

# **Indoor Air Quality Management Plan**

**Intermediate School District 917**

**Dakota County Technical College**

**1300 145<sup>th</sup> Street East**

**Rosemount, Minnesota 55068**

**July, 2012**

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# I. ISD 917 Indoor Air Quality Management Plan

## A. Purpose and Scope

The purpose of this document is to provide minimum building operational standards to ensure acceptable indoor air quality within all Intermediate School District 917 facilities. This plan will impact all building occupants by proactively managing indoor air quality and provide a healthier and safer environment for students and staff members. This document is reviewed and revised annually, or more often if significant changes are made to building operations, cleaning, or maintenance.

## B. Description

Indoor Air Quality (IAQ) files and all records relating to IAQ are located in the Superintendent's office at Dakota County Technical College, 1300 145<sup>th</sup> Street East, Rosemount, MN, 55068.

The following building locations (categorized) will be occupied by Intermediate School District 917 programs during the 2012-2013 school year:

### DISTRICT OWNED SPACE

**Alliance Education Center**  
14300 Biscayne Avenue  
Rosemount, MN 55068  
651-423-8100

### DISTRICT LEASED SPACE

**Apple Valley IDEA SUN/TEA Campus**  
6950 West 146<sup>th</sup> Street, Suite 114  
Apple Valley, MN 55124  
651-423-8500

**Anthony Louis Center**  
1517 Highway 13 E  
Burnsville, MN 55337  
952-890-8879

**TESA Works**  
PD Works  
14050 Pilot Knob Road  
Apple Valley, MN 55124  
651-423-5726

**Dakota County Area Learning School North (DCALS-North)**  
150 E. Marie  
West St. Paul, MN 55118  
651-332-5570

**SPACE OCCUPIED WITHIN ANOTHER PUBLIC SCHOOL DISTRICT**

**Cedar School (IDEA, SUN)**

2140 Diffley Road  
Eagan, MN 55122  
952-707-4050

**Options**

151 W. Burnsville Parkway, #100  
Burnsville, MN 55337  
952-564-3000

**Meadowview Elementary School (PACES Classroom)**

6100 195<sup>th</sup> Street West  
Farmington, MN 55024  
651-460-3100

**Christa McAuliffe Elementary (DASH/ECSE Classroom)**

1601 West 12<sup>th</sup> Street  
Hastings, MN 55033  
651-480-7406

**Dakota County Technical College (TESA, Dakota County Area Learning School (DCALS),  
Administrative Offices)**

1300 East 145<sup>th</sup> Street  
Rosemount, MN 55068  
651-423-8214

**Diamondhead Education Center (D/HH Preschool)**

202 W. Burnsville Parkway  
Burnsville, MN 55337  
952-895-6610

**Boeckman Middle School (PACES Classroom)**

800 Denmark Avenue  
Farmington, MN 55024  
651-460-1462

**Friendly Hills Middle School (TEA Classroom)**

701 Mendota Heights Road  
Mendota Heights, MN 55120  
651-403-7600

**Gideon Pond Elementary (D/HOH)**

613 East 130<sup>th</sup> Street  
Burnsville, MN 55337  
952-707-3090

**Hastings Senior High School (DASH Classroom)**

200 General Sieben Drive  
Hastings, MN 55033  
651-480-7521

**Henry Sibley High School (DASH Classroom)**  
1897 Delaware Avenue  
Mendota Heights, MN 55118  
651-403-7345

**Hastings Middle School (DASH Classroom)**  
1000 West 11<sup>th</sup>  
Hastings, MN 55033  
651-480-7092

**McGuire Junior High School (IDEA Classroom)**  
21220 Holyoke Avenue West  
Lakeville, MN 55044  
952-469-6215

**Lakeville North Senior High School (TESA and DASH)**  
19600 Ipava Avenue West  
Lakeville, MN 55044  
952-232-3600

**Lakeville South Senior High School (IDEA)**  
21135 Jacquard Avenue  
Lakeville, MN 55044  
952-232-3300

**Pine Bend Elementary (IDEA)**  
9875 Inver Grove Trail  
Inver Grove Heights, MN 55076  
651-306-7733

**SPACE OCCUPIED WITHIN OTHER FACILITIES (Public or Private)**

**Juvenile Services Center (JSC)**  
1600 West Highway 55  
Hastings, MN 55033  
651-438-4980

**C. Acceptable Indoor Air Quality Goals**

Intermediate School District 917 has identified the following goals to assure acceptable indoor air quality within its facilities. Each goal is measurable to provide a quantitative assessment of what constitutes good indoor air quality:

**Goals and Objectives**

1. Provide a minimum of 15 cubic feet per minute (cfm) of outside air per person during regular school hours.
2. Reduce the number of complaints and reactive investigations by improving indoor air quality throughout the district and solving any problems/handling concerns proactively.
3. Implement a thorough preventative maintenance program involving heating, ventilation, and air conditioning systems and building envelope.
4. Improve the effectiveness of cleaning buildings with better procedures, supplies, and equipment.
5. Reduce chemical usage during times when buildings are occupied.
6. Improve the overall health and well being of building staff members and students.

7. Ensure well-maintained building envelop (walls, windows, roofs) to limit moisture infiltration into buildings.

#### **D. Process Utilized**

Intermediate School District 917 has followed a logical process as described in the “Tools for Schools” documents to develop this plan. The specific process included:

- Interviews with building custodians and program supervisors (Directors/Assistant Directors) to develop a database of the occupants’ present satisfaction with the quality of indoor air.
- A baseline assessment of the indoor air quality within each facility that included appropriate indoor air quality testing
- Problems identified and isolated were appropriately remedied or a plan was developed for remediation.

#### **E. District Policy**

District 917 understands the importance of providing acceptable indoor air quality to our customer base. The district is committed to ensuring that acceptable indoor air quality is provided and maintained in all buildings. This Management Plan provides the tools to help provide acceptable indoor air quality.

#### **F. IAQ Plan Review**

The Intermediate School District 917 Indoor Air Quality (IAQ) team will review this plan annually.

## **II. Indoor Air Quality Team**

The following is a list of the District’s Indoor Air Quality Team members and their roles and responsibilities:

#### **A. District IAQ Coordinator**

**Name:** Linda Berg, ISD 917 Health and Safety Coordinator, Certificate #I1559

**Telephone:** 651-423-8214

**Role and functions:** The primary role of the IAQ Coordinator is team management, coordination, and record keeping.

- To manage the IAQ team and encourage a sense of shared responsibility and cooperative effort, and ensure the implementation of the Management Plan.
- To prepare for emergency response and consult with the superintendent to determine if and when outside consultation is needed.
- To maintain Minnesota Department of Education IAQ certification.
- To assure that baseline investigations are conducted and make recommendations to remediate identified IAQ problems.
- To disseminate IAQ information, register IAQ complaints, direct the response and communicate IAQ issues and status to school administration, staff, students, parents and media.

#### **B. District IAQ Team Members**

**Name:** John Christiansen, ISD 917 Superintendent, Chair

**Telephone:** 651-423-8226

**Role and functions:** Supervision and administration of the IAQ plan.

- To convene regular meetings of District 917 Health, Safety & Wellness Committee.
- To ensure that agendas include IAQ and health/safety issues, concerns, and action plans.
- To oversee building and facility operations.
- To provide assistance in remediating IAQ concerns as they are identified.
- To direct IAQ remediation activities as needed.

- To communicate IAQ issues and status to school administration, staff, students, parents and the media.

**Name:** Joan Asmus, Licensed School Nurse

**Telephone:** 651-423-8100

**Role and functions:**

- To provide overall assistance related to health concerns attributable to IAQ.
- To provide support in monitoring and recognizing trends in reported illnesses that may give warning signs of IAQ or other more serious health problems.

