
INDOOR ENVIRONMENTAL QUALITY

NIOSH Alert: Preventing Occupational Respiratory Disease from Exposures Caused by Dampness in Office Buildings, Schools, and Other Nonindustrial Buildings
(<http://www.cdc.gov/niosh/docs/2013-102/>) DHHS (NIOSH) Publication No. 2013-102 (November 2012)



"Indoor Environmental Quality," as the name implies, simply refers to the quality of the air in an office or other building environments. Workers are often concerned that they have symptoms or health conditions from exposures to contaminants in the buildings where they work. One reason for this concern is that their symptoms often get better when they are not in the building. While research has shown that some respiratory symptoms and illnesses can be associated with damp buildings, it is still unclear what measurements of indoor contaminants show that workers are at risk for disease. In most instances where a worker and his or her physician suspect that the building environment is causing a specific health condition, the information available from medical tests and tests of the environment is not sufficient to establish which contaminants are responsible. Despite uncertainty about what to measure and how to interpret what is measured, research shows that building-related symptoms are associated with building characteristics, including dampness, cleanliness, and ventilation characteristics.

Indoor environments are highly complex and building occupants may be exposed to a variety of contaminants (in the form of gases and particles) from office machines, cleaning products, construction activities, carpets and furnishings, perfumes, cigarette smoke, water-damaged building materials, microbial growth (fungal / mold and bacterial), insects, and outdoor pollutants. Other factors such as indoor temperatures, relative humidity, and ventilation levels can also affect how individuals respond to the indoor environment.

Understanding the sources of indoor environmental contaminants and controlling them can often help prevent or resolve building-related worker symptoms. Practical guidance for improving and maintaining the indoor environment is available.

Workers who have persistent or worsening symptoms should seek medical evaluation to establish a diagnosis and obtain recommendations for treatment of their condition.

Dampness and Mold Evaluation Tool

NIOSH has developed an observational evaluation tool for dampness and mold in buildings. The tool is currently in review to become an official NIOSH document. The goal of the tool is to provide valuable information for motivating remediation, prioritizing intervention, and evaluating remediation effectiveness. The tool consists of:

1. A form which is used to evaluate signs of dampness, water damage, mold growth, and musty odors in rooms and areas throughout a building.
2. A Visual Basic data entry application to enter data collected from hard copy evaluation forms for electronic record keeping and reports. Data is stored in a Microsoft Access database. The software may also be implemented on PC-based tablets. The software is still under development. Once completed, the software will be made available at this website.

For additional information or to receive a form and instructions for use, contact us at moldsheet#1@cdc.gov (<mailto:moldsheet#1@cdc.gov>).

NIOSH Resources

NIOSH Alert: Preventing Occupational Respiratory Disease from Exposures Caused by Dampness in Office Buildings, Schools, and Other Nonindustrial Buildings
(<http://www.cdc.gov/niosh/docs/2013-102/>)

DHHS (NIOSH) Publication No. 2013-102 (November 2012)

Building Air Quality

Building Air Quality Action Plan (<http://www.cdc.gov/niosh/98-123a.html>)

DHHS (NIOSH) Publication No. 98-123 (June 1998)

The Building Air Quality Action Plan is intended to be used in concert with the more comprehensive Building Air Quality: A Guide for Building Owners and Facility Managers (BAQ). (See below.) This resource meets the needs of building owners and managers who want an easy-to-understand path for taking their building from current conditions and practices to the successful institutionalization of good IEQ management practices.

Building Air Quality: A Guide for Building Owners and Facility Managers (<http://www.cdc.gov/niosh/baqtoc.html>)

DHHS (NIOSH) Publication No. 91-114 (December 1991)

In recognition of the need for practical indoor air quality advice for building owners and facility managers, EPA and NIOSH worked jointly to produce this written guidance on preventing, identifying, and correcting indoor air quality problems.

Health Hazard Evaluations

NIOSH conducts investigations of possible health hazards in the workplace. These investigations, called Health Hazard Evaluations (HHEs), are conducted under the authority of the Occupational Safety and Health Act of 1970 and the authority of the Mine Safety and Health Act of 1977, which authorize the Secretary of Health and Human Services, following a written request from employees, authorized representative of employees, or employers, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

Some recent HHE reports related to indoor air quality have been listed below, but for a comprehensive listing, please search the [HHE Database](http://www2a.cdc.gov/hhe/search.asp)
(<http://www2a.cdc.gov/hhe/search.asp>).

