PEOSH Indoor Air Quality Training for Asthma-Friendly Schools

Part I
PEOSH Indoor Air Quality Standard Overview

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Public Employees Occupational Safety and Health Unit
IAQ Asthma-Friendly Schools Training Goals

- Understand PEOSH IAQ standard
- Appreciate Roles and Responsibilities
  - Designated Person
  - School Nurse
  - IAQ Team
- Recognize basic IAQ problems
  - Asthma triggers
  - Infectious disease transmission
  - Other IAQ health complications
Use of Green Cleaning Products

Perform a Walkthrough Survey

Investigate employee complaints

Use IAQ/TFS checklists & worksheets

Be familiar with HVAC System basics

Understand IAQ Terminology

Know where to get Assistance
PEOSH IAQ Standard
N.J.A.C. 12:100-13

Adopted in 1998; first IAQ Standard in U.S.
Revised May 21, 2007 by PEOSH Advisory Board, IAQ Subcommittee

1. Designated Person
2. Written IAQ Program
3. 48 hrs to remove damp materials
13.1 Scope
13.2 Definitions
13.3 Compliance Program
13.4 Control of Specific Contaminant Sources
13.5 Air Quality During Renovation & Remodeling
13.6 Recordkeeping
13.7 Employer’s Response to Complaints
13.8 IAQ Compliance Documents
Scope: “apply to matters relating to indoor air quality in buildings occupied by public employees during regular work hours.”
Compliance Program

Employer shall identify and train a Designated Person: “person given responsibility [and authority] by the employer to take measures to assure compliance”

- Prepare written plan
- Review and update written plan annually
PEOSH IAQ Standard
N.J.A.C. 12:100-13.3

- Establish a preventative maintenance schedule
- Ensure inoperable components are replaced or repaired promptly
- Ensure no microbial growth
- Implement general or local exhaust ventilation
PEOSH IAQ Standard
N.J.A.C. 12:100-13.3

- Check the HVAC system when:
  - Carbon Dioxide (CO2) levels > 1,000 ppm
  - Temperature is < 68°F - 79°F
- Prevent contamination of fresh air supply
- Check natural ventilation portals are maintained
- Promptly investigate all employee IAQ complaints
"HVAC system"

“collective components of the heating, ventilation and air-conditioning system including, but not limited to, filters and frames, cooling coil condensate drip pans and drainage piping, outside air dampers and actuators, humidifiers, air distribution ductwork, automatic temperature controls, and cooling towers.”
Skills and Authority of Designated Person

- Knowledgeable about NJ IAQ Standard
- Familiar with basic IAQ issues
- Working knowledge of air handling system
- Have a position of authority
- Effectively communicate with management, staff, maintenance, contractors
- Good problem solver
- Available
Controls of Specific Contaminant Sources

• If General Ventilation inadequate implement other control measures
• Microbial Contaminants
  • Promptly repair water intrusion
  • Remediate damp/wet material by drying or removal within 48hrs of discovery
  • Remove visible microbial contamination
Renovation and Remodeling

- Evaluate chemical hazards prior to selection or use.
- Isolate construction areas (scheduling, physical barriers, pressure differentials)
- Utilize local exhaust ventilation
- Notify employees 24 hours prior to any construction
- Construction areas must be cleaned and aired out prior to re-occupancy
"Renovation and remodeling"

building modification involving activities
that include but are not limited to:

removal or replacement of walls, roofing, ceilings, floors, carpet, and components such as moldings, cabinets, doors, and windows; painting; decorating; demolition; surface refinishing; and removal or cleaning of ventilation ducts.
Recordkeeping

- Written IAQ Program
- Documentation of Designated Person Training
- Written Preventive Maintenance Program
- Maintenance Log (Date, What, Who)
PEOSH IAQ Standard
N.J.A.C. 12:100-13.6

Recordkeeping

- Maintained for 3 years
- Available to employees and representatives ASAP or within 10 working days
- Available immediately during PEOSH inspection
PEOSH IAQ Standard
N.J.A.C. 12:100-13.7

Employer’s Response to Complaint

PEOSH will send a letter for response:

- Statement that the complaint is NOT founded

- Study of issue initiated and completion date

- Remediation measures already completed

- Remediation planned and completion time

Must comply with Uniform Construction Code, N.J.A.C. 5:23
PEOSH IAQ Standard
N.J.A.C. 12:100-13.8