**Name:** Scott Zehnder, Alliance Education Center, Maintenance Engineer

**Telephone:** 651-423-8100

**Role and functions:**

- To ensure facility maintenance is appropriately planned and implemented.
- To provide assistance in remediating IAQ concerns as they are identified.

**Name:** Contracted Health & Safety Specialist

**Role and functions:**

- To arrange and/or conduct environmental testing, if warranted.
- To serve as the technical IAQ resource for ISD 917.

**Name:** ISD 917 Directors/Assistant Directors/DCALS Principal

**Role and functions:**

- To assist with reporting of IAQ issues and supporting IAQ training and implementation.

### **III. Building Surveys**

#### **A. Walk-Through**

A walk-through of all District 917 buildings that house students and/or employees will be conducted annually. The walk-through is done by building custodians, directors/assistant directors, classroom teachers, and nurses, and will evaluate the following:

- Obvious water intrusion problems (interior and exterior)
- Obvious ventilation failures and/or problems
- Obvious building/structural failures and/or problems
- Overall cleanliness of buildings and classrooms
- Assess the need for program improvements and upgrades (e.g. ventilation, carpet, building compounds).

Teachers will evaluate classrooms annually using the checklist in Appendix E. Classrooms located in school buildings covered by another district IAQ plan will also be inspected and the district notified regarding any areas of concern.

Maintenance engineers will evaluate ventilation systems annually using the checklist in Appendix K.

Maintenance engineers will evaluate all building maintenance issues using the checklist in Appendix I at least annually.



## **B. Ventilation Surveys**

Ventilation surveys of all buildings will be conducted annually, and as needed when condition changes occur and time elapses. Reports will be available in the Health and Safety Coordinator's Office.

## **IV. Maintaining and Operating Buildings for Optimum Indoor Air Quality**

### **A. Heating, Ventilation, & Air Conditioning (HVAC) Preventative Maintenance Program**

A proactive HVAC management program is key to providing good air quality in schools. To assure good quality of indoor air the following procedures will be implemented through the district's preventative maintenance program:

#### **1. Outdoor Air Intake**

- Inspect intake for blockage quarterly.
- Verify if intake damper works and is within design specifications quarterly.
- Verify damper does not close completely under occupied conditions quarterly.
- Check the calibration of all HVAC controls as needed.

Ideally, the minimum fresh air intake setting, while a building is occupied is 15 to 20 percent (15 to 20 percent of supply air to an occupied space is outdoor air) of the total mixed airstream (return air plus outdoor air). During building occupancy the fresh air intake will not be completely closed.

#### **2. Exhaust Air Outlet – Maintenance Includes:**

Annually, the belt tension on all fan motors will be checked for proper deflection (see manufacturer's service manual).

#### **3. HVAC Ventilation Ductwork – Ductwork will be inspected on an as needed basis. Ductwork inspection should occur when the cleaning of the cooling coils occurs. Ductwork needs to have easy-to-open observation and clean-out doors installed at a minimum in the following locations:**

- a. Clean-out door(s) (as large as possible) upstream and downstream of cooling coils to allow maintenance workers good access to clean the ductwork within five feet of the cooling coils, the cooling coils and drainage pans from the cooling coils.
- b. Inspections door(s) (minimum 10 inch size) 10 to 20 feet downstream of the cooling coils. If there are several supply air ductwork branches in this area, an inspection door needs to be installed in each branch.
- c. Clean-out door(s) (as large as possible) at the filtration system for the air handling unit to inspect the duct work surfaces five feet on each side of the filtration system.
- d. Inspection doors (minimum 10 inch x 10 inch size) 10 to 20 feet upstream of the filtration systems. If there are several return and/or mixed air ductwork branches in this area, an inspection door needs to be installed in each branch.

These observation doors (clean-out doors) are needed to allow inspection of the condition of the ductwork in these buildings. Things to look for are dust, mold (microbial) and water accumulations in the ductwork, which indicate potential problems with the air-handling unit.

Standard galvanized ductwork should be cleaned every 20 to 30 years. Cleaning ductwork lined with fibrous glass on the inside is very difficult and should always be approached with caution. Before any

cleaning is conducted, an appropriate inspection should be conducted to determine the need for cleaning.

**4. Air Handling Unit (AHU)** – The components of the air-handling unit at Alliance Education Center are inspected on a regular basis by the maintenance engineer. This regular maintenance can vary greatly among the different types of air handling units. Service manuals for each air-handling unit are consulted for maintenance schedules. The discussion below outlines regular maintenance to components conducted to prevent indoor air quality concerns.

a. *Air filtration system* – filters are primarily used to remove particles from the air.

Low efficiency filters (ASHRAE Dust Spot ratings of 10-20 percent or less) are often used to keep lint and dust from clogging the heating and cooling coils of a system. In order to maintain clean air in occupied spaces, filters must also remove bacteria, pollens, insects, soot, dust and dirt with efficiency suited to the use of the building. Using high quality filters is one of the best insurance policies for the good health and energy efficiency of an air handling system.

All dirt cannot be eliminated from the HVAC system; however, the amount of dirt present inside the HVAC system can be controlled by proper air filtration.

b. *Heating Coils* – Heating coils are inspected annually for accumulation of debris on the upstream side of the coils. These coils normally are thoroughly cleaned as needed.

c. *Cooling Coils* – These coils are thoroughly cleaned as needed.

d. *Supply Fan or Air Blower* – Supply Fans or Air Blowers should be cleaned as a part of the duct cleaning process. Supply Fans should be thoroughly inspected as least annually for surface debris and general operation.

A copy of the following checklist is kept on file in the Health and Safety Office:

| HVAC COMPONENT   | MONTHLY | QUARTERLY | SEMI-ANNUALLY | ANNUALLY | AS REQUIRED             |
|--|---------|-----------|---------------|----------|-------------------------|
| <b>A. Outdoor air intake inspection (unit ventilators)</b> |         |           |               | X        |                         |
| <b>B. Check belt tension</b>                               |         |           |               | X        |                         |
| <b>C. HVAC duct work inspection</b>                        |         |           |               |          | X                       |
| <b>D. HVAC controls calibration</b>                        |         |           |               |          | X                       |
| <b>E. Filter changes</b>                                   |         |           |               | X        |                         |
| <b>F. Heating coils/cooling coils inspection</b>           |         |           |               | X        |                         |
| <b>G. Heating coils/cooling coils cleaning</b>             |         |           |               |          | X<br>(unit ventilators) |

|                                 |  |  |  |   |   |
|---------------------------------|--|--|--|---|---|
| <b>H. Supply fan inspection</b> |  |  |  | X |   |
| <b>I. Supply fan cleaning</b>   |  |  |  |   | X |

The ASHRAE 62-1989 requirements are 20 cfm of outside air per expected occupant in office area, conference rooms, and 15 cfm per expected occupant in reception areas and classrooms. Buildings complying with these regulations should maintain the carbon dioxide concentrations in occupied spaces (where the source of the carbon dioxide is people’s exhaled breaths) under most operating conditions below 1000 ppm.

Minnesota Occupational Safety and Health Regulation (MOSHA) which were adopted from the Minnesota Industrial Commission in 1972, regulate the amount of fresh air that must be provided and distributed in all workrooms. This is covered under Minnesota Rules 5205.01109 “Workroom Ventilation and Temperature”. This regulation state’s the following:

Subpart 1. Air. Air shall be provided and distributed in all workrooms as required in this code, unless prohibited by process requirements. Outside air shall be provided, to all workrooms, at the rate of 15 cubic feet per minute per person.

Buildings complying with the MOSHA regulation should maintain the carbon dioxide concentration in occupied spaces (where the source of the carbon dioxide is people’s exhaled breath) below an average of 1000 ppm.

