Safety and Health Office, Industrial Hygienist or Echelon 2 Command for course recommendations.

2-4 **PERSONAL PROTECTIVE EQUIPMENT (PPE).** Activities must fit test, issue and train personnel to wear respirators and ensure personnel are medically qualified to wear a respirator (see Table 2-3.) Follow the requirements for the Navy’s *Respiratory Protection Program* in OPNAVINST 5100.23 Series, Chapter 15.

Activities must not fit test personnel, assign them to work in, or permit them to enter, areas requiring respiratory protection unless they have been medically evaluated. Criteria for the medical evaluation of personnel can be found in the Navy Environmental Health Center, *Medical Surveillance Procedures Manual and Medical Matrix* (Edition 7).

Personnel with facial hair or any other condition that interferes with the face-to-face-piece seal or valve function may not wear respirators with tight-fitting face-pieces.

Use respirators that are currently approved by the National Institute of Occupational Safety and Health (NIOSH) or Mine Safety and Health Administration (MSHA).

Fit test each individual required to use a respirator with a tight-fitting face-piece at the time of initial fitting and annually thereafter. Respiratory Protection Program Managers must develop, in concert with servicing Industrial Hygiene personnel, a change out schedule for chemical canisters and cartridges based on objective information or data that will ensure the canisters or cartridges are changed before the end of their service life.

Respirators must be maintained and properly stored when not in use.

**Table 2-3 RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT**

| LEVEL OF REMEDIATION                      | RECOMMENDED PPE   |
|---|---|
| <p><b>Level 1</b><br/><b>Level 2</b></p>  | <p>Half Mask, Negative Pressure Respirator with High Efficiency Particulate Air (HEPA) Filters (P-100)</p> <p>Whole Body Disposable Non-Breathable Coveralls with Head Covering and Foot Covering (Tyvek or comparable) taped at wrists and ankles</p> <p>Impermeable Gloves</p> <p>Goggles/Eye Protection</p>  |
| <p><b>Level 3</b><br/><b>Level 4*</b></p> | <p>Full Face, Negative Pressure Respirator with High Efficiency Particulate Air (HEPA) Filters (P-100)</p> <p>Whole Body Disposable Non-Breathable Coveralls with Head Covering and Foot Covering (Tyvek or comparable) taped at wrists and ankles</p> <p>Impermeable Gloves</p> <p>* If greater than 100 sq. ft. of contamination. Small-scale Level 4 operations Half Mask Negative Pressure Respirators may be used.</p> |

2-5 **EQUIPMENT AND MATERIALS.** The equipment and materials needed to perform mold remediation are those generally accepted and used during asbestos and lead removals. Below is a sample listing of equipment that may be needed or used and is not all-inclusive:

- HEPA Wet/Dry Vacuum Cleaners
- Negative Air Pressure Machines
- Manometer or smoke tubes (used for checking negative pressure)
- Polyethylene Sheeting, 6 mil
- Industrial, Heavy Duty, Clear, Plastic Garbage Bags
- Trowels
- Mops and Buckets
- Detergent/Cleaning Solution
- Steam Carpet Cleaning Machine
- Rags and Sponges
- Duct Tape
- Lock out/Tag out Devices
- Appropriate Personal Protective Equipment
- Fans (for post abatement use in drying area or use in clean area to facilitate drying of cleaned materials)

2-6 **HAZARD COMMUNICATION.** When mold growth requiring large-scale remediation is found, the building owner, management, and/or employer must notify occupants in the affected area(s) of its presence. Notification should include a description of the remedial measures to be taken and a timetable for completion.

While normal small-scale response actions do not dictate “whole building” notifications, coordinate response activities with the supervisors of the affected areas. Supervisors are then responsible for notifying affected personnel and providing a description of remedial measures to be taken and the schedule for completion.

Well-planned group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Servicing Safety and Health professionals, Industrial Hygienists and/or Occupational Health providers may provide valuable assistance during these meetings.

Advise occupants of any known or suspected health risks. Temporarily relocate individuals that may be at a high risk for experiencing adverse reactions to mold, (see paragraph 1-6.1.1) during remediation activities.