- [Health Hazard Evaluation Report, HETA 2009-0193-3114](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20037654+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20037654+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20037654+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), U.S. Immigration and Customs Enforcement Detention and Removal Operations, Chicago, Illinois and Broadview, Illinois
- [Health Hazard Evaluation Report, HETA 2009-0172-3124](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20038712+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20038712+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20038712+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Elementary school, North Carolina
- [Health Hazard Evaluation Report, HETA 2008-0237-3097](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20036222+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20036222+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20036222+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Cincinnati Police Department, Criminal Investigation Section, Cincinnati, Ohio
- [Health Hazard Evaluation Report, HETA 2008-0166-3079](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20035284+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20035284+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20035284+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), NASA Glenn Research Center, Cleveland, Ohio
- [Health Hazard Evaluation Report, HETA 2005-0138-3004](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20030252+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20030252+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20030252+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), International Marine Terminal, Scotia Prince Cruises and Department of Homeland Security, U.S. Customs and Border Protection, Portland, Maine
- [Health Hazard Evaluation Report, HETA 2005-0112-2980](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028468+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028468+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028468+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Taft Elementary School Santa Ana, California
- [Health Hazard Evaluation Report, HETA 2005-0290-2992](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20029708+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20029708+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20029708+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), United States Environmental Protection Agency, Research Triangle Park, Durham, North Carolina
- [Health Hazard Evaluation Report, HETA 2005-0234-2984](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028895+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028895+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028895+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Liberty Central School District Liberty, New York
- [Health Hazard Evaluation Report, HETA 2005-0167-2983](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028896+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028896+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20028896+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Indian River Memorial Hospital Center for Emotional and Behavioral Health Vero Beach, Florida
- [Health Hazard Evaluation Report, HETA 2003-0300-2993](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20029713+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20029713+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20029713+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), West Virginia Department of Health and Human Resources - Webster Springs District Office, Webster Springs, West Virginia
- [Health Hazard Evaluation Report, HETA 2003-0080-2905](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20023551+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20023551+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20023551+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Norwin Middle School East North Huntingdon, Pennsylvania
- [Health Hazard Evaluation Report, HETA 2001-0067-2896](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022841+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022841+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022841+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Somerset County Assistance Office, Somerset, PA
- [Health Hazard Evaluation Report, HETA 2001-0109-2835](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20021519+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20021519+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20021519+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Lac Vieux Desert Resort and Casino, Watersmeet, Michigan
- [Health Hazard Evaluation Report, HETA 2000-0255-2868](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022103+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022103+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022103+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Benefis Healthcare, Great Falls, Montana
- [Health Hazard Evaluation Report, HETA 2000-0168-2871](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022235+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022235+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=20022235+&fi=%2A&Startyear=&Adv=o&terms=1&D1=10&EndYear=&Limit=10000&sort=&PageNo=1&RecNo=1&View=f&), Nassau Community College, Garden City, New York

NIOSHTIC-2 Search

[NIOSHTIC-2 search results on Indoor Environmental Quality](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=%27indoor%2Bair%27%2Bor%2B%27building%2Bair%27%2Bor%2B%27indoor%2Benvironment%27%2Bor%2Biq%2Bor%2Bicq&fi=%27&ti=o&s2=&f2=TI&t2=o&s3=&f3=TI&B1=SI) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=%27indoor%2Bair%27%2Bor%2B%27building%2Bair%27%2Bor%2B%27indoor%2Benvironment%27%2Bor%2Biq%2Bor%2Bicq&fi=%27&ti=o&s2=&f2=TI&t2=o&s3=&f3=TI&B1=SI"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=%27indoor%2Bair%27%2Bor%2B%27building%2Bair%27%2Bor%2B%27indoor%2Benvironment%27%2Bor%2Biq%2Bor%2Bicq&fi=%27&ti=o&s2=&f2=TI&t2=o&s3=&f3=TI&B1=SI))