The legal ventilation standard, which applies to most buildings, is the MOSHA standard Minnesota Rules 5205.0110. The goal on ventilation for buildings should be the ASHRAE standard 62-1989.

Intermediate School District 917 uses the guidelines established by the Environmental Protection Agency in its “Tools For Schools” packet to calculate the amount of outside air being supplied to each individual. The following provides the formulas used to calculate the amount of outside air per person and a layout of a typical HVAC system.

*A Note About Carbon Dioxide As A Measurement of Ventilation:*

In a fully occupied classroom, with doors and windows shut, and measured several hours of occupancy, above 1300 PPM will indicate the need for remediation.

In building areas, where there are sources of carbon dioxide besides peoples exhaled breaths; the above guidelines cannot be used. Other sources can include exhaust gas from kilns, internal combustion engines, and dry ice. Under these conditions, the OSHA standard on carbon dioxide needs to be used to determine whether adequate fresh air is being provided. The OSHA standard on carbon dioxide is an 8-hour time weighted average of 10,000 ppm with a short-term 15-minute average limit of 30,000 ppm.

RECORD KEEPING: Building custodians will develop a record keeping schedule for preventive maintenance of HVAC systems. This schedule will be based on the manufacturer’s recommendations, and information contained in the IAQ Management Plan. See Appendix J.

**B. Temperature**

In Minnesota it is recommended that occupied space temperatures in the summer should be 72-78 degrees with a relative humidity of 20-50 percent. The fall, winter, and spring occupied space temperatures should be 70-74 degrees with a relative humidity of 20-50 percent.

### C. Water Intrusion

Below is a protocol for dealing with building materials where there has been water intrusion:

1. Visually review all flooded areas to determine which building materials have gotten wet.
2. For **ceiling tile**, remove and dispose of all wet ceiling tiles within 24 hours of water contact.
3. For **sheet rock**, remove all drywall and insulation that had become wet up to 12 inches above the water line. This is because wicking can cause water to move up above the water line.
4. For **furniture** that is made of wood, particleboard, or laminates air dry. For upholstered furniture that is wet by drinking quality water, air dry and monitor. For upholstered furniture, wet by contaminated water, discard.
5. For **carpet**, extract excess water from carpet, disinfect, dry as rapidly as possible, and then monitor. Carpet that has been wet for over 24 hours will be evaluated on a case by case basis. A wet/dry vacuum, extractor, and floor fans will be available for use.
6. For **papers, books, and files**, dry essential items within 24 hours. If that is not possible, then freeze them until there is time to dry them. Unessential items should be discarded. Essential items could also be photocopied.

The drying time can be decreased with the use of fans, dehumidifiers, and air conditioning.

### D. Painting, Roofing and Flooring

Other work that can impact IAQ in a building includes flooring, painting, and roofing. Refer to Appendices F, G, and H for proper procedures.

## V. Indoor Air Quality Checklists

Indoor Air Quality information (IAQ complaint form, questionnaire, action items list and the investigative form) is available in the Superintendent's office for review by interested District 917 staff members. In the event that a building custodian, teacher, or health & safety personnel would like to review a particular area with regard to IAQ, a comprehensive checklist is available for use in Appendices A, B, C, & D.

## VI. Integrated Pest Management (IPM)/Chemicals

### A. IPM

Pending state regulations, Integrated Pest Management (IPM) is a coordinated approach to pest control intended to prevent unacceptable levels of pests, while causing the least possible hazard to people, property, and the environment and using the most cost-effective means. IPM uses a combination of methods, which include:

- Improved sanitation removing food from desks, cleaning.
- Inspection and monitoring of pest population sites.
- Managing waste (keeping refuse in tight containers and locating waste containers away from buildings, if possible).
- Maintaining structures (fixing leaking pipes promptly, sealing cracks).
- Adding physical barriers to pest entry and movement (screens for chimneys, doors, and windows; air curtains).
- Modifying habitats (removing clutter, relocating outside light fixtures away from doors).
- Using traps (light traps, snap traps, and glue boards).
- Using pesticides judiciously.

An efficient IPM program will integrate pest management planning with preventive maintenance, housekeeping practices, landscaping, occupant education, and staff training.

Pest control activities that depend upon the use of pesticides involve the storage, handling, and application of materials that can have serious health effects. The district will only use pesticides after providing appropriate notice to staff, students and parents. Caulking or plastering cracks, crevices, and/or holes to prevent harborage behind walls will be used as the preferred strategy for dealing with pests.

Intermediate School District 917 will use an outside contractor for pest control when needed. Terms of the contract will be renewed annually and include the principles discussed below:

#### **1. Pest Control Schedule**

Whenever possible, pesticide applications are scheduled during unoccupied periods so that affected areas can be flushed with ventilation air before occupants return. Pesticides are applied in targeted locations, with minimum treatment of exposed surfaces. They are used in strict conformance with manufacturers' instructions and EPA labels. General periodic spraying may not be necessary. If occupants are present they will be notified prior to the pesticide application.

#### **2. Materials Selection, Handling and Storage**

Pesticides are selected that are species-specific and attempt to minimize toxicity for humans and non-target species. Contractors or vendors are asked to provide EPA labels and material safety data sheets. Pesticides are stored and handled properly consistent with their EPA labels. Pesticides and other chemicals used will be recorded on a "Chemical Inventory" form.

If only limited areas of the building are being treated, the heating ventilation and air conditioning (HVAC) system will be adjusted so that it does not distribute contaminated air throughout the rest of the building. Temporary exhaust systems may be used to remove contaminants during the work day. HVAC system operation will be modified when necessary during and after pest control activities (e.g., running air handling units on 100 percent outdoor air for some period of time or running the system for several complete air exchanges before occupants re-enter the treated space).

Information on pesticide selection, use, and storage is available from several local and national sources. These include Minnesota Department of Agriculture at <http://www.mda.state.mn.us>, University of Minnesota Extension Service at <http://www.extension.umn.edu/Pesticides/about.html>, and the Federal EPA at <http://www.epa.gov>, and 800/858-7378 or email [npic@ace.orst.edu](mailto:npic@ace.orst.edu).

Notification of parents and employees, as required in MN Statute, Section 121A.30, is addressed in the Student/Parent Handbooks distributed to all students in September of each year and to new students as they enroll in the district. Notice of unscheduled applications is available to parents and employees. Relevant documentation is available in the Superintendent's office.

#### **B. Chemicals**

District employees who purchase chemicals will insure that the least hazardous chemical available is selected for every application. The District 917 Buyer requests all available health and safety information for product review and distribution.

### **VII. Indoor Air Quality Cleaning Standards**

After establishing guidelines that focus on prevention and containment, the final procedure for the effective reduction of contaminants that affect air quality is the implementation of Indoor Air Quality Cleaning Standards.

Keep in mind that whether an item is clean or not, does not necessarily affect IAQ, (e.g. a drinking fountain or wash basin). It may affect sanitation, but not IAQ. "Clean air," however, cannot be foul smelling. Items that have a potential of becoming foul smelling must also have IAQ Cleaning Standards (e.g., a urinal or a wastebasket).

IAQ Cleaning Standards deal with *Items* (anything, object, or surface) to be cleaned, the *Tasks* required, *Task Frequencies*, and *When*. Since contaminated dirt by and large gets tracked into buildings onto floors, much emphasis is placed on clean floors. Since contaminated dirt gets into buildings through lower entrance levels, those levels are impacted far greater by contaminated dirt than upper levels. Task frequencies for floor maintenance tasks should therefore be lowered accordingly for upper levels. Recommended IAQ Cleaning Standards are for high impact areas on first and lower floors: Entrances, Hallways, Food and Beverage Areas, Kitchens, Restrooms and Locker rooms, Classrooms, and Offices.

