INDOOR AIR QUALITY

I.A.Q. BOOKLET

for

STAFF, STUDENTS, PARENTS & RESIDENTS OF THE BALDWIN COMMUNITY

BALDWIN SCHOOLS

This booklet was developed by the District's Indoor Air Quality Committee. The district will review and update the I.A.Q. practices on a yearly basis. The committee encourages your input and involvement.

Please direct all inquires by telephone to Russ Randazzo, Director of Facilities, Operations, and Safety at 516-434-6060

Baldwin Union Free School District
Office of Facilities, Operations, and Safety
960 Hastings Street
Baldwin, New York 11510-4798

Thank you.

I.A.Q. Committee Members
Original Handbook 1999

Michael Sheehan, Director Facilities, Operations and Safety - co-chair
John McGrath, Chemical Hygiene Officer, Baldwin High School - co-chair Dr. Cheryl Sulsky, Psychologist, Baldwin UFSD
Karen Nasti, RN St. Christopher School
Mary Hiller, Teacher Assistant, Baldwin UFSD
Mary Clark, PTA Council, Baldwin UFSD
Peter LaDuca, Nassau County BOCES
Jean Feola, US EPA
Dr. Kathy Weiss, Superintendent, Baldwin UFSD

BALDWIN SCHOOLS

INTRODUCTION

This booklet has been developed to encourage and assist the staff, students, parents and residents of our community in reviewing and improving the District's indoor air quality practices. It identifies ways to improve our schools air quality and discusses alternative methods for managing this all important issue. This booklet was developed in conjunction with:

- The Environmental Protection Agency Tools for Schools Program.
- The Consumer Product Safety Commission booklet, A Guide to Indoor Air Quality.
- The SMACNA booklet, IAQ Guidelines for Occupied Buildings Under Construction.
- The Environmental Protection Agency Guide, Building Air Quality Program (I-BEAM).
- The New York State Association of School Superintendents of Buildings and Grounds. Manual, Maintenance Procedures Manual.

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Overview

The goal of this program is to provide clear and easily applied guidance that will help prevent indoor air quality problems and resolve such problems if they do arise. It recommends practical actions that can be carried out by the school staff.

IAQ Coordinator

The district will appoint two IAQ coordinators who shall be responsible for implementing this program. The district's current IAQ coordinators are Russ Randazzo and Lauren Sorgen.

The Importance of IAQ

A healthy indoor environment is one in which the surroundings contribute to productivity, comfort, and a sense of health and well-being. The indoor air should be free from significant levels of odors, dust, and contaminants and circulates to prevent stuffiness without creating drafts. Temperature and humidity are appropriate to the season and to the clothing and activity of the building occupants. There should be enough light to illuminate work surfaces without creating glare, and noise levels should not interfere with activities. Sanitation, drinking water, fire protection, and other factors affecting health and safety are well planned and properly managed.
Good air quality is an important component of a healthy indoor environment. For the purpose of this document, the definition of good indoor air quality includes:

- introduction and distribution of adequate air
- control of airborne contaminants
- maintenance of acceptable temperature

It is important to remember that while occupant complaints may be related to the time at work, they may not necessarily be due to the quality of the air. Other factors such as noise, lighting, ergonomics, and job related psychosocial stressors can individually and in combination contribute to complaints.
Good indoor air quality enhances occupant health comfort and workplace productivity.

Commitment

Provisions of good indoor air quality requires a conscientious effort by all parties who occupy the building. The district will make the following commitments:

- establish a process that encourages an active exchange of information
- address all maintenance concerns affecting air quality
- respond to every concern in a timely fashion

Synopsis of the IAQ Manual

Indoor air pollution is a major public health problem that threatens virtually everyone in New York State school buildings. Contaminated indoor air occurs when toxic substances combine with inadequate building ventilation, causing health problems.

In school buildings, poor air quality can be traced to many sources, including office equipment, classroom supplies, and construction materials. In addition, schools are often designed or renovated without attention to ventilation, resulting in sealed windows, blocked vents, and a general lack of fresh air.

The Baldwin School District is committed to providing the best possible environment for the students and staff in our schools. In order to accomplish this we must assure staff, children and parents that our buildings are healthy and safe. Once again Baldwin has stepped forward to deal with IAQ. This manual will deal with issues that help in creating a healthy environment for all that use our buildings.

In the last several years, it has been found that air in buildings can be more contaminated than outdoor air. Our children deserve the best possible learning environment we can give them. A committee of administrators, teachers, nurses, and parents has worked on this manual for the past twelve months. Attention was paid to: cleaning, construction, staff education, possible sources of pollution and how to prevent them, and regulations/standards dealing with Sick Building Syndrome. This was achieved by addressing such areas as the daily and long term maintenance of buildings, the use of environmentally safe cleaning products, reviewing materials used during construction, and developing a reporting method when problems arise. In 2006 the District Health & Safety Committee revised this handbook using the same philosophy noted above.

Some health effects from indoor air pollutants may be experienced soon after a single exposure or after repeated exposures. An immediate effect that may be experienced is irritation of the eyes, nose and throat, headaches, dizziness or fatigue. These are usually short term and treatable. In some instances it may involve leaving the area and getting fresh air. Many times these symptoms may be similar to a cold or other viral infections, making it difficult to distinguish if you have an IAQ problem. Therefore it is important to pay close attention to when and where these symptoms occur. If the problem fades or goes away when you are away from the area and returns when you come back, it should be appropriately recorded. This will assist in determining if it is a building related problem.

With diligence and common sense on the part of each one of us, we can provide a safe and healthy school for all. You cannot expect this goal to be reached without everyone's involvement. This is not just the maintenance department's problem. Each school should designate a person to discuss and report concerns to. It will take time to investigate concerns, as well as to find acceptable solutions. The district will look into each concern raised and investigate when necessary. The corrective action may be a simple solution such as changing a filter, or it may be a more involved response such as replacing a large heating and ventilation unit. We ask that you have patience and remember many problems are caused by our own actions, so a little thinking before acting goes a long way.

Please help us help you in providing a healthy and safe environment and remember, no problem is too small to report.

Occupant Symptoms Associated with Poor Indoor Air Quality

Human responses to pollutants, climatic factors, and other stressors such as noise and light are generally categorized according to the type and degree of responses and the time frame in which they occur. Building managers should be generally familiar with these categories, leaving detailed knowledge to health and safety professionals.