IAQ Compliance Documents

- As-built construction documents
- HVAC System Commissioning Report
- HVAC Testing, Adjusting, and Balancing Reports
- Operations and Maintenance Manuals
- Water Treatment Logs
- Operator Training Materials

*Must provide to PEOSH upon request (if available)
Other Standards Related to IAQ

Air Contaminants Standards
(29 CFR 1910.1000, Tables Z-1, Z-2)

Access to Employee Exposure and Medical Records Standard
(29 CFR 1910.1020)
Other Standards Related to IAQ

PEOSH Asbestos Standards

- Identification of asbestos-containing materials in all buildings (pre-1980)
- Labeling and signage requirements
- Annual awareness training of maintenance staff
- Classification of asbestos work and requirements
- Notification of outside contractors
Other Standards Related to IAQ

Federal and State Asbestos Standards

- AHERA - U.S. EPA/NJDOH (Schools K-12)
- NJ Uniform Construction Code-Subchapter 8, NJ Dept. of Community Affairs (NJDCA)
Designated Person

Coordinate IAQ Activities

- Prepare and review Written IAQ Program
- Establish preventive maintenance procedures
- Track and document maintenance & repair
- Establish control measures for pollutants
- Manage renovation and construction
- Coordinate specific facility operations
- Manage maintenance activities
- Maintain IAQ Records
Management of IAQ
A Coordinated Effort

- Employee
- Desig. Person
- Maint.
- Employer
Management of IAQ
A Coordinated Effort

Desig. Person

- Employee
- Employer
- Property Manager
- Maint.
- GC
- IAQ Consult
- HVAC Cont.
- Remediation Contractor
- PEOSH
“Acceptable IAQ”

From ASHRAE: “no known contaminants at harmful concentrations as determined by Authorities and at which a substantial majority (80% or more) of the people exposed do not express dissatisfaction”

* American Society of Heating, Refrigeration, and Air-Conditioning Engineers
substantial number of occupants experience health and comfort problems related to working indoors.”

Symptoms do not fit the pattern of any particular illness, are difficult to trace to any specific source and relief from these symptoms upon leaving the building.”
“Building-related Illness”

specific medical conditions of known etiology
documented by physical signs and laboratory findings

sensory irritation when caused by known agents,
respiratory allergies, asthma, nosocomial infections,
humidifier fever, Legionnaires Disease

signs and symptoms characteristic of exposure to chemical or biological substances
IAQ Employee Complaints

- Go to the location(s) of the complaint
- Conduct interviews
- Review building operations and maintenance procedures
- Complete PEOSH IAQ Inspection Checklist
- Involve employees through L/MH&SC*
- Communicate outcome and corrective action
- Report all complaints to School Nurse

*Labor-Management Health & Safety Committee
IAQ Ventilation System

Heating Ventilation and Air Conditioning (HVAC)

- Regulates the temperature and humidity for comfort
- Supplies general dilution ventilation to decrease indoor pollutants
IAQ Basic Ventilation System
IAQ Basic Ventilation System
IAQ Ventilation System
IAQ Complex Ventilation System
IAQ Ventilation System
IAQ Ventilation System
Basics: Factors Affecting IAQ

- Building occupant activities
- General Indoor sources
- Construction and renovation activities
- Design and condition of HVAC
- Outdoor sources
- Unidentified Sources
IAQ Basics: Indoor Sources

- CO2 (primarily from occupants)
- Perfume, cologne, air fresheners
- Cleaning / disinfecting products
- Plants & Flowers
- Off gassing from new materials
- Mold (result of water intrusion)
- Stale air from unventilated storage closets
- Lab chemicals & animals
IAQ Basics: Outdoor Sources

- Exhaust vents located near make up air intakes
- Vehicles idling near open doors or windows
- Pollen from outdoor plants
- Pollution from nearby facilities & construction
- Infiltration of general outdoor contaminants
Types of Air Contaminants

- **Gases** – Formless fluid occupying an enclosure which confines it (i.e., carbon dioxide, oxygen)
- **Vapors** – Solid or liquid converted by heat to a gaseous state (i.e., methylene chloride, mercury)
- **Fumes** – Condensation of gas into particle <1 micrometers (µm) (welding)
- **Dust** – Particulate ranging in size from 0.1 to 25µm
- **Fibers** – An elongated particle with aspect ratio of greater than 3:1
- **Bioaerosols** – Airborne particles that originate from living organisms (i.e., pollen, spores, fragments, waste)
General (Dilution) Ventilation System