*EPA Mold Remediation in Schools and Commercial Buildings* recommends:

## ***Communicate, When You Remediate***

- Establish that the health and safety of building occupants are top priorities.
- Demonstrate that the occupants' concerns are understood and taken seriously.
- Present clearly the current status of the investigation or remediation efforts.
- Identify a person whom building occupants can contact directly to discuss questions and/or comments about the remediation activities.

2-7           **CONTAINMENT.** During remediation, containment limits the release of mold into the air and surroundings, ensures mold is not spread beyond the contaminated area and minimizes exposure to workers and building occupants.

2-7.1           **Area Size.** Determine the containment area size by the extent of the mold contamination, ease of clean up and potential for mold distribution. As a general rule, limited containments are recommended for areas involving between 1 m<sup>2</sup> to 9 m<sup>2</sup> (10 ft<sup>2</sup> and 100 ft<sup>2</sup>) of mold contamination. Full containments are recommended for surfaces with greater than 9 m<sup>2</sup> (100 ft<sup>2</sup>) of contamination or in situations where it appears that the space would be further contaminated without full containment. An enclosure should be the minimum volume to encompass all of the working surfaces yet allow unencumbered movement by the worker(s), provide unrestricted air flow past the worker(s), and ensure walking surfaces can be kept free of tripping hazards. For larger containments, erect wood or steel frames with polyethylene sheeting attached. With small containments, polyethylene sheeting can be affixed to the floors or ceilings with duct tape. Ensure the walls, ceilings and floors are structurally adequate to ensure that portions of the enclosure do not fall down during normal use. Exercise sound judgment when determining containment requirements.

2-7.2           **Containment Enclosure.** It is not necessary that the structure be airtight. Design openings to direct airflow; design them to draw air into the enclosure under all anticipated circumstances. Use an airlock or a vestibule to control openings for exits.

Line walls, barriers, ceilings, and floors with double layers of polyethylene sheeting having a thickness of at least 0.15 mm (6 mil.)

Seal all supply and air vents, doors, chases and risers within the containment with polyethylene sheeting to minimize the migration of contaminants to other parts of the building.

Minimize seams in the sheeting material to reduce the possibility of accidental rips and tears in the adhesive or connections. Overlap and stagger all seams in the sheeting. Do not locate seams at corners or wall-to-floor joints.

Each enclosure consists of a work area, a decontamination area, and waste storage area. Separate the work area where the mold removal operations occur from both the waste storage area and the contamination control area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the work area.

Construct the decontamination room or airlock for entry into and exit from the remediation area. The entryways to the airlock from the outside and from the airlock to the main containment area should consist of a slit entry with covering flaps on the outside surface of each slit entry. The chamber should be large enough to hold a waste container and allow a person to put on and remove PPE. Place all contaminated PPE, except respirators, in a sealed bag while in this chamber.

**2-7.3 Establishing Negative Pressure.** Air is to be drawn into the enclosure under all anticipated conditions and exhausted through a HEPA filter for the duration of the project. This can be accomplished through the use of HEPA filtered fans exhausted to the outside of the building. For small, easily contained areas, this can be accomplished using a fan or HEPA vacuum.

Check airflow patterns before removal operations begin and any time there is a question regarding the integrity of the enclosure. The primary tests for airflow trace air currents with smoke tubes or other visual methods. Make flow checks at each opening and at each doorway to demonstrate that air is being drawn into the enclosure and at each worker's position to show that air is being drawn away from the breathing zone.

After the initial airflow patterns have been checked, monitor the static pressure within the enclosure, using manometers, pressure gauges, or combinations of these devices.

The design parameters for static pressure differentials between the inside and outside of enclosures typically range from 5 to 25 Pa (0.02 to 0.10 inches of water gauge,) depending on conditions. All zones inside the enclosure should have less pressure than the ambient pressure outside of the enclosure e.g. -5 Pa (-0.02 inches water gauge differential). Design specifications for the differential vary according to the size, configuration, and shape of the enclosure as well as ambient and mechanical air pressure conditions around the enclosure.

The airflow volume (cubic meters per minute) exhausted (removed) from the workplace must exceed the amount of makeup air supplied to the enclosure. Design the rate of air exhausted from the enclosure to maintain a negative pressure in the enclosure and air movement past each worker. The

volume of airflow removed from the enclosure should replace the volume of the container at every 5 to 15 minutes. Airflow volume must be relatively high for large enclosures, enclosures with awkward shapes, enclosures with multiple openings, and operations employing several workers in the enclosure.