Acute Effects

Acute effects are those that occur immediately (e.g., within 24 hours) after exposure. Chemicals released from building materials may cause headaches, or mold spores may result in itchy eyes and runny noses in sensitive individuals shortly after exposure. Generally, these effects are not long lasting and disappear shortly after exposure ends. However, exposure to some biocontaminants (fungi, bacteria, viruses) resulting from moisture problems, poor maintenance, or inadequate ventilation have been known to cause serious, sometimes life threatening respiratory diseases which themselves can lead to chronic respiratory conditions.

Chronic Effects

Chronic effects are long-lasting responses to long-term or frequently repeated exposures. Long-term exposure to even low concentrations of some chemicals may induce chronic effects. Cancer is the most commonly associated long-term health consequence of exposure to indoor air contaminants. For example, long term exposure to environmental tobacco smoke, radon, asbestos, and benzene increases cancer risk.

Discomfort

Discomfort is typically associated with climatic conditions, but building contaminants may also be implicated. People complain of being too hot or too cold or experience eye, nose or throat irritation because of low humidity. However, reported symptoms can be difficult to interpret. Complaints that the air is "too dry" may result from irritation from particles on the mucous membranes rather than low humidity, "stuffy air" may mean that the temperature is too warm or there is lack of air movement, or "stale air" may mean that there is a mild but difficult to identify odor. These conditions may be unpleasant and cause discomfort among occupants, but there is usually no serious health implication involved. Absenteeism, work performance and employee morale, however, can be seriously affected when building managers fail to resolve these complaints.

Performance Effects

Significant measurable changes in people's ability to concentrate or perform mental or physical tasks have been shown to result from modest changes in temperature and relative humidity. In addition, recent studies suggest that similar effects are associated with indoor pollution due to lack of ventilation or the presence of pollution sources. Estimates of performance losses from poor indoor air quality for all buildings suggest a 2-4% loss on average. Future research should further document and quantify these effects.

Building Associated Illnesses

The rapid emergence of indoor air quality problems and associated occupant complaints have led to terms which describe illnesses or effects particularly associated buildings. These include sick building syndrome, building related illness, and multiple chemical sensitivity.

Sick Building Syndrome (SBS)

Sick Building Syndrome (SBS) is a catch-all term that refers to a series of acute complaints for which there is no obvious cause and where medical tests reveal no particular abnormalities. The symptoms display when individuals are in the building but disappear when they leave. Complaints may include such symptoms as irritation of the eyes, nose and throat; headache; stuffy nose; mental fatigue; lethargy and skin irritation. These complaints are often accompanied by non-specific complaints, such as the air is stuffy or stale. A single causative agent (e.g., contaminant) is seldom identified and complaints may be resolved when building operational problems and/or occupant activities identified by investigators are corrected. Experience in resolving SBS complaints has led to many of the suggestions for "good practice" founding I-BEAM.

Increased absenteeism, reduced work efficiency, and deteriorating employee morale are the likely outcomes of SBS problems which are not quickly resolved.

Building Related Illness (BRI)

Building related illness refers to a defined illness with a known causative agent resulting from exposure to the building air. While the causative agent can be chemical (e.g., formaldehyde), it is often biological. Typical sources of biological contaminants are humidification systems, cooling towers, drain pans or filters, other wet surfaces, or water damaged building material. Symptoms may be specific or mimic symptoms commonly associated with the flu, including fever, chills and cough. Serious lung and respiratory conditions can occur. Legionnaires' disease, hypersensitivity pneumonitis, and humidifier fever are common examples of building related illness.

Multiple Chemical Sensitivity (MCS)

It is generally recognized that some persons can be sensitive to particular agents at levels which do not have an observable affect in the general population. In addition, it is recognized that certain chemicals can be sensitizers in that exposure to the chemical at high levels can result in sensitivity to that chemical at much lower levels.

Some evidence suggests that a subset of the population may be especially sensitive to low levels of a broad range of chemicals at levels common in today's home and working environments. This apparent condition has come to be known as multiple chemical sensitivity (MCS).

Persons reported to have MCS apparently have difficulty being in most buildings. There is significant professional disagreement concerning whether MCS actually exists and what the underlying mechanism might be. Building managers may encounter occupants who have been diagnosed with MCS. Resolution of complaints in such circumstances may or may not be possible with the guidance provided in I-BEAM. Responsibility to accommodate such individuals is subject to negotiation and may involve arrangements to work at home or in a different location.

Building Factors Affecting Indoor Air Quality

Factors Affecting Indoor Climate

The thermal environment (temperature, relative humidity and airflow) are important dimensions of indoor air quality for several reasons. First, many complaints of poor indoor air may be resolved by simply altering the temperature or relative humidity. Second, people that are thermally uncomfortable will have a lower tolerance to other building discomforts. Third, the rate at which chemicals are released from building materials is usually higher at higher building temperatures. Thus, if occupants are too warm, it is also likely that they are being exposed to higher pollutant levels.

Indoor thermal conditions are controlled by the heating, ventilating, and air conditioning (HVAC) system. How well the thermal environment is controlled depends on the design and operating parameters of the system, and on the heat gains and losses in the space being controlled. These gains and losses are principally determined by indoor sources of heat, the heat gains from sunlight, the heat exchange through the thermal envelope, and the outdoor conditions and outdoor air ventilation rate.

Factors Affecting Indoor Air Pollution

Much of the building fabric, its furnishings and equipment, its occupants and their activities produce pollution. In a well functioning building, some of these pollutants will be directly exhausted to the outdoors and some will be removed as outdoor air enters the building and replaces the air inside. The air outside may also contain contaminants which will be brought inside in this process. This air exchange is brought about by the mechanical introduction of outdoor air (outdoor air ventilation rate), the mechanical exhaust of indoor air, and the air exchanged through the building envelope (infiltration and exfiltration).

Pollutants inside can travel through the building as air flows from areas of higher atmospheric pressure to areas of lower atmospheric pressure. Some of these pathways are planned and deliberate so as to draw pollutants away from occupants, but problems arise when unintended flows draw contaminants into occupied areas. In addition, some contaminants may be removed from the air through natural processes, as with the absorption of chemicals by surfaces or the settling of particles onto surfaces. Removal processes may also be deliberately incorporated into the building systems. Air filtration devices, for example, are commonly incorporated into building ventilation systems.