#### A. Entrances

The purpose of entry mats is to stop and trap dirt and moisture. It's necessary, therefore, to have two types of mats in place: a dirt mat and a moisture mat.

***Dirt Mat:*** A dirt mat should have a coarse surface that affects removing contaminated dirt more easily from shoes. It should be porous to allow dirt to fall through to the backing of the mat, or into a dirt well into which the mat is placed. It should be thick enough to trap and hold at least 1/8 of an inch of dirt before emptying; and, it should be big enough for a person to step on it at least four times. Of course, the more traffic, the more mat.

***Moisture Mats:*** A moisture mat should be capable of absorbing at least 4 ounces of water per square foot. It should have a backing to prevent moisture from passing through to the floor on which it is placed. And it should be big enough for a person to step on it at least four times. At this time Thompson Heights School is not utilizing moisture mats due to entrance size restrictions. This is an option that will continue to be explored in the future.

***Waste Receptacles (plastic lined):*** Fifteen-inch, double lined waste receptacles are located at each entrance of Alliance Education Center to easily accommodate a day's trash. The location of these waste receptacles encourages use and greatly reduces the amount of contaminants that would otherwise be brought into building.

#### B. Hallways

It is a goal of District 917 to keep the hallways clean at Alliance Education Center (dusted, damp mopped, or cleaned with the automatic equipment regularly and stripped and refinished annually).

#### C. Food and Beverage Areas

Food and Beverages (F&B areas) should be designated and should be provided with appropriate facilities:

##### Facilities:

Food and beverages storage  
Clean-up  
Eating  
Food and beverage purchases  
Food disposal  
Recyclable Disposal

##### Examples:

Refrigerator  
Wash basin, hand soap, hand towels  
Tables and chairs  
Vending machines  
Lined wastebaskets or refuse containers  
Aluminum cans containers

At Alliance Education Center food and beverage areas are thoroughly cleaned by staff daily.

#### D. Kitchens

The kitchen staff is responsible for cleaning and sanitizing the surfaces, tools, and utensils they use for food preparation, but the custodial staff is responsible for the remainder of the cleaning. Cleaning is completed at the end of the cooking staff shift.

When sweeping and wet mopping the floor, special precautions are taken to reach under stoves and tables to remove all residues. Kitchen floors are swept or mopped daily.

**E. Restrooms and Locker Rooms.**

Fixtures, floors, and spots on the walls are cleaned daily. Entry surfaces are cleaned annually.

Weekly damp dusting horizontal surfaces and vent covers are a priority IAQ Cleaning Standard.

**F. Classrooms**

Clean floors, chalkboards, and chalk trays are priorities in classrooms. Clean floors because the tracked in contaminated dirt is a major carrier and source of contaminants. Also, clean chalkboards and chalk trays because of the chalk dust, an air contaminant and irritant.

**G. Offices**

Office parallel classrooms, the emphasis being on floor care and dusting.

**H. Carpet**

**Weekly routine Carpet Maintenance:**

***Vacuuming Carpet:*** A top-fill upright vacuum with brush agitation or a canister vacuum with a power head incorporating brush agitation is to be used with frequency. Equally important, soil that is loosened and vacuumed from carpet must be collected in the vacuum recovery system and not allowed to re-enter the air within the structure to contribute to indoor air pollution. For this reason a high efficiency filtering system and vacuum cleaner bags with a minimum rating of 90 percent efficient for 1 micron size particles need to be used in any vacuum equipment employed. Three of the five vacuum cleaners used at Thompson Heights School currently use installed micron bags. A goal is to purchase and install micron bags for all five of the vacuum cleaners.

***Immediate Spotting:*** Immediate attention is given to any spotting at Alliance Education Center as soon as the need is reported by a student or staff member.

**Carpet Dry Chemical/Foam/Shampoo/Steam (Hot Water) Cleaning:**

***Cleaning Frequency:*** Specialized maintenance and cleaning programs (e.g. weekly, monthly, quarterly, and semi-annually) will be implemented based on individual needs.

Frequent cleaning of exterior entrances and high traffic areas reduces the contaminants and soil particles from outside the structure that accumulate in these areas.

**Carpet Treatment for Fungi/Bacteria:**

Carpets which have tested higher than normal will be cleaned or removed depending on the location, age of carpet and microbiological levels.

## **VIII. Area Indoor Air Quality Guidelines**

**A. Animals in Classrooms**

Certain individuals, in particular those with asthma, may be sensitive to animal fur, dander, body fluids, or feces, and may experience reactions to these allergens. Furthermore, individuals can become sensitized (made allergic) by repeated exposure to allergens. District 917 has developed the following guidelines to address this area:

1. Use alternatives to animals, if possible.
2. If the teacher's intent is to have animals, then it is the site administrators responsibility to:

- a. Prior to having animals consult the school nurse/health aide about student allergies or sensitivities (data privacy laws will need to be adhered to).
- b. Ask parents about potential allergies, or seek to obtain information through a note that students take home or during parent-teacher conference. Remember to check for allergies when new students enter the class.
- c. Locate sensitive students away from animals and habitats.
- d. Have the teacher clean cages regularly (daily if possible).
- e. Have the teacher locate animals away from ventilation system vents to avoid circulating allergens.
- f. Use gloves to handle feces and dispose of in double bags and immediately place in the outside dumpster, not in building trash containers.
- g. Keep animals caged. An exception is made for instructional activities in the Animal Science program.
- h. Bottom of cage should have an impermeable liner on the bottom to prevent liquid or solid leakage from the cage.
- i. Ensure trash bag is removed from classroom after cage cleaning.
- j. Animals will be kept in the classroom as needed for curriculum activities and not for extended time periods.

For any health issues related to these guidelines please contact Intermediate School District 917 licensed school nurses: Joan Asmus (LSN) 651-423-8100.

## **B. Food Service**

Cooking activities generate odors, heat, moisture, food waste, and other trash which, if not managed carefully, can lead to indoor air quality problems. Intermediate School District 917 has delineated the following responsibilities involved in the preparation and/or serving of food to ensure IAQ management:

### **Cooking Areas:**

1. Make sure that the exhaust fans are working properly. If problems are noted, contact the building custodian.
2. Exhaust fans should be operational whenever cooking, dishwashing, and cleaning.
3. Any leaks or odors of combustion gas should be reported immediately to the building engineer.
4. Clean kitchen after each use as required by district and Department of Health policy.
5. Report any signs of mold, mildew, or algae to building custodian.
6. Report any plumbing water leaks to building custodian.
7. Report any pest problems to building custodian.

### **Food Handling and Storage:**

1. Regularly check food service areas for signs of insects or vermin.
2. Follow food handling and storage practices as recommended by district and Department of Health.
3. Maintain general cleanliness.

### **Waste Management:**

1. Follow district guidelines concerning the recycling of waste.
2. Store waste in appropriate sealed containers.
3. Make sure dumpsters are located away from air intake vents, operable windows, etc.

The District 917 Secondary Technical Center offers several courses to high school students involving food preparation careers (Food Industry Careers, Dietary Aide, and Fundamental Chef). Instructors attend training updates as needed to maintain safety and health within these departments.



**C. Art and Crafts Classrooms**

Classrooms used for arts and crafts activities shall comply with items detailed in the Teacher's Checklist in Appendix E. Materials emitting toxic fumes are not used in classroom spaces when students and staff members are present.

## **IX. Indoor Air Quality Complaint Resolution System**

**A. Purpose/Scope**

The purpose of the IAQ Complaint Resolution system is to investigate and attempt to resolve IAQ issues within Intermediate School District 917 buildings in a prompt, responsive manner.