Airlocks are mechanisms on doors and curtains that control the air flow patterns in the doorways. Direct the patterns through doorways so that air flows toward the inside of the enclosure. Use vestibules, double doors, or double curtains to prevent air movement through the doorways. To use a vestibule, a worker enters a chamber by opening the door or curtain and then closing the entry before opening the exit door or curtain.

Check the airflow between adjacent rooms using smoke tubes or other visual tests to ensure the flow patterns draw air toward the work area.

As a general rule, if the containment has been constructed properly and openings have been sealed, the polyethylene sheeting should billow inwards on all surfaces. If it flutters or billows outward, negative pressure has not been established or has been lost, and you must find and correct the problem before continuing the remediation activities.

**2-7.4 Heating, Ventilating, and Air Conditioning (HVAC) Systems.** Heavy mold growth on ceiling tiles may impact HVAC systems if the space above the ceiling is used as a return air plenum. In this situation, construct the containment from the floor to the ceiling deck and replace the filters in the air-handling units servicing the area once remediation is finished.

Prior to work beginning, secure HVAC systems servicing the contaminated area; lock and tag-out in accordance with the Command's Energy Control (Lockout/Tagout) Program.

Coordinate technical assistance in identifying remediation procedures for contaminated HVAC systems with the local Industrial Hygienist and/or Safety and Health professional and mechanical engineers.

**2-8 USE OF BIOCIDES AND DISINFECTANTS.** The use of a biocide, such as chlorine bleach, is not recommended during mold remediation. Mold remediation removes the mold to prevent human exposure and damage to building materials and furnishings. It is necessary to clean up mold contamination, not just to kill it. Dead mold is still allergenic, and some dead molds are potentially toxic.

In most cases, it is not possible or desirable to sterilize an area; a background level of mold spores will remain in the air (roughly equivalent to or lower than the level in outside air). These spores will not grow if the moisture problem has been resolved.

If you choose to use disinfectants or biocides, always ventilate the area. Bring in outdoor air with fans. When using fans, take care not to distribute mold spores into an unaffected area. Biocides are toxic to humans, as well as to mold; use appropriate PPE and read and follow label precautions. Never mix chlorine bleach solution with cleaning solutions or detergents that contain ammonia; toxic fumes could be produced.

Some biocides are considered pesticides, and should only be applied or used by trained and certified pesticide applicators. Fungicides are commonly applied to outdoor plants, soil, and grains as a dust or spray—examples include:

- Hexachlorobenzene
- Organomercurials
- Pentachlorophenol
- Phthalimides
- Dithiocarbamates

Do not use fungicides developed for use outdoors for mold remediation or for any other indoor situation.

Do not use gaseous ozone or chlorine dioxide for remedial purposes. Both compounds are highly toxic and contamination of occupied space poses a health threat. Further, the effectiveness of these treatments is unproven.

**In all cases, consult the cognizant Industrial Hygienist and/or Safety and Occupational Health Specialist prior to using any biocide/disinfectant.**

2-9 **REMEDATION PERFORMANCE METRICS.** At present, no state or federal agencies have established standards for “acceptable” air or surface concentrations of mold indoors. Similarly, professional organizations such as AIHA and ACGIH also have not established quantitative guidelines for air and surface mold levels in occupied spaces. Consequently, determining when a mold remediation project has been completed and judging the effectiveness of such a project must rely upon qualitative measures. The most basic of these is that people should be able to occupy or re-occupy the remediated space without health complaints or physical symptoms.

For remediation to be judged successful, at least two criteria must be met:

- The water or moisture problem that led to the mold problem must have been identified and fixed.

- All affected areas must have been inspected and visible mold and mold-damaged materials must have been removed.

If air sampling is performed, the types and concentrations of molds measured indoors should be similar to what is measured outdoors. ACGIH adds that concentrations of biological agents in any surface samples taken should be similar to what is observed in well-maintained buildings or on construction and finishing building materials. EPA recommends revisiting the site of remediation shortly after work is completed to ensure that there are no signs of water damage or mold growth.

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## CHAPTER 3 EXECUTION

3-1           **REQUIREMENTS.** Activities must ensure that contracts involving mold remediation include appropriate statement of work, ensure hazard control techniques are properly applied and all safety and health requirements are addressed.