Thus, the factors most important to understanding indoor pollution are a) indoor sources of pollution, b) outdoor sources of pollution, c) ventilation parameters, d) airflow patterns and pressure relationships, and e) air filtration systems.

Types of Pollutants

Common pollutants or pollutant classes of concern in commercial buildings along with common sources of these pollutants are provided below.

Table 1.1 Indoor Pollutants and Potential Sources

Pollutant or Pollutant Class	Potential Sources
Environmental Tobacco Smoke	Lighted cigarettes, cigars, pipes
Combustion Contaminants	Furnaces, generators, gas or kerosene space heaters, tobacco products, outdoor air, vehicles
Biological Contaminants	Wet or damp materials, cooling towers, humidifiers, cooling coils or drain pans, damp duct insulation or filters, condensation, re-entrained sanitary exhausts, bird droppings, cockroaches or rodents, dust mites on upholstered furniture or carpeting, body odors
Volatile Organic Compounds (VOCs)	Paints, stains, varnishes, solvents, pesticides, adhesives, wood preservatives, waxes, polishes, cleansers, lubricants, sealants, dyes, air fresheners, fuels, plastics, copy machines, printers, tobacco products, perfumes, dry cleaned clothing
Formaldehyde	Particle board, plywood, cabinetry, furniture, fabrics
Soil gases (radon, sewer gas, VOCs, methane)	Soil and rock (radon), sewer drain leak, dry drain traps, leaking underground storage tanks, land fill
Pesticides	Termiticides, insecticides, rodenticides, fungicides, disinfectants, herbicides
Particles and Fibers	Printing, paper handling, smoking and other combustion, outdoor sources, deterioration of materials, construction/renovation, vacuuming, insulation

Contaminant Sources

Indoor Sources

The following table identifies sources of contaminants commonly found in office buildings and offers some measures for maintaining control of these contaminants. Follow these measures to help maintain a healthy indoor environment.

Table 1.2 Indoor Sources and Tips for Mitigation

Category/Common Sources	Tips for Mitigation and Control
Housekeeping and Maintenance	
• Cleansers • Waxes and polishes • Disinfectants • Air fresheners • Adhesives • Custodial/storage closets • Wet mops • Drain cleaners • Vacuuming • Paints and coatings • Solvents • Pesticides • Lubricants	• Use low-emitting products • Avoid aerosols and sprays • Dilute to proper strength (manufacturer's instructions) • Do not overuse; use during unoccupied hours • Use proper protocol when diluting and mixing • Store properly with containers closed and lid tight • Use exhaust ventilation for storage spaces (eliminate return air) • Clean mops; store mop top up to dry • Avoid "air fresheners" – clean and exhaust instead • Use HEPA vacuum bags/filters • Use Integrated Pest Management
Occupant-Related Sources	
• Tobacco products • Office equipment printers, copiers • Cooking/microwave • Art supplies • Marking pens • Paper products • Personal products (e.g., perfume) • Tracked in dirt/pollen	• Smoking Policy – No Smoking • Use exhaust ventilation with pressure control for major local sources • Low emitting art supplies/marking pens • Avoid paper clutter • Education material for occupants and staff • Use entrance mats
Building Uses as Major Sources	
• Print/photocopy shop • Dry cleaning • Science laboratory • Medical office • Cafeteria	• Use exhaust ventilation and pressure control • Use exhaust hoods where appropriate; check hood airflows
Building-Related Sources	
• Plywood/compressed wood • Construction adhesives • Asbestos products • Insulation • Wall/floor coverings (vinyl/plastic) • Carpets/carpet adhesives • Wet building products • Transformers • Upholstered furniture • Renovation/remodeling	• Use low emitting products • Air out in an open/ventilated area before installing • Increase ventilation rates during and after installing • Keep material dry prior to enclosing • Use renovation guidelines

HVAC System	
• Contaminated filters • Contaminated duct lining • Dirty drain pans • Humidifiers • Lubricants • Refrigerants • Mechanical Room • Maintenance activities • Combustion appliances - Boilers/furnaces - DHW - Generators - Stoves	• Perform HVAC preventive maintenance • Use filter change protocol • Clean drain pans; proper slope and drainage • Use potable water for steam humidification • Keep duct lining dry; move lining outside of duct if possible • Fix leaks/clean spills (see filter change protocol) • Maintain spotless mechanical room (not a storage area) • Avoid backdrafting • Check/maintain flues from boiler to outside • Keep combustion appliances properly tuned • Disallow unvented combustion appliances • Perform polluting activities during unoccupied hours
Moisture	
• Mold	• Keep building dry • Mold and Moisture Control Protocol
Vehicles	
• Garage	• Use exhaust ventilation • Maintain garage under negative pressure relative to the building • Check air flow patterns frequently • Monitor CO

Outdoor Sources

The following table identifies common sources of contaminants that are introduced from outside buildings. These contaminants frequently find their way inside through the building shell, openings, or other pathways to the inside.

Table 1.3 Outdoor Sources and Tips for Mitigation

Category/Common Sources	Tips for Mitigation and Control
Ambient Outdoor Air	
• Air quality in the general area	• Filtration or air cleaning of intake air
Vehicular Sources	
• Local vehicular traffic • Vehicle idling areas • Loading dock	• Locate air intake away from source • Require engines shut off at loading dock • Pressurize building/zone • Add vestibules/sealed doors near source
Commercial/Manufacturing Sources	
• Laundry • Photo processing • Automotive shop • Paint shop	• Locate air intake away from source • Pressurize building relative to outdoors • Use landscaping to block or redirect flow of contaminants, but not too close to air intakes

Grounds	
• Pesticide spraying • Ponds	• Use IPM • Limit use at ponds
Building Exhaust	
• Bathroom exhaust • Restaurant exhaust • Air handler relief vent	• Separate exhaust or relief from air intake • Pressurize building
Water Sources	
• Pools of water on roof • Cooling tower mist	• Proper roof drainage • Separate air intake from source of water • Treat and maintain cooling tower water
Birds and Rodents	
• Fecal contaminants • Bird nesting	• Bird proof intake grills • Consider vertical grills • Use Integrated Pest Management
Building Operations and Maintenance	
• Trash and refuse area • Chemicals/fertilizers • Painting/roofing/sanding	• Separate source from air intake • Keep source area clean/lids on tight • Isolate storage area from occupied areas
Ground Sources	
• Underground fuel storage tanks	• Keep air ducts away from ground sources

Protocols for Managing Major Sources of Pollution in Buildings

Table 1.4 summarizes protocols.

