An Air Quality Fact Sheet - On School Renovation

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How does renovation affect indoor air quality?

The design, construction, and operation of school buildings are major factors that can affect indoor air quality. When change takes place in any or all of these areas, there is greater chance of new building materials or furnishings giving off vapors and odors, of increased dust and combustion fumes, and of ventilation problems.

Building additions, changes in floor plans, renovations, and replacement of building components like carpeting, roofing materials, or heating and ventilation equipment can all impact the air inside the school. Thus, special care must be taken to prevent related health problems and to minimize possible effects on the learning environment.

What steps should be taken to protect the health of occupants before a school renovation project begins?

Renovation or new building projects provide an opportunity to improve IAQ. However, such projects can also result in exposure to higher levels of indoor air pollutants if careful attention is not given to prevention.

Express any concerns to your architect and builder, and enlist their help in taking measures to assure a safer environment both during and after the project. Areas to be renovated should be inspected long before work begins. This provides time to identify potential problems, to evaluate them, and to incorporate language into the contract specifications, if necessary. Publications from organizations such as the Sheet Metal and Air Conditioning Contractors' National Association SMACNA may be helpful in preparing contract language. Examples of situations to be examined before work begins include the following:

- Asbestos - All schools should have an Asbestos Hazard Emergency Response Act (AHERA) management plan. When renovations are planned, consult your school's plan. If renovation will disturb any asbestos, hire an asbestos professional to assist with the project. Sampling may be required to determine asbestos content.
- Lead - For information about lead hazards, consult the .
- Mold - Reduce exposure to microbial growth such as mold that may be found on water-damaged materials. If renovation is likely to expose or require handling of large surface

areas mold or visible mold in a heating, ventilation or air conditioning system (HVAC), consult with an environmental professional about ways to ensure both worker and occupant safety.

- Ventilation - Because construction is likely to generate some pollutants, some indoor areas may have air-related problems. Also, be aware of designs that may interfere with ventilation. When renovation is completed, all occupied areas should be capable of having adequate exhaust and outdoor air supply. For example, if a room is subdivided, the newly created rooms should have their own separate air supply and exhausts. The HVAC system serving the newly created area should be tested and balanced. Ideally, the newly constructed or renovated area should then be under constant ventilation (100 percent fresh air supply and 100 percent air exhaust) for at least two weeks prior to occupancy. This will allow for the curing of finishes and the dilution of vapors from new building materials.

Who should be notified that work is to take place?

Staff, students, and parents should all be notified before planned changes in the building and they should be kept up-to-date as the project progresses. Providing accurate information will help people understand steps that are being taken to protect their health during a renovation project and allow individuals with special health concerns to prepare for the event. Good communication is an important step in addressing indoor air situations. If problems arise during the course of the project, a pattern of good communication will help foster an atmosphere in which people are more willing work together on solutions.

- Give advance notice of work to staff, students, and parents, even if work is to take place during summer or student breaks.
- Avoid withholding information. It is usually counterproductive, and can affect trust.
- Identify an individual at the school who will be responsible for answering indoor air quality questions during the renovation. Let parents, students and staff know how to contact this individual.
- Encourage students and staff to report complaints, concerns, and observations, including health symptoms, and keep a log of this information.

What are the ways to reduce indoor air problems during renovation?

Several factors must be considered to reduce the chance of indoor air quality problems including preexisting air problems in the building; the potential for hazards in existing building materials; appropriate selection and use of new building materials and furnishings; scheduling of work when students and teachers are not present; use of appropriate ventilation and barriers; reduction of the spread of pollutants through good housekeeping and work practices; assignment of a person knowledgeable about indoor air issues to oversee the work; inclusion of topics discussed here in bid and contract specifications; and communication with all staff, students, and parents.