Use the following Unified Facilities Guide Specifications (UFGS) as a guide for contractual mold services:

- UFGS 13281N, *Engineering Control of Asbestos Containing Materials*
- UFGS 13282N, *Lead in Construction*
- UFGS 01525, *Safety and Occupational Health Requirements*

3-2           **CONTRACTS.** Perform complete, accurate and site specific Health and Safety Plans (HASP) and Activity Hazard Analysis (AHA), as required by the U. S. Army Corps of Engineers *Safety and Health Manual*, EM 385-1-1, for each mold remediation project (Level 2 –4). Plans must provide site-specific safety and health performance of work to include at a minimum:

- Hazard Analysis
- Work-area control specifications
- Monitoring
- Training
- Medical Surveillance
- Personal Protective Equipment
- Emergency response and contingency requirements
- Sampling
- Clearance criteria

A certified Industrial Hygienist or equivalent by training and/or experience must review all contractor HASPs prior to initiating site work. In addition, the servicing Occupational Safety and Health Manager or his designated representative, who has sufficient knowledge and authority to review and accept, must review HASPs for appropriate inclusion of appropriate safety requirements. Plans must be reviewed and accepted prior to issuing the Notice to Proceed.

CNO letter 5100 Ser 4540/IU595518 dated 22 June 2001 provides a guide to safety and health responsibilities in contract management. This document is available for review at: <http://www.navosh.net>.

3-3           **GOVERNMENT EXECUTION.** Government forces must complete a Job Hazard Analysis (JHA) and Standard Operating Procedure (SOP) for mold remediation projects.

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## GLOSSARY

Acceptable indoor air quality - That quality of air in an occupied enclosed space that is within an established temperature and humidity comfort zone, and which does not contain air contaminants in sufficient concentration to produce a negative impact on the health and comfort of the occupants.

Air contaminant - A gaseous, liquid, or solid substance or combination of substances in a form transported by or in air that has the potential to be detrimental to human health.

Allergen – substance (such as mold) that can cause an allergic reaction

Biocide – substance or chemical that kills organisms such as molds

Fungi – neither plants nor animals including molds, yeasts, mushrooms, and puffballs. Molds reproduce by making spores, which travel through the indoor and outdoor continually. When mold spores land on a moist/damp surfaces they begin growing and digesting whatever organic substance they are growing on if oxygen and moisture are present. It is estimated that more than 1.5 million species of fungi exist.

Fungicide – substance or chemical that kills fungi.

Hypersensitivity – Great or excessive sensitivity

Indoor Air Quality (IAQ) - The quality of air in an occupied enclosed space.

Indoor air pollution - The presence, in an indoor environment, of one or more air contaminants in sufficient concentration and of sufficient duration to be capable of causing adverse effects to human health.

Mold – Mold are a group of organisms that belong to the kingdom Fungi. In this document mold/fungi are used interchangeably. There are over 20,000 species of mold.

Microbial - Agents derived from, or that are, living organisms (e.g., viruses, bacteria, fungi, and mammal, bird and dust mite antigens) that can be inhaled and can cause adverse health effects including allergic reactions, respiratory disorders, hypersensitivity disorders, and infectious diseases. Also referred to as "microbiological" or "biological contaminants."

Negative pressure - A condition that exists when the air pressure in an enclosed space is less than that in the surrounding areas. Under this condition, if an opening exists between these locations, air will flow from surrounding areas into the negatively pressurized space. A negatively pressurized building will have airflow from the outside into the building through available openings.

Positive pressure - A condition that exists when the air pressure in an enclosed space is greater than that in the surrounding areas. Under this condition, if an opening exists between these locations, air will flow from the positively pressurized space into surrounding areas. A positively pressurized building will have airflow from the building to the outside through available openings.

Preventive maintenance - Regular and systematic inspection, cleaning, and replacement of worn parts, materials and systems. Preventive maintenance helps to keep parts, materials, and systems from failing by ensuring they are in good working order.

Spore – means by which molds reproduce. Spores are microscopic in size (2-100 micrometers) and vary in size and shape. Spores may travel several ways; passively moved (by a breeze or water drop), mechanically disturbed (by a person or animal passing by), or actively discharged (usually under moist conditions or high humidity).