Table 1.4 Protocols

Type of Protocol	Solution
Remodeling and Renovation	• Use effective strategies for material selection and installation • Isolate construction activity from occupants
Painting	• Establish a protocol for painting and insure that the protocol is followed by both in-house personnel and by contractors • Use low VOC emission, fast drying paints where feasible • Paint during unoccupied hours • Keep lids on paint containers when not in use • Ventilate the building with significant quantities of outside air during and after painting. Insure a complete building flush prior to occupancy • Use more than normal outside air ventilation for some period after occupancy • Avoid spraying, when possible

Pest Control ***Integrated Pest Management***	• Use or require the use of Integrated Pest Management by pet control contractors in order to minimize the use of pesticides when managing pests. • Control dirt, moisture, clutter, foodstuff, harborage, and building penetrations to minimize pests • Use baits and traps rather than pesticide sprays where possible • Avoid periodic pesticide application for "prevention" of pests • Use pesticides only where pests are located • Use pesticide specifically formulated for the targeted pest • Apply pesticides only during unoccupied hours • Ventilate the building with significant quantities of outside air during and after applications • Insure a complete building flush prior to occupancy • Use more than normal outside air ventilation for some period after occupancy • Notify occupants prior to occupation • If applying outside, keep away from air intake
Shipping and Receiving	• Establish and enforce a program to prevent vehicle contaminants from entering the building. • Do not allow idling of vehicles at the loading dock. Post signs and enforce the ban. • Pressurize the receiving area relative to the outside to insure that contaminants from the loading area do not enter the building. • Notify delivery company supervisors of policy.
Establish and Enforce a Smoking Policy	Environmental tobacco smoke (ETS) is a major indoor air contaminant. A smoking policy may take one of two forms: • A smoke-free policy which does not allow smoking in any part of the building. • A policy that restricts smoking to designated smoking lounges only. (Partial policies such as allowing smoking only in private offices are not effective.)

Managing Moisture and Mold *(Also see EPA's Mold Remediation Guideline)*	Mold thrives in the presence of water. The secret to controlling mold is to control moisture and relative humidity. • Adequately insulate exterior walls or ceilings to avoid condensation on cold surfaces. • Insulate coldwater pipes to avoid sweating. • Clean spills immediately. Thoroughly clean and dry liquid spills on porous surfaces such as carpet within 24 hours, or discard the material • Do not allow standing water in any location. • Maintain proper water drainage around the perimeter of the building. • Provide sufficient exhaust in showers or kitchen areas producing steam. Discard all material with signs of mold growth • Discard furniture, carpet, or similar porous material having a persistent musty odor. • Discard furniture, carpet, or similar porous material that has been wet for more than 24 hours. • Discard ceiling tiles with visible water stains.

Pollution Transport

Air Movement and Pressure

Contaminants reach occupant breathing-zones by traveling from the source to the occupant by various pathways. Normally, the contaminants travel with the flow of air.

Air moves from areas of high pressure to areas of low pressure. That is why controlling building air pressure is an integral part of controlling pollution and enhancing building IAQ performance.

Air movement should be from occupants, toward a source, and out of the building rather than from the source to the occupants and out the building. Pressure differences will control the direction of air motion and the extent of occupant exposure.

Driving Forces

Driving forces change pressure relationships and create airflow. Common driving forces are identified in the table below.

Table 1.5 Major Driving Forces

Driving Force	Effect
Wind	Positive pressure is created on the windward side causing infiltration, and negative pressure on the leeward side causing exfiltration, though wind direction can be varied due to surrounding structures.

Stack Effect	When the air inside is warmer than outside, it rises, sometimes creating a column of rising air—up stairwells, elevator shafts, vertical pipe chases etc. This buoyant force of the air results in positive pressure on the higher floors and negative pressure on the lower floors and a neutral pressure plane somewhere between.
HVAC/Fans	Fans are designed to push air in a directional flow and create positive pressure in front, and negative pressure behind the fan.
Flues and Exhaust	Exhausted air from a building will reduce the building air pressure relative to the outdoors. Air exhausted will be replaced with air through infiltration or through planned outdoor air intake vent.
Elevators	The pumping action of a moving elevator can push air out of or draw air into the elevator shaft as it moves.

Common Airflow Pathways

Contaminants travel along pathways – sometimes over great distances. Pathways may lead from an indoor source to an indoor location or from an outdoor source to an indoor location.

The location experiencing a pollution problem may be close by or in the same or an adjacent area, but it may be a great distance from, and/or on a different floor from a contaminant source.

Knowledge of common pathways helps to track down the source and/or prevent contaminants from reaching occupants.

Table 1.6 Common Airflow Pathways for Pollutants

Common Pathway	Comment
Indoors	
Stairwell Elevator shaft Vertical electrical or plumbing chases	The stack effect brings about air flow by drawing air toward these chases on the lower floors and away from these chases on the higher floors, affecting the flow of contaminants.
Receptacles, outlets, openings	Contaminants can easily enter and exit building cavities and thereby move from space to space.
Duct or plenum	Contaminants are commonly carried by the HVAC system throughout the occupied spaces.
Duct or plenum leakage	Duct leakage accounts for significant unplanned air flow and energy loss in buildings.
Flue or exhaust leakage	Leaks from sanitary exhausts or combustion flues can cause serious health problems.
Room spaces	Air and contaminants move within a room or through doors and corridors to adjoining spaces.
Outdoors to Indoors	
Indoor air intake	Polluted outdoor air or exhaust air can enter the building through the air intake.
Window/doors Cracks and crevices	A negatively pressurized building will draw air and outside pollutants into the building through any available opening.
Substructures and slab penetrations	Radon and other soil gases and moisture-laden air or microbial contaminated air often travel through crawlspaces and other substructures into the building.

Ventilation

Ventilation can be used to either exhaust pollutants from a fixed source, or dilute pollutants from all sources within a space.

Exhaust Ventilation - Ideally, exhaust airflow should be sufficient to draw pollutants from the source in to the exhaust and away from occupants. The source should be located between the exhaust and the occupants. Rooms with major sources should be under negative pressure relative to the surrounding spaces. Some sources, such as cooking stoves and laboratory benches, may require exhaust hoods. Also see Exhaust Systems.

