



IEQ INFO

Indoor Environmental Quality Information

Hazard Evaluations and Technical Assistance Branch

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Good Practice Guidelines for Maintaining Acceptable Indoor Environmental Quality During Construction and Renovation Projects

National Institute for Occupational Safety and Health
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Cincinnati, Ohio 45226

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Good Practice Guidelines for Maintaining Acceptable IEQ During Construction and Renovation Projects

Introduction

The following good practice guidelines for maintaining acceptable indoor environmental quality (IEQ) during construction and renovation projects were prepared to serve as objective criteria for the evaluation of building construction and renovation practices by NIOSH. They are also intended to be educational and informative. These guidelines were prepared from information contained in two reference documents along with our own collective experience. These two reference documents are “IAQ Guidelines for Occupied Buildings Under Construction,” prepared and published by the Sheet Metal and Air-Conditioning Contractors’ National Association, Inc.¹ and, “Construction/ Renovation Influence on Indoor Air Quality” by Dr. Thomas Kuehn, an article published in the October 1996 issue of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Journal.²

Background

Construction and renovation projects can adversely affect building occupants by the release of airborne dusts, gases, organic vapors, and odors during the construction, renovation, demolition, repair, or reconfiguration activities. Microbiological contaminants can also be released during construction and renovation activities. Two sources of contaminants, those generated from inside the building and those generated from outside the building, need to be considered. There are several important distinctions regarding exposures of construction workers versus exposures of non-construction workers (building occupants), and these differences are critically important in the development of management strategies to: (1) ensure awareness on the part of the construction contractors regarding the potential impact of construction and renovation activities on building occupants; (2) anticipate construction and renovation activities that may generate contaminants; and (3) implement controls to minimize or prevent exposures of both construction and renovation workers and building occupants. Foresight and planning are necessary prerequisites to prevent IEQ-related complaints during building construction and renovation activities. Even nuisance odors and dusts from construction and renovation activities can be triggering factors, resulting in complaints from building occupants. These complaints can be due to actual symptoms resulting from exposures or to a perceived risk of exposures to unknown materials, which may or may not be an actual health hazard.

Effective maintenance of acceptable IEQ during construction and renovation activities requires a collective effort and input from building managers, the general contractor,

subcontractors, engineers, and building occupants. Input from heating, ventilating and air-conditioning (HVAC) professionals and architects is important to assess ventilation system performance when making design changes or implementing control measures. The ability and desire for effective communication between all parties is essential, especially during rapidly changing circumstances, which are often a hallmark of construction- and renovation-related activities.

Guidelines for Initial Planning

The initial stage of any construction or renovation activity is the appropriate time to develop a site- and activity-specific plan to control contaminants that may affect construction or renovation workers and building occupants.

- Identify all key personnel (representatives from the building and general contractor) responsible for addressing construction- or renovation-related activities and airborne contaminant control. Other personnel such as building staff, engineers, and subcontractors, should be involved as necessary.
- Develop a construction or renovation impact assessment describing anticipated work activities, along with their associated source contaminants, generation points, and areas potentially affected by the release of air contaminants.
- Develop a detailed budget for the contaminant control methods to be utilized.

Guidelines for Bid Specifications

Bid document specifications should be developed. In addition to general control measures, the bid document should include the particular control measures appropriate for the specific construction or renovation project being proposed. These bid specifications should be clearly written to reduce the likelihood of misinterpretation.

- Identify the specific controls needed for the construction or renovation project along with the appropriate performance metrics, and write specifications into the bid document accordingly.
- Require the general contractor to designate a representative to handle IEQ issues and establish appropriate channels of communication with subcontractors.
- Specify construction or renovation conditions that would require an emergency response (such as a contaminant release into an occupied area).

Guidelines for Control Options

Since a variety of methods are available for the control of both indoor- and outdoor-generated contaminants, the most effective and cost efficient strategies should be considered for implementation.