Toxins – proteins produced by molds, which cling to mold spores and can cause allergies and other health effects.

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## APPENDIX A

### REFERENCES

#### GOVERNMENT PUBLICATIONS

1. Department of Defense  
  
Unified Facilities Criteria  
[http://www.wbdg.org/ccbref/pa\\_dod.php?category=pa](http://www.wbdg.org/ccbref/pa_dod.php?category=pa)  
  
UFGS 01525, Safety and Occupational Health Requirements  
  
UFGS 13281N, Engineering Control of Asbestos Containing Materials  
  
UFGS 13282N, Lead in Construction
2. Chief of Naval Operations  
  
SECNAV/OPNAV Directives Control Office  
N09B15  
Washington Navy Yard, Bldg. 36  
720 Kennon Street, SE Rm 203  
Washington Navy Yard, DC 20374-5074  
Phone (202) 433-4934/5/6  
<http://neds.nebt.daps.mil/usndirs.htm>  
  
OPNAVINST 5100.23F, Navy Occupational Safety and Health Program Manual  
  
CNO Letter 5100 Ser 4540/IU595518, 22 June 2001 (<http://www.navosh.net>.)
3. Naval Facilities Engineering Command  
  
Commander  
Naval Facilities Engineering Command  
1322 Patterson Avenue SE Suite 1000  
Washington Navy Yard, DC 20374-5065  
Phone (202) 685-9078  
<http://www.navfac.navy.mil/>  
  
NAVFACINST 5100.11J,  
NAVFACENGCOM Safety and Health Program
4. Navy Environmental Health Center  
  
Commanding Officer  
Navy Environmental Health Center  
20 John Paul Jones Cir Ste 1100  
Portsmouth VA 23708-2103  
Phone: (757) 953-0700  
<http://www-nehc.med.navy.mil/>  
  
Industrial Hygiene Filed Operations Manual  
  
Medical Matrix Manual
5. U.S. Army Corps of Engineers  
  
4820 University Square  
Huntsville, AL 35816-1822  
<http://www.hnd.usace.army.mil/techinfo/>  
  
EM-385-1-1, Safety and Health Requirements Manual

6. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM)

United States Army Center for Health Promotion & Preventive Medicine  
5158 Blackhawk Road  
Aberdeen Proving Ground, MD 21010-5403  
Phone (800) 222-9698  
<http://chppm-www.apgea.army.mil>

Army Facilities Management Information document on Mold Remediation Issues, USACHPPM TG 277, February 2002

Health Effects of Mold, USACHPPM Information Paper, 28 February 2002

Preventing Mold in the Home, USACHPPM Fact Sheet, February 2002

Industrial Hygiene and Preventive Medicine Mold Assessment Guide, USACHPPM TG 278, February 2002

7. Environmental Protection Agency

Environmental Protection Agency  
Ariel Rios Building  
1200 Pennsylvania Avenue, N.W.  
Mail Code 3213A  
Washington, DC 20460  
Phone (202) 260-2090  
<http://www.epa.gov>

Mold Remediation in Schools and Commercial Buildings, EPA 402-K-01-001, March 2001

A Brief Guide to Mold, Moisture and Your Home

8. New York City Department of Health

<http://www.ci.nyc.ny.us/html/doh>

Guidelines on Assessment and Remediation of Fungi in Indoor Environments

9. Occupational Safety and Health Administration (OSHA)

200 Constitution Avenue, NW  
Washington, DC 20210  
<http://www.osha.gov>

29 CFR 1910.1200, Hazard Communication Standard

29 CFR 1910.134, Respiratory Protection Standard

**NON-GOVERNMENT PUBLICATIONS**

1. American Society for Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

ASHRAE  
1791 Tullie Circle, N.E  
Atlanta, GA 30329  
Phone (800) 527-4723  
or (404) 636-8400  
<http://www.ashrae.org>

ANSI/ASHRAE 55-1992 (with addendum 55a-1995), Thermal Environmental Conditions for Human Occupancy (NOTAL)

ANSI/ASHRAE 62-2001 (with addendum 62a-1990), Ventilation for Acceptable Indoor Air Quality (NOTAL)