Dilution Ventilation - Contaminants from area sources such as, people, building materials, and office equipment, are diluted with outdoor air from natural or mechanical ventilation. Ventilation systems should be operated to provide sufficient outdoor air ventilation. Reducing outdoor air ventilation rates below required levels saves little energy and is not advisable. If capacity is available, outdoor air ventilation rates should meet applicable standards under all operating conditions. Problems with reduced outdoor air during part-load in certain VAV systems should be addressed.

Ventilation Measurements - Measurement instruments and techniques, which are generally available to building personnel, can be extremely useful in assessing the performance of a ventilation system for both exhausting and diluting pollutants. Useful measuring tools include:

- Smoke tube to observe airflow
- Flow hood to measure air volume
- Velocity meter to measure air velocity
- Measuring carbon dioxide to estimate the percentage of outdoor air or to generally evaluate outdoor air ventilation

I.A.Q. Sources and Prevention

Training

Training of staff is an integral part of an effective Indoor Air Quality Program because the level of technical background that a staff member may possess and the degree of hazard to which he or she might be exposed vary dramatically. Generally, those involved with students in a classroom setting, teachers, teaching assistants, administrators, and others, constitute one large training segment. Those involved in the school from different perspectives, housekeeping and maintenance staff, cafeteria workers, and clerical or office staff, are a second large group.

All training will be part of the "Employee Right-To-Know" instruction. For Indoor Air Quality or Hazard Communication training, employees will be apprised of applicable laws, given an explanation of the information contained in Material Safety Data Sheets, made aware of the methods of detection of contaminants in the workplace, told the physical and health hazards of chemicals known to be in the work area, and be notified as to the protective measures in place regarding any hazardous substances. Documentation of the content included in the training sessions(s) will be included in the written Hazard Communication binder. Training for administrators will include dealing with concerns raised by students, staff, and residents of the District.

Personal Items in Use by Staff

Today schools are faced with new and mounting regulations. Compliance with these regulations issued by federal, state and local governmental agencies requires cooperation between employee groups and the administration. An example is the District's Integrated Pest Management Program. It forbids the application of any pesticide/insecticide by anyone other than a NYS licensed applicator, yet on occasion we have come across a can of insecticide an employee has brought in from home. Should this person actually use the product on school grounds they are committing a crime. This same person may appropriately use the identical product at home. While this may be an extreme example, it is important for all staff to understand the basic fundamentals on Indoor Air Quality when applied to bringing in materials, equipment, and furniture from home. Some areas of concern are as follows:

- Food: If any food is kept in a classroom, it should be in a sealed plastic or metal container and should be limited to immediate needs only. Food consumption in classrooms is not a desirable practice, but when permitted, necessary precautions should be taken to reduce long-term problems. These problems include the nutritional support of microbial, insect, and rodent populations, and the subsequent concern over unpleasant odors and diseases.

- Heaters, fans, beverage makers, etc.: Staff members are discouraged from bringing in any electrical equipment from home. Each employee must realize that all equipment used in our schools must meet federal and state requirements and be UL approved. It is the responsibility of the District to meet these requirements and when employees bring in items from home it is impossible to monitor compliance. In addition, some electrical devices may emit odors (e.g. the ("hot plastic smell") that are unpleasant or irritating to building occupants. Malfunctioning devices may produce additional air contaminants that are potentially toxic or allergenic.

- Furniture, rugs: Staff members are discouraged from bringing in any furniture or carpets to be used in classrooms. Beside the potential health concerns, under no circumstances should the employee expect the district to clean, maintain, repair or replace any personal items.

- Chemicals: Staff must not bring in any type of cleaner, disinfectant, pesticide, insecticide, paint, (etc.) for use in school. These are highly regulated materials and any use of these chemicals may unknowingly jeopardize the health and safety of staff, students and residents. It should also be understood that disposal of these products is strictly regulated by federal, state, and local laws.

It is the recommendation of the IAQ Committee that:

I. Staff members are informed of the problems associated with bringing in personal items for use in school.

II. Consumption of food in classrooms, when permitted, be regulated and monitored by a building administrator.

School Renovation and Repairs

All school renovation and repair work should comply with the provisions of the Comprehensive Public School Safety Program as set forth in Section 155.3 and the Uniform Code of Public School Building Inspections, Safety Rating and Monitoring as prescribed in Section 155.4.

Uniform Code of Public School Building Inspections, Safety Ratings and Monitoring Procedures for Periodic Inspections – Buildings shall be assessed by a building condition survey conducted **once every five years**, and annual fire safety inspection and an annual visual inspection shall be conducted in years in which no building condition survey is conducted for the building.

- **Building Condition Survey** – A building condition survey will be conducted for all occupied buildings on or before **November 15, 2000 and at least every five years** thereafter.
    - The survey shall be conducted by a team that includes at least one **licensed architect or engineer** format prescribed by the Commissioner of Education.
    - Reports of building condition surveys signed and sealed by the licensed architect or engineer shall be submitted to the Commissioner by **January 15, 2001 and January 15th of every fifth year thereafter.** Building aid is available for building condition surveys as defined in the regulation.

- **Annual Visual Inspections** – A visual inspection of every occupied building shall be conducted **annually except in years that building condition surveys are conducted.**
    - The annual visual inspection shall consist of a **visual re-inspection** of the components of the building condition survey for changes that may have occurred and a review and update of the safety rating as needed.
    - The annual visual inspection shall be **conducted by a team composed of a certified code enforcement official, the district director of facilities or designee, and a member of the health and safety committee.**

- **Monitoring of Construction and Maintenance Activities**
    - The **occupied portion** of any school building shall always comply with the minimum requirements necessary to **maintain a Certificate of Occupancy** and shall be **monitored during construction or maintenance** activities for safety violations by **school district personnel.**

- **Investigation and disposition of complaints** relating to health and safety as a result of construction and maintenance activities are required as established under section 155.4(d)(7).

- **Pre-Construction Testing and Planning for Construction Projects**

    - Safety shall be addressed in **bid specifications** and contract documents before contract documents are advertised for bid. All school areas to be disturbed during renovation or demolition shall be **tested for lead and asbestos**. Appropriate procedures to **protect the health of building occupants** shall be included in the final construction documents for bidding.
    - **Safety committees shall monitor safety** during school construction projects. This **committee shall be expanded during construction projects** to include the

project architect, construction manager and the contractors, and shall **meet periodically** to review issues and address complaints related to health and safety resulting from the construction project.