- Schedule construction or renovation work during periods of low building occupancy or low occupancy adjacent to the work areas, if possible.
- Isolate work areas from occupied areas using critical barriers, negative and positive pressurization, and high-efficiency particulate air (HEPA) filtration, as necessary, and minimize the number of building penetrations required for the construction or renovation activities.
- Negatively pressurize work areas and/or positively pressurize occupied areas to prevent migration of air contaminants from work areas to occupied areas.
- Modify HVAC operations as necessary during times of construction or renovation activities to ensure isolation of work areas from occupied areas. This could include increasing the HVAC outdoor air intake filtration efficiency and temporarily relocating the HVAC outdoor air intakes serving the occupied areas.
- Maintain an adequate unoccupied buffer zone around the work areas to allow for construction or renovation traffic and to ensure acceptable IEQ. This could require temporarily relocating building occupants in the immediate vicinity of the work areas.
- Increase housekeeping activities in adjacent occupied areas during construction or renovation projects.
- To reduce the likelihood of contaminant generation, specify low-emitting materials for use in construction or renovation projects.

Guidelines to Protect HVAC Systems

Protect the HVAC system(s) serving the construction or renovation areas from damage or contamination.

- The HVAC system(s) serving the construction or renovation areas should be disabled, if possible.
- Isolate portions of the HVAC system where appropriate to prevent damage or contamination.
- Return air grilles should be blocked or sealed in construction or renovation areas.

- Upgrade filtration efficiency in the HVAC systems continuing in use during construction or renovation activities
- Do not store construction materials or equipment in HVAC mechanical rooms.

Guidelines for Good Work Practices

Good work and housekeeping practices that minimize contaminant release and ensure acceptable IEQ are essential to the success of any construction or renovation project.

- Use local exhaust ventilation with HEPA filtration where dust generation is anticipated. If local exhaust is not feasible, portable air cleaning devices could be used as appropriate.
- Use work practices and materials that result in little or no generation of airborne contaminants during construction or renovation activities, such as wet methods to suppress dust generation.
- Identify routes for construction or renovation traffic through unoccupied areas and away from building openings to occupied areas.
- Use HEPA vacuums and damp mop regularly to clean floors and ledges during construction or renovation activities.
- Bag and promptly remove off site all construction or renovation debris through demolition chutes on the exterior of building and/or through other dedicated perimeter wall penetrations.
- Locate dumpsters and salvage bins away from operating HVAC outdoor air intakes and exterior doors to occupied areas.

Guidelines to Implement Project Specifications

Effective implementation and management of the construction or renovation project is essential to maintain acceptable IEQ for the building occupants.

- Ensure that the general contractor's IEQ designee is adequately trained and has the authority to immediately correct problems affecting IEQ as they arise.
- Hold regularly scheduled meetings between building representatives, the general contractor, subcontractors, and other personnel as appropriate to ensure the acceptability of IEQ.

- Monitor construction or renovation activities carefully so that all work conforms to the bid document specifications.
- Monitor the pressurization of both construction or renovation and occupied areas to ensure that the complete isolation of the work area is maintained.
- Monitor for airborne contaminants in the occupied areas as appropriate to ensure acceptable IEQ.

Guidelines to Maintain Effective Communication

Ensure that effective communication exists between building occupants, the project manager, the general contractor, subcontractors, and other personnel as appropriate.

- Prior to the start of construction or renovation activities, communicate the scope of work and the precautions that will be used to control the release of contaminants.
- During the construction or renovation project, update building occupants regarding the project's progress and other pertinent information.
- Promptly respond to complaints from building occupants regarding construction- or renovation-related IEQ issues and specify any situations requiring an emergency response.

Guidelines to Commission Work Area

- Use 100% outdoor air to ventilate the work areas before and during initial occupancy.
- Ensure the HVAC system(s) in the work areas are tested and balanced, preferably before occupancy.
- Monitor for airborne contaminants in the work areas (as necessary) to ensure acceptable IEQ during initial occupancy.

References

1. SMACNA [1995]. IAQ Guidelines for Occupied Buildings Under Construction. Chantilly, VA: Sheet Metal and Air Conditioning Contractors' National Association, Inc.

2. Kuehn, Thomas [1996]. Construction/Renovation Influence on Indoor Air Quality. ASHRAE Journal 38(10):22-29.