**B. Process**

The following describes the process to be implemented if a building occupant is concerned about IAQ:

1. The person(s) concerned about indoor air quality should contact the Health and Safety Coordinator using an IAQ complaint form (Appendix A)
2. The Health and Safety Coordinator and/or building custodians will conduct an investigation, using Appendix B, to try to resolve the problem internally.
3. The Health and Safety Coordinator will review the IAQ complaint form and may request relevant medical documents from occupants with symptoms.
4. The Health and Safety Coordinator will investigate the problem using Appendix D. The Health and Safety Coordinator will provide a written report to the Superintendent, the Director/Assistant Director of the program involved, and the building custodian. The Superintendent and Health and Safety Coordinator contact an outside vendor if additional testing is required.
5. District employees will perform remediation when feasible and appropriate. If an outside contractor is necessary the Superintendent will define the scope of services and assist in procuring those services in accordance with district policies.
6. If a problem is not solved after appropriate testing, investigation and remediation, the person may need to be moved to a different space based on availability.

## **X. Communication/Information**

**A. Availability of Information**

Intermediate School District 917 is committed to open communication regarding IAQ and will make available any and all information regarding IAQ in district facilities. Parents and employees can obtain information about IAQ by contacting the Superintendent's office, or checking the District 917 website: <http://www.isd917.k12.mn.us>. Information available includes:

- Checklists or self-help information so they can properly evaluate their child's home or other out of school situations.
- Information about school facility construction, maintenance, and housekeeping practices, chemicals used, mold and HVAC related information, chemical producing academic subjects, pesticides and herbicides and the like to determine the extent to which school activities contribute to a child's symptoms.
- Information on what a parent can do (how they can effect change) upon discovering questionable activities occurring within schools.

**B. Annual Notification**

Annual notification of parents will occur each September (or when a new student is enrolled in District 917) through the Parent/Guardian and Student Handbook. Notification of employees will be included in employee orientation materials, policy handbooks, and the annual IAQ Walk-through Inspection process.

**XI. Training, Education, and Information**

*Employee Annual Training Plan:*

| <b>EMPLOYEE</b>                              | <b>TRAINING<br/>1</b>        | <b>TRAINING<br/>2</b> | <b>TRAINING<br/>3</b> |
|--|------------------------------|-----------------------|-----------------------|
| Superintendent                               | <b>X</b>                     | <b>X</b>              |                       |
| Directors/Assistant Directors                | <b>X</b>                     |                       | <b>(As Needed)</b>    |
| IAQ / Health and Safety<br>Committee Members | <b>(IAQ<br/>Coordinator)</b> | <b>X</b>              |                       |
| Maintenance/Custodial Staff                  |                              | <b>X</b>              | <b>X</b>              |
| School Nurses/Health<br>Assistants           |                              | <b>X</b>              | <b>(As Needed)</b>    |
| Teachers                                     |                              |                       | <b>(As Needed)</b>    |

**Training 1 – Executive IAQ Briefing**

This briefing opportunity, provided annually at a meeting of the District 917 Administrative Team, will provide a broad overview of IAQ and its impact on occupant’s health. The presentation will also review/discuss Intermediate School District 917 plan to manage IAQ in the proactive manner.

**Training 2– IAQ Plan Implementation**

This training will take place at a meeting of the Health, Safety, and Wellness Committee, and will specifically review the IAQ management plan, the impact of the plan on building occupants, and the process and individual responsibilities for its implementation.

**Training 3– IAQ in Classrooms**

This training for District 917 custodians will address the operation of ventilation equipment, carpet care, animals, food, and the district IAQ plan.

**XII. Renovation, Remodeling, and Redecorating Activities**

Renovation, remodeling, and redecorating activities have the potential for causing indoor air quality problems. Proper planning is important to minimize potential problems. Building occupants will be informed of the nature of these activities.

District remodeling specifications require cleanliness, dust control, protection of building and building materials from water and clean HVAC parts:

- All mechanical ventilation improvements will result in demonstrated current performance criteria as found in state law, statute or rule, to include proper amount of ventilation rate over a specified outside temperature range, proper filtration, and ability to measure ventilation rate.

- Proper commissioning of all mechanical ventilation improvements will be done and validated by a designated professional who has adequate errors and omissions insurance.
- Mechanical ventilation improvement work will remain under warranty by the outside party until a full range of seasons has occurred, allowing any deficiencies to surface and be corrected.

A common concern which can occur during these activities is the release of volatile organic compounds from paint, stain, adhesives, sealants, new carpeting, and furniture. When feasible these types of activities will be scheduled to occur when the building is not occupied. Many times, for a variety of reasons, these activities need to occur while the building is occupied. During these activities the maintenance engineer will increase the fresh intake air as feasible. This increased ventilation will occur during these activities and for a short time after the work has been completed. A representative from the Indoor Air Quality Management team will advise on the selection and purchase of paint products.

If only limited areas of the building are being remodeled, the HVAC system will be adjusted and/or containment systems utilized as applicable so that it does not distribute contaminated air throughout the rest of the building. Temporary exhaust systems to remove contaminants during the work day will be considered. It may be necessary to modify HVAC system operation during and after these activities (e.g., running air handling units on 100 percent outdoor air for a period of time or running the system for several complete air exchanges before occupants return to the building).

When feasible, activities where solvents will be released will be scheduled to occur late in the day or on Friday so the building can air out overnight or during the weekend. Whenever possible, carpeting will be installed on a Friday so the solvents in the carpet and its adhesive have the weekend to air out before the tenants return to work.

Prior to modifications to the building system that could impact asbestos-containing materials, the AHERA inspection manual will be reviewed. If asbestos-containing materials will be affected by work, asbestos abatement contractors will generally remove asbestos-containing materials and document the removal work.

The documents in Appendices F and G will be provided by the purchasing department to contractors who do painting and roofing repairs.

### **XIII. Budgeting**

The district health and safety budget is available for use in remedying IAQ problems. This budget is submitted annually for approval. Annual needs, project upgrades, etc., are prioritized and included in the health and safety budget. Routine maintenance items are planned and budgeted for in order to prevent water intrusion, maintain airflow, and improve cleanliness in district buildings as a part of annual budgeting.

### **XIV. Appendices**

**APPENDIX A**  
**Intermediate School District 917**  
**Indoor Air Quality Complaint Form**

(This form is to be filled out by the building occupant or a staff member)

Date: \_\_\_\_\_ Building Name: \_\_\_\_\_ Room Number: \_\_\_\_\_

Occupant's Name: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Please describe the problem in detail. Include specific symptoms you have experienced, time of day, weather conditions, number of occupants and any additional observations you would like to make.