- **General Safety and Security Standards for Construction Projects**
  - All construction materials shall be **stored in a safe and secure manner.**
  - **Fences** around construction supplies or debris shall be maintained.
  - **Gates shall always be locked** unless a worker is in attendance to prevent unauthorized entry.
  - During exterior renovation work, **overhead protection shall be provided** for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
  - Workers shall be required to wear **photo-identification badges** at all times while working at occupied sites.

- **Separation of Construction Areas from Occupied Spaces**
  - Construction areas under control of the contractor and not occupied by students and staff shall be **separated from occupied areas**. Provisions shall be made to prevent passage of dust and contaminants into occupied areas and these barriers shall be inspected periodically. **Gypsum board must be used in exit ways or other areas that require fire-rated separation**. Heavy-duty plastic sheeting may only be used as an infiltration barrier and **not to separate** occupied spaces from construction areas.
  - A specific stairwell and/or elevator should be assigned for construction worker use during work hours. **Corridors, stairs or elevators designated for students or staff shall not be used by workers**.
  - Large amounts of debris must be removed by using **enclosed chutes** and not through halls of occupied spaces. No materials shall be dropped or thrown outside the walls of the building.
  - All occupied parts of the building affected by renovation activity shall be **cleaned at the close of every workday**.

- **Maintaining Exiting and Ventilation During School Construction Projects**
  - A **plan should be available detailing how required exiting** will be maintained during construction. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.
  - A **plan should be available detailing how required exiting** will be maintained during construction.

- **Fire and Hazard Prevention**
  - ●**No smoking** is allowed on school property, including construction areas.
  - **Daily inspections** should be conducted to assure **exits are not blocked**.
  - **Proper operation** of fire extinguishers, fire alarms, and smoke/fire detection systems shall be maintained throughout the project.

- **Noise Abatement During Construction and Maintenance Activities**
  - Noise shall not be produced in occupied spaces in excess of **60 dba** as measured by a type 2 sound level meter in the occupied space closest to the source of the noise.

- **Complaints** regarding noise shall be incorporated into the bid for periods when noise may be unacceptable.
- **"No work"** periods shall be incorporated into the bid for periods when noise may be unacceptable.

- **Control of Chemical Fumes, Gases, and other Contaminants During Construction and Maintenance Projects**
  - Bid specifications shall require schedules of work on construction and maintenance projects, which include time for **"off-gassing"** of volatile organic compounds before re-occupancy. Special attention should be given to **glues, paint, furniture, carpeting, wall coverings and drapery**. Manufacturers shall be contacted to assure appropriate practices are followed. Building materials or furnishings which "off-gas" chemical fumes shall be aired out in a well-ventilated heated warehouse before installation. If toxic gases are generated which cannot be contained, then work must be done when school is not in session. **The building must be properly ventilated and given time to cure or "off-gas" before reoccupancy.**
  - **Material Safety Data Sheets (MSDS)** shall be maintained at the site for all materials used in projects.

- **Asbestos Abatement Protocols**
  - All asbestos abatement projects shall comply with all Federal and State laws. **Large and small asbestos projects as defined in 12 NYCRR 56 shall not be performed while the building is occupied.** Minor asbestos projects as defined in 12 NYCRR 56 (10 square feet or less or 25 lineal feet or less) may be performed in unoccupied areas of a building.

- **Lead Paint**
  - Any construction or maintenance operations which will disturb lead-based paint will require abatement of those areas according to protocols detailed in *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* (June, 1995 U.S. Department of Housing and Urban Development). All areas scheduled for construction, as well as areas of peeling and flaking paint, shall be tested for the presence of lead and abated or encapsulated in accordance with the above-noted guidelines.

- **Radon**
  - Districts shall take responsibility to be aware of the **geological potential** for high levels of radon and to test and mitigate as appropriate. This information is available from the New York State Department of Health Radon Measurement Database. Long Island, in general, does not have a high radon concern, due to its sandy soil.

- **Post-Construction Inspection**
  - The school district shall provide the opportunity for a **walk-through inspection** by the Health and Safety Committee members to confirm that the area is ready to be reopened for use.

- **School Facility Report Cards**
  - **On January 1, 2001 and each year thereafter**, every school district shall prepare a school facility report card for each occupied school building.

- The report card for each building shall be reviewed annually by the Board of Education. The Board of Education shall report at a public meeting on the status of each item contained on the report card in a **format prescribed by the Commissioner.**

Painting Procedure

The school plant is an important factor in the functioning of the total educational program. Proper maintenance of school buildings is necessary to provide a healthy and pleasant atmosphere. Based on past experience, certain steps must be taken by all concerned prior to the beginning of work to ensure minimum disruption occurs to the teaching process and maximum information is communicated between all involved parties. To this end the following procedures shall be followed:

- Use water **low VOC** latex-based paints as much as practical
- When it is necessary to use oil-based paints, use only on the evening before a weekend or holiday when school will not be occupied the next day
- Painting, when practical, shall take place during the evening hours or when school is not in session
- Never use lead or mercury-based paints
- A 48-hour notice shall be given to staff that painting will take place in a building via the building principal
- A copy of the Material Safety Data Sheet shall be kept on file in the MSDS binder for the school building.

All staff members are to be advised that any and all concerns with painting should be directed to the building principal as soon as possible.

Grounds Upkeep

In order to assist staff that has a reaction to the side effect of cutting grass and grounds care in general, the grounds department has been instructed to notify each building a minimum of 24 hours in advance when they will be arriving to cut the grass or perform general clean-up type work. The building administrator will post a notice to this effect in the main office for staff to review. We encourage staff to keep windows closed when this work is being performed.

Animals in the Classroom

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. Therefore the following is recommended before animals are kept in a school:

- Use alternatives to animals when possible

- Prior to having animals, consult the school nurse about student allergies or sensitivities
- Ask parents about potential allergies prior to animal arriving
- Locate sensitive students away from animals and habitats
- Have teacher clean cages a minimum of once a week
- Locate cages away from ventilation system
- Use gloves when cleaning cage and immediately remove waste from the classroom
- Store animal food in tightly sealed containers
- Do not let animals roam freely
- Discourage visiting animals
- Secure permission from building administrator for animals to be in your room

Use of Facilities by Outside Groups

The Baldwin UFSD recognizes the importance in providing a safe and secure environment for persons that use our facilities and grounds. With that end in mind, the district has developed a 45-minute course to train appropriate group leaders in dealing with emergency situations and to help understand exactly what their responsibilities are when using our school facilities and grounds.