[NIOSHTIC-2 search results on IEQ and Mold](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=%27indoor+air%27+or+%27indoor+environment%27+or+%27building+air%27+or+ieq+or+iaq&fi=%27&ti=o&s2=mold+or+molds+or+fungi+or+fungus+or+fungal+&f2=%27&t2=o&s3=NIOSHTIC-2) ([http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=%27indoor+air%27+or+%27indoor+environment%27+or+%27building+air%27+or+ieq+or+iaq&fi=%27&ti=o&s2=mold+or+molds+or+fungi+or+fungus+or+fungal+&f2=%27&t2=o&s3=NIOSHTIC-2"\)](http://www2a.cdc.gov/nioshtic-2/BuildOvr.asp?s1=%27indoor+air%27+or+%27indoor+environment%27+or+%27building+air%27+or+ieq+or+iaq&fi=%27&ti=o&s2=mold+or+molds+or+fungi+or+fungus+or+fungal+&f2=%27&t2=o&s3=NIOSHTIC-2))

NIOSHTIC-2 (<http://www2a.cdc.gov/nioshtic-2/>) is a searchable bibliographic database of occupational safety and health publications, documents, grant reports, and journal articles supported in whole or in part by NIOSH.

Other Resources

[Asbestos Bibliography](http://www.cdc.gov/niosh/97-162.html) (<http://www.cdc.gov/niosh/97-162.html>)

DHHS (NIOSH) Publication No. 97-162 (September 1997) 8252 KB (224 pages)

This publication is a compendium of NIOSH research and recommendations on asbestos. It updates and supercedes the NIOSH document Asbestos Publications dated June 1992.

[Occupational Safety and Health Administration \(OSHA\) - Indoor Air Quality](http://www.osha.gov/SLTC/indoorairquality/index.html) (<http://www.osha.gov/SLTC/indoorairquality/index.html>) [Ⓔ](http://www.cdc.gov/Other/disclaimer.html)

[Lawrence Berkley National Laboratory](http://eetd.lbl.gov/ied/sfrb/overview.html) (<http://eetd.lbl.gov/ied/sfrb/overview.html>) [Ⓔ](http://www.cdc.gov/Other/disclaimer.html) (<http://www.cdc.gov/Other/disclaimer.html>)

Indoor Air Quality Scientific Findings Resource Bank - Overview of IAQ

[Environmental Protection Agency \(EPA\) - Indoor Air Quality](http://www.epa.gov/iaq/) (<http://www.epa.gov/iaq/>) [Ⓔ](http://www.cdc.gov/Other/disclaimer.html) (<http://www.cdc.gov/Other/disclaimer.html>)

[Guidance for Filtration and Air-Cleaning Systems to Protect Building Environments from Airborne Chemical, Biological, or Radiological Attacks](http://www.cdc.gov/niosh/docs/2003-136/) (<http://www.cdc.gov/niosh/docs/2003-136/>)

DHHS (NIOSH) Pub No. 2003-136

Provides preventive measures that building owners and managers can implement to protect building air environments from a terrorist release of chemical, biological, or radiological contaminants.

[Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks](http://www.cdc.gov/niosh/docs/2002-139/) (<http://www.cdc.gov/niosh/docs/2002-139/>)

DHHS (NIOSH) Publication No. 2002-139 (May 2002) 841 KB (40 pages)

This document identifies actions that a building owner or manager can implement without undue delay to enhance occupant protection from an airborne chemical, biological, or radiological attack. Includes information about: what you can do; specific recommendations; things not to do; physical security; ventilation and filtration; maintenance, administration, and training.

[National Occupational Research Agenda - Indoor Environment \(http://www2.cdc.gov/NORA/noratopictemp.asp?rscharea=ie\)](http://www2.cdc.gov/NORA/noratopictemp.asp?rscharea=ie)

The goal of the NORA Indoor Environment (IE) Team is to focus and facilitate research, through broadly based multi-sector partnerships, that will improve the health of workers in indoor environments.

[NIOSH Interim Recommendations for the Cleaning and Remediation of Flood-Contaminated HVAC Systems: A Guide for Building Owners and Managers \(http://www.cdc.gov/niosh/topics/flood/Cleaning-Flood-HVAC.html\)](http://www.cdc.gov/niosh/topics/flood/Cleaning-Flood-HVAC.html)

This guide contains recommendations to help ensure that HVAC systems contaminated with flood water are properly cleaned and remediated to provide healthy indoor environments.

[Hazard Controls \(http://www.cdc.gov/niosh/hazcomm-hazid.html\)](http://www.cdc.gov/niosh/hazcomm-hazid.html)

HCs are brief 1-2 page, user-friendly documents that describe control techniques documented to substantially reduce hazardous exposures to workers in a particular application/industry process.

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