Someone may need to contact you to discuss the complaint. What is the best time to reach you? \_\_\_\_\_

**So that we can respond promptly, please return this form to Linda Berg, Health and Safety Coordinator, District Office, 1300 145<sup>th</sup> Street East, Rosemount, MN 55068 or fax to 651-423-8564.**

# APPENDIX B

## Indoor Air Quality Questionnaire

The purpose of this form is to gather the information required for solving the indoor air quality concerns.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Program/Site: \_\_\_\_\_

### Background Information

| Question  | Response |
|---|----------|
| 1. How long have you been in the building?  |          |
| 2. How long have you been your present location in the building?                            |          |
| 3. Have you experienced any physical discomfort or symptoms related to indoor air quality?  |          |
| 4. What type of symptoms are you experiencing?  |          |
| 5. When did the symptoms start?   |          |
| 6. How long do the symptoms last?   |          |
| 7. Are symptoms experienced apart from the work area? If yes, when and where?               |          |
| 8. Is an odor coinciding with our symptoms? If yes, describe the odor.                      |          |
| 9. Have these symptoms ever been experienced at another work area? If yes, please describe. |          |

Additional comments:

**APPENDIX C**  
**INTERMEDIATE SCHOOL DISTRICT 917**  
**HEALTH, WELLNESS & SAFETY**  
**ACTION ITEMS LIST**

**LOCATION:** \_\_\_\_\_

| <b>DATE</b> | <b>ACTION ITEMS</b> | <b>ASSIGNED TO</b> | <b>COMPLETED</b> |
|-------------|---------------------|--------------------|------------------|
|             |                     |                    |                  |
|             |                     |                    |                  |
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|             |                     |                    |                  |
|             |                     |                    |                  |

*\*\*\*Please write down all Health, Wellness & Safety issues. RETURN this completed form to Linda Berg in District Administration by June 1 of each year.*

**APPENDIX D**  
**Intermediate School District 917**  
**Health & Safety Coordinator Indoor Air Quality Investigation Form**

---

**1. INVESTIGATOR INFORMATION**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Room #/Area \_\_\_\_\_ # of Occupants in Room or Area \_\_\_\_\_

**2. COMPLAINT DATA**

Name: \_\_\_\_\_ Date of complaint \_\_\_\_\_ Time: \_\_\_\_\_  
 Room #/Area \_\_\_\_\_ Building Name: \_\_\_\_\_  
**Health Symptoms Associated With Complaint:**  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
**Other Concerns, i.e. odor, moisture, airflow, cleaning, etc.:**  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**3. INVESTIGATION CHECKLIST**

| <b>Air Handling Unit</b>   | <b>Comments/Action Taken</b> |
|--|------------------------------|
| Air Handling Unit On: <input type="checkbox"/> Yes <input type="checkbox"/> No           | _____                        |
| Air flowing from Vents: <input type="checkbox"/> Yes <input type="checkbox"/> No         | _____                        |
| Exhaust Operations: <input type="checkbox"/> Yes <input type="checkbox"/> No             | _____                        |
| Thermostat Properly Set: <input type="checkbox"/> Yes <input type="checkbox"/> No        | _____                        |
| Other Problems Noted:<br>_____<br>_____  |                              |
| <b>Moisture</b>  |                              |
| Any Present Signs of Moisture: <input type="checkbox"/> Yes <input type="checkbox"/> No  | _____                        |
| Any Previous Moisture Concerns: <input type="checkbox"/> Yes <input type="checkbox"/> No | _____                        |
| Any signs of Biological Growth: <input type="checkbox"/> Yes <input type="checkbox"/> No | _____                        |

**Any Odors:** Yes No \_\_\_\_\_

**Other Sources**  
Any Recent Renovation in Area: Yes No \_\_\_\_\_  
Is it Overly Dusty/Unclean: Yes No \_\_\_\_\_  
Are Chemicals Stored in Room: Yes No \_\_\_\_\_  
Any Pesticides Recently Applied: Yes No \_\_\_\_\_  
Any Tunnel System: Yes No \_\_\_\_\_  
Any Unused Drains: Yes No \_\_\_\_\_

**4. TEST DATA**

|                                  |                                     |
|----------------------------------|-------------------------------------|
| AHU # _____                      | VAV/Zone # _____                    |
| Room Temp. (°F) _____            |                                     |
| Room Relative Humidity (%) _____ |                                     |
| T'stat Setting (°F) _____        |                                     |
| Room CO (ppm) _____              | Room CO <sub>2</sub> (ppm) _____    |
| Particulates _____               |                                     |
| Outside Air Temp (°F) _____      |                                     |
| Outside CO (ppm) _____           | Outside CO <sub>2</sub> (ppm) _____ |

**5. WATER INTRUSION**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. OTHER DATA**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**7. IMMEDIATE CORRECTIVE ACTIONS TAKEN**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**8. ADDITIONAL CORRECTIVE ACTION REQUIRED**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**9. ADDITIONAL COMMENTS**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## APPENDIX F

| RENOVATION AND REPAIRS CHECKLIST- FLOORING   |  |
|--|--|
| <b>Pre-Installation</b>  |  |
| <input type="checkbox"/>   | Determine whether resilient tile flooring scheduled for removal contains asbestos fibers.  |
| <input type="radio"/>  | <b>Renovation may/will disturb asbestos- containing flooring.</b>  |
| <input type="checkbox"/>   | Select low-emitting adhesive when installing glue-down flooring.   |
| <input type="checkbox"/>   | Obtain information about product constituents and emissions that may adversely impact IAQ from manufacturers.  |
| <input type="checkbox"/>   | Select low-emitting adhesive.  |
| <input type="checkbox"/>   | Select low-emitting flooring materials.  |
| <input type="radio"/>  | <b>Need additional information for selecting low-emitting adhesive and flooring materials.</b>   |
| <input type="checkbox"/>   | Do not install carpet near water sources.  |
| <input type="checkbox"/>   | When possible, schedule installation for time when school is unoccupied.   |
| <b>During Installation</b>   |  |
| <input type="checkbox"/>   | Use low-emitting adhesives.  |
| <input type="checkbox"/>   | Use low-emitting flooring materials.   |
| <input type="checkbox"/>   | Air new products before installation.  |
| <input type="radio"/>  | <b>Need help arranging the airing out of flooring products.</b>  |
| <input type="checkbox"/>   | Follow manufacturers' recommendations for ventilating the work area during and after flooring installation.  |
| <input type="checkbox"/>   | Install carpet, vinyl, and related flooring materials only when the school building is not in use or maintain the room under negative pressure relative to the surrounding rooms and hallways.   |
| <input type="checkbox"/>   | Avoid re-circulating air from the installation area, through the heating, ventilation, and air conditioning system, and into occupied areas. Seal return air grilles, open door ways, stairways, and use exhaust fans to remove airborne contaminants. |
| <input type="radio"/>  | <b>Need help arranging the airing out of space during and after installation.</b>  |
| <input type="checkbox"/>   | Vacuum old carpet that is to be removed and subfloor surfaces (once carpet is removed).  |
| <input type="checkbox"/>   | Seal joints of hard surfaces and/or entire surface of porous flooring installed near water sources.  |
| <b>Post-Installation</b>   |  |
| <input type="checkbox"/>   | Vacuum new flooring after installation to remove loose matter and particles generated by the installation process and general construction in the area.  |
| <input type="checkbox"/>   | Follow manufacturers' recommendations for ventilating the work area space during and after flooring installation. (Typical recommendation is maximum outdoor air for 72 hours after installation.)   |
| <input type="checkbox"/>   | <b>No Problems to Report.</b>  |
| I have completed the activities on the Renovation and Repairs Checklist, and I do not need help in |  |

|  |            |
|--|------------|
|  | any areas. |
|--|------------|

Name:

School:

Room or Area:

Date Completed:

Signature:

# APPENDIX G

## Intermediate School District 917

### Painting Checklist

---

|      |      |        |
|------|------|--------|
| Name | Room | School |
|------|------|--------|

---

|                |           |
|----------------|-----------|
| Date Completed | Signature |
|----------------|-----------|

#### Instructions:

1. Check off each box as you complete the activity.
2. Check the triangle as appropriate or check the circle if you need additional help with this activity.
3. File this checklist for future reference.

There are many factors to consider before beginning a painting project. Special care should be taken when sanding a surface to prepare for painting, due to the dust released into the air. This dust may contain lead particles. Exposure to excessive levels of lead could affect a child's mental growth, and interfere with nervous system development, which could cause learning disabilities and impaired hearing. In adults, lead can increase the blood pressure.

The type of paint is an important decision. For instance, both solvent-based and water-based paints give off volatile organic compounds (VOCs) that could lead to IAQ problems. Water-based paints produce less VOCs than solvent-based paints, but produce them over a longer period of time.