2. American Society for Testing and  
Materials

ASTM International  
100 Barr Harbor Drive  
PO Box C700  
West Conshohocken, PA 19428-2959  
<http://www.astm.org>

ASTM Manual 18, Moisture Control in  
Buildings

ASTM Manual 40, Moisture Analysis and  
Condensation Control in Building  
Envelopes

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## APPENDIX B ADDITIONAL WEB RESOURCES

|   |   |
|---|---|
| Occupational Safety and Health Administration (OSHA)                | Mold and Fungi<br><a href="http://www.osha.gov/SLTC/molds/index.html">http://www.osha.gov/SLTC/molds/index.html</a>   |
|   | Indoor Air Quality (IAQ)<br><a href="http://www.osha.gov/SLTC/indoorairquality/index.html">http://www.osha.gov/SLTC/indoorairquality/index.html</a>   |
| Army Center for Health Promotion and Preventive Medicine (USACHPPM) | USACHPPM Mold Resources<br><a href="http://chppm-www.apgea.army.mil/mold">http://chppm-www.apgea.army.mil/mold</a>  |
|   | Mold Investigation Decision Logic notes<br><a href="http://chppm-www.apgea.army.mil/mold/Mold_Investigation_Decision_Logic.pdf">http://chppm-www.apgea.army.mil/mold/Mold_Investigation_Decision_Logic.pdf</a>      |
|   | Mold Related Health Complaints – An Integrated Clinical and Environmental Approach<br><a href="http://chppm-www.apgea.army.mil/mold/Mold_Treatment.pdf">http://chppm-www.apgea.army.mil/mold/Mold_Treatment.pdf</a> |
|   | USACHPPM Tri-Fold, Preventing Mold in the Home<br><a href="http://chppm-www.apgea.army.mil/mold/Mold_Prevention_Home.pdf">http://chppm-www.apgea.army.mil/mold/Mold_Prevention_Home.pdf</a>                         |
| American Industrial Hygiene Association (AIHA)                      | Report of Microbial Task Force<br><a href="http://www.aiha.org/Committees/documents/webmicrobial.pdf">http://www.aiha.org/Committees/documents/webmicrobial.pdf</a>   |
|   | Facts about Mold: For Everyone<br><a href="http://www.aiha.org/governmentaffairs-pr/html/mold-consumer.htm">http://www.aiha.org/governmentaffairs-pr/html/mold-consumer.htm</a>                                     |
| U.S. Environmental Protection Agency (EPA)                          | New Residential Mold Guide<br><a href="http://www.epa.gov/iaq/molds/moldguide.html">http://www.epa.gov/iaq/molds/moldguide.html</a>   |
|   | Mold Resources<br><a href="http://www.epa.gov/iaq/pubs/moldresources.html">http://www.epa.gov/iaq/pubs/moldresources.html</a>   |
| U.S. Centers for Disease Control and Prevention                     | Molds in the Environment<br><a href="http://www.cdc.gov/nceh/airpollution/mold/moldfacts.htm">http://www.cdc.gov/nceh/airpollution/mold/moldfacts.htm</a>   |
|   | Questions and answers on Stachybotrys chartarum and other molds<br><a href="http://www.cdc.gov/nehc/airpollution/mold/stachy.htm">http://www.cdc.gov/nehc/airpollution/mold/stachy.htm</a>                          |
|   | National Center for Environmental Health (NCEH)<br><a href="http://www.cdc.gov/nceh/airpollution/mold">http://www.cdc.gov/nceh/airpollution/mold</a>  |

