# Indoor Environmental Quality During Construction and Renovation Projects

## I Purpose

The purpose of the document is to provide project managers and facilities management staff with guidance on how to minimize the negative impact of construction and renovation projects on indoor environmental quality (IEQ).

## II Scope

Construction projects can have a significant impact on indoor environmental quality (IEQ) through the introduction of pollutants such as particulates, offensive odors, toxic chemical vapors, microbials, and combustion products. Pre-planning efforts that anticipate these issues and specify adequate pollutant control methods prior to commencing work can be an essential step to "on-time", "within budget", project completion. Planning efforts should also include a commissioning procedure that specifies re-occupancy criteria at project completion. The following components shall be implemented to minimize negative impacts of construction on IEQ:

1. Pre-Planning
2. Occupant Notification
3. Methods for Pollutant Control
4. Re-occupancy Criteria/Commissioning

## III Definitions

- IEQ – Indoor Environmental Quality
- Project support personnel- workforce engaged in the construction project. These may include, but are not limited to, project managers, facilities management staff, contractors, and others tasked with construction or renovation activities on Tennessee Tech University property.

## IV Responsibilities

- The project personnel shall be responsible for maintaining acceptable indoor environmental quality within the space or contiguous spaces where the construction project is occurring.
- EHS reserves the right to issue a "Stop Work" order in the event that the indoor environmental quality of the project space or contiguous spaces is adversely affected by the construction project.

## V Program Component Procedures

- Pre-Planning: key factors to assess include:
    - Types of chemical and physical sources of dusts or odors:
        - Produced from material being demolished or disturbed.
        - Products used in construction equipment or material used.
    - Presence of pollutants that are a recognized hazard, as evidenced by the Safety Data Sheet (SDS).
    - Times and locations where occupants are most likely to encounter airborne pollutants.
    - The expected amount and duration of exposure occupants may have to the pollutants.
    - General safety and hygiene; for example, keeping hallways and exits unobstructed.
    - As specific details of the project become clear, control methods can be tailored to the project. Specific control measures may involve:

- Securing the work area and adding signage to keep non-workers out of the work area.
- Protection of the heating, ventilating, and air conditioning (HVAC) system.
- Control of the pollutant source.
- Interruption of the pollutant pathway (plastic sheeting barriers, etc.).
- Housekeeping scheduling considerations.

- Occupant Notification

  Notifying building coordinators and occupants of the proposed work, work schedule, and a description of the type of inconvenience it may cause is critical to the success of most projects. Specifically, occupants should be advised of potential odors, noise, dust generation, etc., well in advance of work so that individuals with pre-existing medical conditions can make alternate arrangements or go on a modified work schedule.

- Methods for Pollutant Control

  Prior to commencement of work, project personnel should be made familiar with locations of all posted regulations, personal protection requirements (including workplace entry and exit procedures), and emergency procedures. Project personnel should wear appropriate personal protective equipment.

  - HVAC Protection
    - Where feasible, the HVAC system should be shut down during demolition or any other dust, fume or contaminate producing activity. All openings, including but not limited to ducts, grilles, grates, diffusers, pipe chases, or other openings within the designated work area, should be sealed with 6-mil polyethylene sheeting and secured with duct tape.
    - When total HVAC isolation is not feasible, consider the use of temporary filters on grilles, diffusers, etc. These filters should be frequently inspected during the course of the project and replaced as needed.
    - The mechanical room must not be used to store construction or waste materials.

  - Source Control
    - All surfaces to be disturbed should be misted with water to minimize airborne dust.
    - When possible, products emitting lower amounts of odor or volatile organic compounds (VOC's) should be used.
    - If feasible, electric-powered equipment should be used in lieu of gasoline-powered equipment.

  - Isolate work areas from occupied areas
    - Use physical barriers, negative pressurization of the construction or renovation area relative to occupied areas, HEPA filtration to remove contaminants, and sticky mats at each entrance.
    - All openings, including but not limited to windows, doorways, drains, ducts, grilles, grates, diffusers, pipe chases, access panels, or other openings within the designated work area should be sealed with 6-mil fire resistant polyethylene sheeting and duct tape.
    - Temporary isolation wall enclosures should be constructed where needed i.e. open areas, hallways, etc. The temporary wall enclosures should be assembled with one layer of 4-mil polyethylene sheeting overlapping in alternate layers. Affix 4-mil polyethylene sheeting to the ceiling grid or a temporary framework to form the walls of the enclosure. The floor within the enclosure should be covered with one layer of

6-mil polyethylene sheeting. Each layer should be taped at all edges. All carpeting must be protected from contamination during construction, unless new carpeting will be installed.

- Adequate exhaust ventilation equipment with appropriate filtration should be installed to maintain a negative pressure differential between the work area and adjacent areas of the building. **(Note: It is good practice to smoke test the enclosure to ensure it is under negative pressure. EH&S may be contacted to provide this service.)**
- As far as practicable, negative pressure ventilation units should be exhausted to the outside of the building. Careful installation and daily inspections should be performed to ensure ducting does not release construction debris into uncontaminated areas of the building.
- The negative pressure systems should continuously operate while work is in progress. Damage and defects in the enclosure system are to be repaired immediately upon discovery.

- Housekeeping
  - Daily, after completion of the work and as needed throughout the day, the entire work area (including walls, ceilings, floors, and other work surfaces) should be cleaned and vacuumed with a HEPA vacuum. All surfaces should be free from visible construction debris.

- Scheduling
  - Depending on the expected impact, some projects should be scheduled off-hours. If this is not feasible, a buffer zone should be established around the work area where no building occupants are permitted. Building occupants should not be allowed to remain in the area where construction activities are in progress.
  - Projects that generate malodorous or toxic air contaminants may create special scheduling needs if the sampling methods and information available to Industrial Hygienists precludes making immediate assessments of employee exposures. For example, contaminants that require submitting samples to a lab and waiting for results before employees can be advised whether exposures are acceptable pursuant to recognized occupational exposure limits require special scheduling considerations.

- Reoccupancy Criteria/Commissioning
  - Prior to reoccupation of the project area, the worksite should be cleaned until there is no visible haze in the air and no settled dust is found on surfaces.
  - There should be low to no detectable odors upon re-occupancy.
  - The HVAC system should be restored to good operating conditions when odors and visible emissions have dissipated or otherwise been eliminated.

## VI References


- Maintaining Acceptable Indoor Environmental Quality (IEQ) During Construction and Renovation Projects; National Institute for Occupational Safety and Health. https://www.cdc.gov/niosh/docs/wp-solutions/2020-110/pdfs/2020-110.pdf?id=10.26616/NIOSHPUB2020110
- IAQ Guidelines for Occupied Buildings Under Construction. Sheet Metal and Air Conditioning Contractors' National Association, Inc. 1995, 2000, 2008. http://www.smacna.org
- Steps to Safe Renovation and Repair Activities; United States Environmental Protection Agency. https://www.epa.gov/pcbs/steps-safe-renovation-and-repair-activities#a5