Durability is important – a relatively low-emitting paint might create more IAQ problems in the long run than a higher emitting paint, if the lower-emitting paint requires repainting more often. In addition, many water-based (even interior paints) have, until recently, used mercury as a fungicide. Any paint that contains mercury should not be used indoors.

#### Confirm that the painted surface is lead-free before preparing a surface for painting

- Check painting records or old paint cans to determine whether the paint contains lead
- Do an initial screen using a trained lead paint inspector
- If there is lead paint in the existing paint, contact a trained lead-based paint contractor
- No lead in existing paint
- Paint contains lead or testing is needed to determine if lead is in existing paint

#### Select a low-VOC emitting paint that is free of lead and mercury

- Evaluate existing stock of paint (properly dispose of paints containing lead or mercury or having higher VOC emissions than new paints)
- Evaluate new paint before you purchase it. Express your indoor air quality concerns to paint suppliers and use their technical personnel as a resource. Not all paint suppliers have information on pollutant emissions; consult other sources (e.g., manufacturers) if your paint supplier cannot provide adequate information
- Have selected an appropriate paint
- Need to discuss which paint to use with an IAQ specialist

**During exterior painting, minimize occupant exposure to odors and pollutants**

- ❑ Schedule exterior painting to occur when the building is unoccupied (for example, on weekends or during vacation periods), and allow time for paint odors to dissipate before occupants return to the area. If the area being painted has a heating, cooling, and ventilation system which is shared with other areas, those areas should also be unoccupied
- ❑ Use supply and exhaust fans to sweep paint fumes out of the building. Operate supply fans continuously (24-7) at the highest possible outdoor air supply setting, from the beginning of the painting work until several days after the painting has been completed
- ❑ Block return openings to prevent circulating air from the work area to occupied areas
- △ Occupant exposure is minimized
- Need help to minimize occupant exposure

**Use appropriate storage and disposal practices for paints, solvents, clean-up materials, and asbestos containing materials**

- ❑ Seal containers carefully after use
- ❑ Keep paint containers in designated storage areas equipped with exhaust ventilation, but not in heating, ventilation, and air conditioning equipment
- ❑ Use an appropriate waste disposal method to dispose of any paints containing lead or mercury  
Follow EPA National Emission Standards for Hazardous Air Pollutant rules for disposal of asbestos-containing materials
- △ No problem with storage and disposal
- Need help with storage and disposal

# APPENDIX H

## Intermediate School District 917

### Roofing Checklist

---

Name

Date Completed

---

School Building

Signature

#### **Instructions:**

- 1. Check off each box as you complete the activity.**
- 2. Check the triangle as appropriate or check the circle if you need additional help with this activity.**
- 3. File this checklist for future reference.**

Roofing work often involves the use of tar or other pollutant-producing chemicals that may cause indoor air problems if fumes enter the building. School officials and roofers can cooperate to prevent these problems and complaints from occupants.

Schedule pollutant-producing activities for unoccupied periods (e.g., weekends or vacation periods):

- Check to ensure that pollutant-producing activities occur during unoccupied periods
- Work is scheduled for an unoccupied period
- Work is scheduled for an occupied period; need help to minimize occupant exposure
- Locate “hot-spots” of tar and other pollutant-producing materials away from outdoor air intakes:
- Consider wind patterns at the work site, and arrange equipment so that prevailing winds carry odors away from the building
- Pollutant-producing materials are away from and downwind from outdoor air intakes
- No good location for pollutant-producing materials

Modify ventilation to avoid introducing odors and contaminants:

- Advise staff and students to keep doors and windows closed until the roofing work is finished
- It may be advisable to temporarily close the outdoor air intakes of air handlers; particularly rooftop units in the vicinity of (and downwind from) the work area. (NOTE: To avoid creating IAQ problems from underventilation, provide a temporary means (fans and/or ducts) to supply unaffected outdoor air.)
- Ventilation is arranged to avoid entry of pollutants
- Need help to modify ventilation

# Building and Grounds Maintenance Checklist

|                     |                       |
|---------------------|-----------------------|
| Name: _____         |                       |
| School: _____       |                       |
| Room or Area: _____ | Date Completed: _____ |
| Signature: _____    |                       |

### Instructions

1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
2. Keep the Background Information and make a copy of the checklist for future reference.
3. Complete the Checklist.
  - Check the “yes,” “no,” or “not applicable” box beside each item. (A “no” response requires further attention.)
  - Make comments in the “Notes” section as necessary.
4. Return the checklist portion of this document to the IAQ Coordinator.

### 1. BUILDING MAINTENANCE SUPPLIES

|  | Yes                      | No                       | N/A                      |
|--|--------------------------|--------------------------|--------------------------|
| 1a. Developed appropriate procedures and stocked supplies for spill control  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1b. Reviewed supply labels .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1c. Ensured that air from chemical and trash storage areas vents to the outdoors .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1d. Stored chemical products and supplies in sealed, clearly labeled containers.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1e. Researched and selected the safest products available .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1f. Ensured that supplies are being used according to manufacturers’ instructions.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1g. Ensured that chemicals, chemical-containing wastes, and containers are disposed of according to manufacturers’ instructions..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1h. Substituted less- or non-hazardous materials (where possible) .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1i. Scheduled work involving odorous or hazardous chemicals for periods when the school is unoccupied .....                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1j. Ventilated affected areas during and after the use of odorous or hazardous chemicals .....                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### 2. GROUNDS MAINTENANCE SUPPLIES

|  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2a. Stored grounds maintenance supplies in appropriate area(s).....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2b. Ensured that supplies are used and stored according to manufacturers’ instructions.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2c. Established and followed procedures to minimize exposure to fumes from supplies .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2d. Reviewed and followed manufacturers’ guidelines for maintenance .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2e. Replaced portable gas cans with low-emission cans.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2f. Stored chemical products and supplies in sealed, clearly-labeled containers.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2g. Ensured that chemicals, chemical-containing wastes, and containers are disposed of according to manufacturers’ instructions..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### 3. DUST CONTROL

|   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3a. Installed and maintained barrier mats for entrances ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3b. Used high efficiency vacuum bags .....                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3c. Used proper dusting techniques .....                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3d. Wrapped feather dusters with a dust cloth.....            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3e. Cleaned air return grilles and air supply vents.....      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### 4. FLOOR CLEANING

- 4a. Established and followed schedule for vacuuming and mopping floors .....
- 4b. Cleaned spills on floors promptly (as necessary) .....
- 4c. Performed restorative maintenance (as necessary).....

#### 5. DRAIN TRAPS

- 5a. Poured water down floor drains once per week (about 1 quart of water).....
- 5b. Ran water in sinks at least once per week (about 2 cups of water) .....
- 5c. Flushed toilets once each week (if not used regularly) .....

#### 6. MOISTURE, LEAKS, AND SPILLS

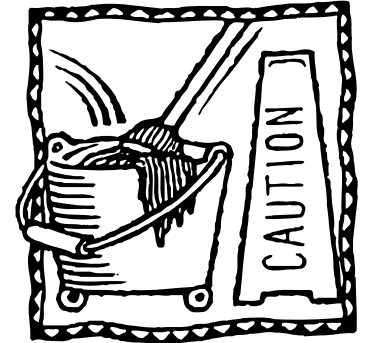
- 6a. Checked for moldy odors .....
- 6b. Inspected ceiling tiles, floors, and walls for leaks or discoloration (may indicate periodic leaks).....
- 6c. Checked areas where moisture is commonly generated (e.g., kitchens, locker rooms, and bathrooms).....
- 6d. Checked that windows, windowsills, and window frames are free of condensate .....
- 6e. Checked that indoor surfaces of exterior walls and cold water pipes are free of condensate .....
- 6f. Ensured the following areas are free from signs of leaks and water damage:
  - Indoor areas near known roof or wall leaks .....
  - Walls around leaky or broken windows .....
  - Floors and ceilings under plumbing .....
  - Duct interiors near humidifiers, cooling coils, and outdoor air intakes.....