Contract specifications should also state that all applicable Vermont Occupational Safety and Health Administration regulations must be satisfied. While VOSHA regulations apply to employees' exposure, the use of good work practices to meet the regulations should help to lower

the chance of student exposure to such things as dust, diesel fumes, carbon monoxide and noise which are common at construction sites.
To the greatest extent possible, isolate students and staff from dust, fumes and construction debris generated during the renovation work. If possible, begin and end renovation activity during summer break. If the renovation or construction occurs during the school year, then:

- Schedule as much work as possible in hours when the students and staff are not in school.
- Physically separate the work from students to the greatest extent possible. Construction areas should be sealed off from student, teacher, and staff areas. Construction workers should be discouraged from walking through the occupied areas of the school and tracking dust and dirt through the school.
- Use plastic sheeting, portable fans, and mechanical ventilation to prevent dust and fumes from reaching non-work areas through hallways, doors, windows and the ventilation system.
- Don't allow the ventilation system to carry construction-related pollutants throughout the building. Whenever possible, exhaust pollutants from work areas directly to the outside. Avoid cutting off an occupied room from its supply of outdoor air or enclosing a potential pollutant source, such as a photocopier, in an area that does not have adequate ventilation.

How can a school maintain adequate ventilation during renovation?

Adequate ventilation is important for both occupants and construction workers. To prevent dust and pollutants from reaching occupied space, use local exhaust (e.g., fans facing outwards in windows) to remove pollutants and help ensure that air does not move from the renovation work space to the rest of the school. It may be necessary to block ventilation grills in some rooms to avoid having the ventilation system serve as either a reservoir or pathway for pollutants. This is especially important in areas where a portion of the return (exhaust) air is normally recirculated through the building.

In order to remove or dilute odors or pollutants that somehow reach occupied areas or are the result of fumes given off by new building materials, the ventilation system in student or staff occupied areas should be run as much as possible. This assumes that the above measures have been taken to control dust and fumes so that ventilation does not stir up dust in the building or carry pollutants into occupied areas from either indoor or outdoor construction areas.

Before reoccupying areas where a ventilation system has been installed, altered, serviced or otherwise affected, check the system to make sure that it is functioning properly. This check is sometimes called "commissioning."

What housekeeping or cleanup methods help reduce risks?

Because renovation projects can create extra dust and dirt, the school cleaning schedule should be increased. Dust is easily stirred up and can be a lung irritant to occupants, especially those with existing respiratory problems. The following should be done on a daily basis:

- Clean all horizontal surfaces (desks, windowsills, etc.) to minimize exposure to dust. Dusting should be done with a damp cloth.
- Damp mop vinyl, tile, and any other hard surface flooring.
- Vacuum carpets with a High Efficiency Particulate Air (HEPA) filter vacuum.
- Ideally, this should occur after construction activities have finished for the evening, or before students arrive in the morning.

How may new building materials and furnishings affect air quality?

Some products, such as paints and glues, may emit solvents into the air quickly. Others may emit pollutants over a longer time. Schools or contractors doing the work must obtain a Material Safety Data Sheet (MSDS) for each product used in the renovation project. Try to use the least potentially harmful products when possible. Although MSDSs are primarily intended for users of the products (for example, construction workers), the information can be useful for occupants of the school as well.

Schools should avoid using carpets, especially on concrete slabs in contact with the ground, in favor of hard and smooth cleanable flooring such as textured (skid-free) tile. Vapors (including volatile organic compounds or VOCs) given off by carpet components, carpet adhesives, and even compounds absorbed by the carpet over time can all result in air pollution. Carpets can also harbor a variety of biological contaminants such as dust mites, bacteria and mold that can thrive in carpets that have been exposed to moisture. Also, carpet is likely be more difficult to maintain than other flooring alternatives.

- When practical, air out new products before bringing them into the school. For example, ideally, vinyl flooring should be unrolled in a well-ventilated location, such as a warehouse.
- Select low- or no-VOC emitting paints, finishes and glues.
- Schedule painting to occur when areas are unoccupied, and allow time for paint odors to dissipate before occupants return. During this time, providing maximum ventilation can help.
- Protect new materials from water and high humidity to guard against mold growth.

NOTE: The goal of this fact sheet is to provide school personnel with information to minimize the negative effects that renovation may have on air quality in schools. The recommendations do not cover every possible situation, but instead outline general considerations. This fact sheet is not intended to address the regulatory requirements that apply to construction in a school, including disturbing substances such as asbestos-containing materials and lead-based paint.

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