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| California Research Bureau Reports                                     | Molds, Toxic Molds, and Indoor Air Quality<br><a href="http://www.library.ca.gov/crb/notes/v8n1.pdf">http://www.library.ca.gov/crb/notes/v8n1.pdf</a>   |
| California Department of Health Services (CDHS) – Indoor Air Program   | Indoor Air Quality info Sheet: Mold in My Home: What Do I Do?<br><a href="http://www.cal-iaq.org/mold0107.pdf">http://www.cal-iaq.org/mold0107.pdf</a><br><a href="http://www.cal-iaq.org/mold0107.htm">http://www.cal-iaq.org/mold0107.htm</a><br><br><a href="http://www.cal-iaq.org/iaqsheet.htm#Mold">http://www.cal-iaq.org/iaqsheet.htm#Mold</a><br><br><a href="http://www.cal-iaq.org/iaqsheet.htm">http://www.cal-iaq.org/iaqsheet.htm</a> |
| CDHS Environmental Health Investigations Branch (EHIB)                 | Information on Indoor Mold<br><a href="http://www.dhs.cahwnet.gov/org/ps/deodc/ehib/EHIB2/topics/mold.html">http://www.dhs.cahwnet.gov/org/ps/deodc/ehib/EHIB2/topics/mold.html</a><br><br>Misinterpretation of Stachybotrys Serology, November 2000<br><a href="http://www.dhs.cahwnet.gov/org/ps/deodc/ehob/EHIB2/PDF/Stachy_Serology.pdf">http://www.dhs.cahwnet.gov/org/ps/deodc/ehob/EHIB2/PDF/Stachy_Serology.pdf</a>                         |
| Minnesota Department of Health   | Mold In Homes<br><a href="http://www.health.state.mn.us/divs/eh/indoorair/mold/index.html">http://www.health.state.mn.us/divs/eh/indoorair/mold/index.html</a><br><br>Indoor Mold: Health Hazard Identification and Control<br><a href="http://www.health.state.mn.us/divs/eh/indoorair/mold/hazardid.html">http://www.health.state.mn.us/divs/eh/indoorair/mold/hazardid.html</a>  |
| University of Minnesota, Department of Environmental Health and Safety | Fungi in Buildings<br><a href="http://www.dehs.umn.edu/iaq/fungus">http://www.dehs.umn.edu/iaq/fungus</a><br><br>Fungal Abatement Safe Operating Procedures<br><a href="http://www.dehs.umn.edu/iaq/sop.html">http://www.dehs.umn.edu/iaq/sop.html</a><br><br>Managing Water Infiltration into Buildings<br><a href="http://www.dehs.umn.edu/iaq/flood.html">http://www.dehs.umn.edu/iaq/flood.html</a>   |
| Washington State Department of Health                                  | Got Mold? Frequently Asked Questions<br><a href="http://www.doh.wa.gov/ehp/ts/IAQ/Got_Mold.html">http://www.doh.wa.gov/ehp/ts/IAQ/Got_Mold.html</a><br><br>Is Indoor Mold Contamination a Threat to Health?<br><a href="http://www.doh.wa.gov/ehp/oehas/mold.html">http://www.doh.wa.gov/ehp/oehas/mold.html</a>  |
| Montana State University   | Healthy Indoor Air for America's Homes Project<br><a href="http://www.montana.edu/wwwcxair">http://www.montana.edu/wwwcxair</a><br><br>Eliminate Molds, Excessive Moisture and Other Biological Pollutants<br><a href="http://www.montana.edu/wwwcxair/facts_mold.html">http://www.montana.edu/wwwcxair/facts_mold.html</a>   |

**APPENDIX C**

**FACILITY ASSESSMENT CHECKLIST**

Inspection Date: \_\_\_\_\_ Building Number: \_\_\_\_\_

Inspector: \_\_\_\_\_ Room: \_\_\_\_\_

| <b>Potential Sources of Contamination</b>   | <b>Comments</b> |
|---|-----------------|
| <b>Water Damage To:</b> <ul style="list-style-type: none"> <li>• Walls</li> <li>• Ceiling</li> <li>• Carpets</li> </ul>   |                 |
| <b>Missing Ceiling Tiles/Panels</b>   |                 |
| <b>Visible Mold Growth</b>  |                 |
| <b>Odors, Unsanitary Conditions</b>   |                 |
| <b>Renovation/Construction Activity</b>   |                 |
| <b>HVAC System:</b> <ul style="list-style-type: none"> <li>• Number of Units</li> <li>• State of Repair</li> <li>• Condition of Supply and Return Air Grills</li> <li>• Location of Fresh Air Intakes</li> <li>• Condition of Filters</li> </ul>  |                 |
| <b>Area Condition/Information:</b> <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Humidity</li> <li>• Chemicals (Solvents, cleaners, air fresheners)</li> <li>• Water Leaks</li> <li>• Housekeeping</li> <li>• Modular Furniture</li> <li>• Area Use</li> <li>• Adjacent Area Use</li> </ul> |                 |
| <b>List any other significant findings:</b>   |                 |