#### 7. COMBUSTION APPLIANCES

- 7a. Checked for odors from combustion appliances .....
- 7b. Checked appliances for backdrafting (using chemical smoke) .....
- 7c. Inspected exhaust components for leaks, disconnections, or deterioration .....
- 7d. Inspected flue components for corrosion and soot .....

#### 8. PEST CONTROL

- 8a. Completed the *Integrated Pest Management Checklist* .....



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#### NOTES

## Appendix J

### HVAC Maintenance Schedule

| HVAC COMPONENT   | MONTHLY | QUARTERLY | SEMI-ANNUALLY | ANNUALLY | AS REQUIRED             |
|--|---------|-----------|---------------|----------|-------------------------|
| <b>A. Outdoor air intake inspection (unit ventilators)</b> |         |           |               | X        |                         |
| <b>B. Check belt tension</b>                               |         |           |               | X        |                         |
| <b>C. HVAC duct work inspection</b>                        |         |           |               |          | X                       |
| <b>D. HVAC controls calibration</b>                        |         |           |               |          | X                       |
| <b>E. Filter changes</b>                                   |         |           |               | X        |                         |
| <b>F. Heating coils/cooling coils inspection</b>           |         |           |               | X        |                         |
| <b>G. Heating coils/cooling coils cleaning</b>             |         |           |               |          | X<br>(unit ventilators) |
| <b>H. Supply fan inspection</b>                            |         |           |               | X        |                         |
| <b>I. Supply fan cleaning</b>                              |         |           |               |          | X                       |

TO: Scott Zehnder, Maintenance Engineer

\_\_\_\_\_

Signature

\_\_\_\_\_

Date

When this page is filled with "DATES" please sign, date and return to Linda Berg, Health and Safety Coordinator, DCTC, District Administration, for the Health, Wellness and Safety files.



# Ventilation Checklist



Name: \_\_\_\_\_  
 School: \_\_\_\_\_  
 Unit Ventilator/AHU No: \_\_\_\_\_  
 Room or Area: \_\_\_\_\_ Date Completed: \_\_\_\_\_  
 Signature: \_\_\_\_\_

**Instructions**

1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
2. Keep the Background Information and make a copy of the checklist for **each** ventilation unit in your school, as well as a copy for future reference.
3. Complete the Checklist.
  - Check the “yes,” “no,” or “not applicable” box beside each item. (A “no” response requires further attention.)
  - Make comments in the “Notes” section as necessary.
4. Return the checklist portion of this document to the IAQ Coordinator.

## 1. OUTDOOR AIR INTAKES

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 1a. Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1b. Ensured that the ventilation system was on and operating in “occupied” mode .....                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 1: OBSTRUCTIONS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 1c. Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers .....                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1d. Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 2: POLLUTANT SOURCES

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 1e. Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1f. Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1g. Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe).....                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 3: AIRFLOW

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 1h. Obtained chemical smoke (or a small piece of tissue paper or light plastic) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1i. Confirmed that outdoor air is entering the intake appropriately .....             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 2. SYSTEM CLEANLINESS

### ACTIVITY 4: AIR FILTERS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2a. Replaced filters per maintenance schedule .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2b. Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2c. Vacuumed filter areas before installing new filters .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2d. Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter .....    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2e. Confirmed proper installation of filters (correct direction for airflow).....                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**2. .... SYSTEM CLEANLINESS (continued)**

**ACTIVITY 5: DRAIN PANS**

- |   | Yes                      | No                       | N/A                      |
|---|--------------------------|--------------------------|--------------------------|
| 2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2g. Cleaned drain pans.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2h. Checked drain pans for mold and mildew .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**ACTIVITY 6: COILS**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2i. Ensured that heating and cooling coils are clean ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|

**ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS**

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 2j. Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2k. Ensured that ducts are clean.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**ACTIVITY 8: MECHANICAL ROOMS**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2l. Checked mechanical room for unsanitary conditions, leaks, and spills .....                                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**3. CONTROLS FOR OUTDOOR AIR SUPPLY**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3a. Ensured that air dampers are at least partially open (minimum position).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3b. Ensured that minimum position provides adequate outdoor air for occupants..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**ACTIVITY 9: CONTROLS INFORMATION**

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|

**ACTIVITY 10: CLOCKS, TIMERS, SWITCHES**

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3d. Turned summer-winter switches to the correct position .....                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3e. Set time clocks appropriately.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**ACTIVITY 11: CONTROL COMPONENTS**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting.....                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3h. Checked that the line dryer prevents moisture buildup.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer’s recommendation (for example, when you blow down the tank) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**ACTIVITY 12: OUTDOOR AIR DAMPERS**

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3k. Ensured that the outdoor air damper is visible for inspection.....                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3l. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3m. Ensured that air temperature in the indoor area(s) served by each                             |                          |                          |                          |



### 3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

- |  | Yes                      | No                       | N/A                      |
|--|--------------------------|--------------------------|--------------------------|
| 3n. Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3o. Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3p. If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3q. If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3r. If the outdoor air damper does not move, confirmed the following items:  |                          |                          |                          |
| • The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Moving parts are free of impediments (e.g., rust, corrosion) .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Electrical wire or pneumatic tubing connects to the damper actuator .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*Proceed to Activities 13–16 if the damper seems to be operating properly.*

#### ACTIVITY 13: FREEZE STATS

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3s. Disconnected power to controls (for automatic reset only) to test continuity across terminals.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| OR  |                          |                          |                          |
| 3t. Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3u. Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.*

#### ACTIVITY 14: MIXED AIR THERMOSTATS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F.....                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### ACTIVITY 15: ECONOMIZERS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3x. Confirmed proper economizer settings based on design specifications or local practices ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|

*NOTE: The dry-bulb is typically set at 65°F or lower.*

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3y. Checked that sensor on the economizer is shielded from direct sunlight.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.*

### 3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

#### ACTIVITY 16: FANS

- 3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied) .....  Yes  No  N/A

*NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.*



### 4. AIR DISTRIBUTION

#### ACTIVITY 17: AIR DISTRIBUTION

- 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required.....
- 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning .....

*NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.*

- 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) .....
- 4d. Ensured that supply and return vents are open and unblocked .....

*NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.*

- 4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply .....
- 4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes.....
- 4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents .....
- 4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities.....
- 4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals .....

#### ACTIVITY 18: PRESSURIZATION IN BUILDINGS

*NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the “occupied” cycle when doing this activity.*

- 4j. Ensured that air flows out of the building (using chemical smoke) through windows, doors, or other cracks and holes in exterior wall (for example, floor joints, pipe openings) .....

### 5. EXHAUST SYSTEMS

#### ACTIVITY 19: EXHAUST FAN OPERATION

- 5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) .....

*If fans are running but air is not flowing toward the exhaust intake, check for the following:*

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt



## 5. EXHAUST SYSTEMS (continued)

### ACTIVITY 20: EXHAUST AIRFLOW

*NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).*

- 5b. Checked (using chemical smoke) that air is drawn into the room from adjacent spaces ..... **Yes** **No** **N/A**

*Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").*

- 5c. Ensured that air is flowing toward the exhaust intake .....

### ACTIVITY 21: EXHAUST DUCTWORK

- 5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.....

## 6. QUANTITY OF OUTDOOR AIR

### ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

*NOTE: Refer to "How to Measure Airflow" for techniques.*

- 6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit .....
- 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration .....
- 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c).....

### ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES

- 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 .....
- 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1 .....

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## NOTES