Parts of this course will include, but not be limited to, good indoor air quality practices, integrated pest management procedures, and green cleaning practices. Group leasers will leave with a good understanding of how to operate within these guidelines.

Upon completion of the course each individual will receive a certificate of completion, which is good for three years. Effective 1/1/05, all group leaders will be required to take this course prior to any use of district facilities and grounds.

Environmental Surveys

In order to ensure a healthy and safe learning environment, the district will perform environmental surveys of each school at a minimum of three times per year. The inspection team will consist of the school principal, the school nurse, the school head custodian and the supervisor of operations. The inspections shall be done during the school day, and a written report shall be generated detailing the condition of the school and the general upkeep.

Barrier Matting

The proper application of floor matting at building entrances and other key building areas is the first step in creating a good Indoor Air Quality Program. An effective matting program can catch, trap, hold and hide dirt and moisture. The end result will be a cleaner and healthier school environment.

A survey was completed by the District's Director of Facilities and the building head custodians in October of 1997. Recommendations were based on the type and amount of usage at each entrance. Matting purchased is a scrape and dry type as manufactured by Encore Inc. or equal. Entrance mats have been purchased and installed at every school as per the survey recommendations.

The following maintenance program will be implemented to assist in our Indoor Air Quality program:

- Daily vacuuming, sweeping and shaking clean
- Monthly cleaning with an approved cleaner
- Twice yearly deep clean using a carpet extractor

Vacuum Cleaners

A recent study conducted by Phil Lawless, senior research physicist for the Research Triangle Institute located in North Carolina found that the penetration of particles through the vacuum cleaner bag and leaks from vacuum cleaner housings were found to be the major source of particles released from vacuuming. Using measured amounts of dust on bare floors and on carpets, the vacuum cleaner was monitored for particle release. Clean and dirty bags were used in these tests. The main finding was that the initial emission of particles is much larger than steady emissions from a vacuum cleaner. The peak emission rate is roughly proportional to the amount of dust on the floor. Although the initial emissions are of a short duration, the amount of dust is equivalent to running the vacuum cleaner for 1 to 2 hours.

IAQ Requirement: use vacuum cleaners that are equipped with a HEPA (high efficiency particulate air) filter. The study found that the startup emissions are less likely to be a problem when using the HEPA filter.

It is the recommendation of the IAQ committee that the district purchase only HEPA filter vacuum cleaners for use in all school buildings. The estimated cost is approximately 4% more to equip a vacuum cleaner with this improved type of filter.

Green Cleaning

Effective September 2006, school districts in New York State must comply with Chapter 584 of the laws of New York, "The Procurement and Use of Environmentally Sensitive Cleaning and Maintenance Products".

Our district has been using bio-based cleaning products since September 2000, and is recognized nationwide as a leader in the area of green cleaning. The District will continue to be vigilant in the area of using only the safest products available to clean and maintain our schools. This includes the use of styrene free floor finish and strippers and products that contain no heavy metals.

Integrated Pest Management

Integrated Pest Management (IPM) is a coordinated approach to pest control 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. An effective IPM program will integrate pest management with preventative maintenance, housekeeping practices, landscaping, occupant education, and staff training.
The Baldwin UFSD has a comprehensive IPM program and this program is to be followed by all staff.

Chemical Hygiene Program

The Baldwin UFSD's Laboratory Chemical Hygiene Plan has been developed through extensive use of the Federal Occupational Safety and Health Administration Standard (29 CFR1910.14500)

which addresses occupational exposure to hazardous chemicals in laboratories. This standard in turn extracted much information from Prudent Practices for Handling Hazardous Chemicals in Laboratories, published by the National Research Council, which is a well respected publication within the laboratory science community. The School District has developed a written Chemical Hygiene Plan in an attempt to afford protection from health hazards associated with chemicals in the laboratory and to keep exposure below specified limits.

Right-to-Know

The Right to Know Law guarantees employees the right-to-know about hazards that they may be exposed to in the workplace and how to protect themselves from those hazards. By making information and training for safe chemical use available to employees, illnesses and injuries will be reduced.

The Baldwin UFSD provides yearly right-to-know training to designated staff and to all employees upon hire. Material Safety Data Sheets are kept in the main office of each school and may be viewed upon request.

Should an employee desire specific information on a chemical used in the workplace, he may do so by completing an "Employee Information Request Form" and forwarding this written request to the building administrator.

Univents

Univents

The vast majority of classrooms have a univent. This is a system that has a heating coil, much like a car radiator, with blowers (fans) mounted underneath the coil. The blowers blow air through the coils to heat the room and to provide fresh air. Each univent has a damper that controls the amount of fresh air that comes into the room. The heat is controlled by the thermostat typically located by the classroom door.

The top of the univent should never be blocked or covered. Students' and teachers' desks should not be in the immediate area of the univent as return grilles at the bottom of the univent create a constant flow of air which should not be impeded.

Thermostats

The amount of heat and fresh air is regulated by the thermostat. The thermostat, typically set at 68° - 70°, determines when the univent coil becomes hot. It is a pneumatic system that opens and closes a valve at the univent to allow the steam or hot water into the coil. Example: A room is set at 62° night stat. and at 68° day stat. At 6:00 am, the system goes on days – now the univent is pumping heat to warm an empty room from 62° to 68°. At 9:00 am the empty room, which is now 68°, becomes occupied by 25 people. The room now satisfies at 70°, and begins the cooling process (fresh air and return air). The coil cools down, as the valve regulated by the thermostat either completely or partially closes to stop the steam/hot water to the coil. The coil will not heat up until the thermostat reads approximately 67°, at which time the valve will open and allow steam/hot water back into the coil. The cool air is a mixture of fresh air and return air being blown into the room. This process helps in preventing a build-up of gasses, germs, etc.

Univent Service

Twice a year, all univent filters are changed using a synthetic filter. They have an American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) rating of 30% efficiency and contain no fiberglass. These filters remove pollutants down to 5 microns. Along with filter replacement, the coils are cleaned and disinfected. The unit is completely vacuumed, the motors are lubricated, and an inspection is made for any problems. Steam traps are replaced once every six years.

Any and all problems with this system should be reported immediately to the building administrator. Please remember cool air blowing from the univent is part of the fresh-air process.