- Balanced system of supply & return air
- Control exchange of inside air with fresh air
- Filter, temper & humidify supply air
- Maintain rooms at slight positive pressure
- Maintain building at slight positive pressure

Primary Goal: Comfort
Air Handling Unit (AHU)
Air Filters

- Use filters that meet HVAC manufacturer’s and operating specifications
- Minimum Efficiency Rating Value (MERV) of between 8 and 13
- Below 13 may remove small bacterial or fungal spores
- Check that are proper size, in good condition, clean and not clogged

IAQ - Ventilation System
<table>
<thead>
<tr>
<th>MERV</th>
<th>Particle size</th>
<th>Typical controlled contaminant</th>
<th>Typical Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>17–20[3]</td>
<td>&lt; 0.3 μm</td>
<td>Virus, carbon dust, sea salt, smoke</td>
<td>Electronics &amp; pharmaceutical manufacturing cleanroom</td>
</tr>
<tr>
<td>13–16</td>
<td>0.3–1.0 μm</td>
<td>Bacteria, droplet nuclei (sneeze), cooking oil, most smoke and insecticide dust, most face powder, most paint pigments</td>
<td>hospital &amp; general surgery</td>
</tr>
<tr>
<td>9–12</td>
<td>1.0–3.0 μm</td>
<td>Legionella, Humidifier dust, Lead dust, Milled flour, Auto emission particulates, Nebulizer droplets</td>
<td>Superior residential, better commercial, hospital laboratories</td>
</tr>
<tr>
<td>5–8[4]</td>
<td>3.0–10.0 μm</td>
<td>Mold, spores, dust mite debris, cat and dog dander, hair spray, fabric protector, dusting aids, pudding mix</td>
<td>Better residential, general commercial, industrial workspaces</td>
</tr>
<tr>
<td>1–4</td>
<td>&gt; 10.0 μm</td>
<td>Pollen, dust mites, cockroach debris, sanding dust, spray paint dust, textile fibers, carpet fibers</td>
<td>Residential window AC units</td>
</tr>
</tbody>
</table>
IAQ - Ventilation System

Air Handling Unit (AHU)
Humidification and Dehumidification

- Humidification - add moisture
- Dehumidification - reduce moisture
- Maintain RH below 60% in all occupied spaces and plenums
IAQ Ventilation System

Air Handling Unit (AHU)

Cooling Coils and Drain Pans

- Coils condense water vapor into drain pans
- Drain pipes must remove water from the AHU
IAQ Ventilation System

Air Handling Unit

Return Air Plenum *

- Maintain all exhaust systems that pass through plenum
- Prevent contamination of the plenum
- Ensure air flow is not blocked

* Space above ceiling tiles is often used as return air plenum
IAQ Ventilation System

Ducts

- Move the supply air (filtered and conditioned) air to occupied areas
- Repair leakage especially at joints
- Do not make paths for utilities through ducts
IAQ Ventilation System

Fans

- Force the supply air to ventilated areas
- Ensure fan belts are operating properly
- Ensure the rotation is in correct direction
- Ensure there are no obstructions in the Fan

* Safety hazard – maintain guards & use lockout procedure
IAQ Ventilation System

Local Exhaust Systems
Lab / Vo-tech

- Hazardous contaminant removal
- Point of exhaust (hood) close to source
- Make up air requirements may be greater than for general ventilation
- Room should have negative pressure
IAQ Ventilation System
Dampers
Control airflow

- Check condition of dampers and controls
- Ensure all dampers are operable and meet design specifications
- Clean screens and grilles
IAQ Preventive Maintenance

- Equipment List & Operation Manuals, Blueprints
- Master Schedule & Manufacturer Recommendations
- Maintenance Contracts
- Documentation Inspection/Maintenance: checklists, Work Order & Maintenance Log, Repair Documentation
Fan belts operate properly and in good condition
Filters are installed properly and replaced as scheduled
Dampers are open as designed and not blocked
Motor functions properly
Diffusers are opened
Condensate pan drains remove condensate properly
Supply and exhaust system are properly balanced
IAQ - PM Documentation

- Name of person(s) and date
- Reason for Inspection/Repair(s)
- Activity(s) performed
- Item(s) repaired/replaced
- Time spent on activity
- Observations