School Personnel to be Contacted

In the event of an IAQ concern, any student or staff member should immediately inform the person who directly supervises them. In the event that the cause of the IAQ concern can not be determined or corrected at this level, the procedure progresses in one of two directions.

If the cause of the concern is determined, but a solution can not be reached, a maintenance request submitted through the building principal is the most probable course of action. If the cause can not be determined, the affected person should prepare an IAQ concern report form. Once this form is received, an interview will be arranged to gather further information. If additional data is needed, the individual may be asked to keep an "Occupant Diary" to aide in the investigation.

Once the investigation of the IAQ concern begins, the building principal and nurse will be informed as other staff and students may be experiencing similar effects. The IAQ coordinator or his designee will conduct the initial interview. The individual making the report is encouraged to advise their union officials who may be present during the interview. Upon resolution of their concern, the Assistant Superintendent for Administration will be informed so as to determine if the findings should become part of employee's personal file. As an example, TSCA requires records be kept of alleged chemical exposures and/or alleged allergic reactions to exposure to chemicals.

Asbestos

The district shall comply with the EPA's Asbestos Hazard Emergency Response Act (AHERA).

As required, a school employee certified as, at a minimum, an asbestos handler by the New York State Department of Labor will conduct periodic surveillance every six months. A written report will be generated and filed in each school AHERA booklet.

As required, an asbestos survey will be conducted every three years by an outside firm certified as an asbestos inspector. A written report will be generated and filed in each school's AHERA booklet.

All asbestos related work shall be done in strict compliance with all state and federal regulations. A notice to building occupants shall be posted prior to any asbestos related work taking place.

Anyone interested in viewing the schools asbestos management plan may do so by contacting the district safety officer at 516 377-9312.

Health and Safety Committee

Anyone interested in becoming part of this committee should contact the District Director of Facilities at 434-6060

Indoor Air Quality

The Board of Education recognizes the importance of provided safe and well-maintained facilities for use by students, staff, and residents.

The district shall implement an Indoor Air Quality program to ensure a healthy work place for students and staff as recommended by the Environmental Protection Agency (EPA) in the *Tools for Schools* guidelines. The district shall educate students and staff on the Indoor Air Quality program.

Other policies adopted by the Board of Education which relate to safe and well-maintained facilities include Policy 4132 (Smoking), which prohibits smoking of any kind in school and on school grounds, and Policy 8115 (Integrated Pest Management), which provides regulations limiting the use of pesticides and insecticides.

The superintendent of schools shall establish administrative procedures to implement the Indoor Air Quality program.

Reference:
Environmental Protection Agency *Tools for Schools* guidelines
Policy 1530– Smoking, Vaping, other Tobacco
Policy 8115 – Integrated pest management

Adopted
Board of Education
November 10, 1999

Indoor Air Quality

The superintendent of schools shall ensure that the Indoor Air Quality (IAQ) program is implemented utilizing the following methods:

1. Authorizing the creation of an Indoor Air Quality Committee that will annually review procedures and make recommendations.

2. Creating a handbook to be used as a resource guide by students, staff, and residents.

3. Providing training in IAQ as recommended by the Environmental Protection Agency (EPA) in the *Tools for Schools* guidelines.

4. Establishing air quality control procedure for use during renovation and remodeling projects.

5. Exploring alternative products and procedures to be used in the cleaning process and maintenance activities.

6. Seeking alternative materials for use in art instruction, technology instruction, science instruction, and office use.

7. Establishing a written maintenance program for the building heating, ventilation, and air conditioning (HVAC) systems which shall be proactive and preventative.

8. Developing a reporting protocol for registering concerns of staff, students, and the community.

Procedures shall be consistent with the district's Chemical Hygiene Program, Right-to-Know Program, Integrated Pest Management Program, Personal Protection Program, and all other pertinent Board of Education policies.

Reference:
Environmental Protection Agency *Tools for Schools* guidelines
November 10, 1999

Baldwin – IAQ

Hypothesis Form

Building Name: _____ File Number: _____

Date: _____ Completed by: _____

Complaint Area (may be revised as the investigation progresses):

_____
_____
_____

Complaints (e.g. summarize patterns of timing, location, number of people affected):

_____
_____
_____

HVAC: Does the ventilation system appear to provide adequate outdoor air, efficiently distributed to meet occupancy needs in the complaint area? If not, what problems do you see?

_____
_____
_____

Is there any apparent pattern connecting the location and timing of complaints with the HVAC system layout, condition or operating schedule?

_____
_____
_____

Pathways: What pathways and driving forces connect the complaint area to locations of potential sources?_____
_____

Are the flows opposite to those intended in the design? _____
_____

Sources: What potential sources have been identified in the complaint and are in locations associated with the complaint area (connected by pathways)? _____
_____
_____

Is the pattern of complaints consistent with any of these sources? _____
_____

Hypothesis: Using the information you have gathered, what is your best explanation for the problem?

_____
_____
_____

Hypothesis testing: How can this hypothesis be tested?

_____
_____
_____

If measurements have been taken, are the measurement results consistent with this hypothesis?

_____
_____
_____

Results of Hypothesis Testing:

_____
_____
_____
_____

Additional Information Needed:

_____
_____
_____
_____

Baldwin UFSD – I.A.Q.

Occupant Interview

Building Name: _____ File Number: _____

Address: _____

Occupant Name: _____ Work Location: _____

Completed by: _____ Title: _____ Date: _____

Symptom Patterns

What kind of symptoms or discomfort are you experiencing?

Are you aware of other people with similar symptoms or concerns? Yes No

If so, what are their names and locations?

Do you have any health conditions that may make you particularly susceptible to environmental problems?

▫ contact lenses ▫ chronic cardiovascular disease ▫ undergoing chemotherapy or radiation therapy

▫ allergies ▫ chronic respiratory disease ▫ immune system suppressed by disease or other causes

▫ chronic neurological problems

Timing Patterns

When did your symptoms start?

When are they generally worse? Do they go away? If so, when?

Have you noticed any other events (such as weather events, temperature or humidity changes, or activities in the building) that tend to occur around the same time as your symptoms?

Occupant Interview

Spatial Patterns

Where are you when you experience symptoms or discomfort?

Where do you spend most of your time in the building?

ADDITIONAL INFORMATION

Do you have any observations about building conditions that might need attention or might help explain your symptoms (e.g., temperature, humidity, drafts, stagnant air, odors)?

Have you sought medical attention for your symptoms?

Do you have any other comments?