



Ministry of Education

Indoor Air Quality Complaint Investigation Protocol

Capital Planning Branch

October 2000

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Introduction

Students, teachers, and other school staff expect and need a healthy and comfortable environment in which to function. And parents expect a healthy school environment for their children. Problems associated with indoor air quality may lead to discomfort or illness in susceptible individuals.

Notably, the provision and maintenance of acceptable indoor environments is not solely a function of ventilation systems. Other factors having important effects on indoor air quality include building design, interior construction materials and finishes, and how well the building envelope protects against moisture. In addition, many *activities* affect indoor air quality. These can be the various activities of students and teachers; housekeeping; building maintenance activities; pest control; renovation and remodeling; introduction of new furnishing or fixtures; increasing occupant densities; or adding heat sources, such as computers.

Failure to properly maintain buildings or equipment will also contribute to poor indoor air quality. This may not only create discomfort and adverse health effects in building occupants, but may lead to equipment malfunctions, void warranties, and further deterioration of buildings, equipment and furnishings. And once problems arise, the costs for additional cleaning, repair, replacement, or maintenance of the building, equipment and furnishings may be substantially higher than the cost savings from deferred maintenance.

The *Workers' Compensation Board Occupational Health and Safety Regulation* requires employers to develop a protocol for investigating indoor air quality. The employer must ensure that the indoor air quality is investigated when:

- Complaints are reported;
- Occupancy in the space changes substantially; or
- Renovations involving significant changes to the ventilation system occur.

The purpose of this Indoor Air Quality Complaint Investigation Protocol is to suggest ways to investigate and resolve complaints about IAQ problems, thereby contributing to a more healthy, productive, and comfortable environment for students, teachers, other school staff, and visitors.

Public Agency Roles

School District Roles

In sharing the responsibility with the Ministry to achieve and maintain good IAQ, each school district should establish and implement an indoor air quality management program. This entails coordinating overall activities, working towards achieving WCB compliance, providing staff education and training, and responding in a timely and effective manner to indoor air complaints.

At the school level, maintenance staff must keep the systems and equipment working in good order. All other building users must also be educated and trained about IAQ and how to prevent problems. Incorrect building operation accounts for approximately 50 percent of all diagnosed indoor air quality problems. Building operation is therefore a key responsibility, shared by school administrators, staff, maintenance and custodial personnel and students.

Workers' Compensation Board Role

The *Workers' Compensation Board Occupational Health and Safety Regulation* provides legal requirements that must be met by all workplaces under the inspectional jurisdiction of the WCB. The indoor air quality sections of the *Regulation* require the following:

1. **Adequate ventilation** – in accordance with relevant ASHRAE standards for indoor ventilation.
2. **Preventive maintenance** – a documented ventilation system maintenance plan.
3. **Investigations of indoor air quality** – a written procedure for documenting and responding to IAQ complaints and potential problems.

Ministry of Education Role

The Ministry can play an instrumental role in assisting and encouraging school districts to effectively manage schools' indoor environments. The Ministry can first set out the organizational framework within which the issues are to be addressed. This would include establishing lines of communication, defining broad roles and responsibilities, acting as a resource for problem resolution, and where necessary, providing funding support.

There is also a need for the Ministry, in collaboration with school districts, the WCB and Ministry of Health, to assess the extent of IAQ problems in public schools and to gather accurate information upon which to establish priorities for capital spending. Such assessment would involve the evaluation of patterns of IAQ problems and identification of known causes. Mitigation efforts must also be monitored for effectiveness, with the conclusions shared with both health officials and other school building managers throughout the province.

IAQ Complaint Investigation Protocol

The following protocol is offered to school districts to assist them with the development of their own IAQ complaint investigation methods. It should be noted that the WCB must ultimately endorse whatever investigation method is adopted by individual school districts. However, the purposes of any protocol are to:

- Create a simple and effective way to register IAQ complaints.
- Provide a simple and effective documentation system to both direct and track the actions taken in response to complaints or changed building conditions.
- Create a simple and effective way to monitor the effectiveness of the ventilation system as the building or occupancy change.

IAQ Complaints

In many cases, building managers may be alerted to potential indoor air quality problems by complaints from occupants. The complaints may be vague, perhaps to the effect that one or more people feel “sick” or “uncomfortable”, or that someone has noticed an “unusual” odour. They may be specific, blaming a particular material as the cause of discomfort or health problems. People are usually reacting to a real problem, so their complaints should be taken seriously. However, they may attribute their symptoms to the wrong cause, so their theories about the problem should be heard respectfully but weighed cautiously.

With specific reference to complaint investigations, the key features of this protocol include:

- School district personnel intake complaints and complete a standard registration form
- All actions taken in response to the complaint are tracked on the registration form
- Trained personnel screen initial complaints into one of two categories: building-related or health-related
- District building maintenance personnel do not diagnose health symptoms, but refer school staff complaints about health to a worker health and safety representative, and student complaints about health to the health region
- Medical and health officials do not diagnose building-related matters, but refer complaints about building performance to the school district for action by building maintenance personnel
- Compliance with the WCB hierarchy of responsibility is achieved (worker, supervisor, administrator, owner)

It is intended that this complaint investigation protocol clarify the responsibilities of school district staff, as well as the roles of regional health authority and the WCB. A key feature of the protocol is that it separates personal health symptom complaints from building performance issues. It also encourages an early dialogue between the complainant and a qualified health professional in those instances where the relationship between an individual’s symptoms and building conditions are difficult or impossible to establish.

Components of the IAQ Complaint Investigation

This section details a five-step process for the investigation of IAQ complaints made by staff, students, and the public. The process is also summarized in a flowchart, **Indoor Air Quality Complaint Process**, provided in the **Appendix**.

Step One: Complaint

1. Staff, student, parent or other member of the public makes complaint.
 - a) If staff, this will usually be a phone call to the maintenance department.
 - b) If student, parent or other member of the public, contact will likely be made with the school administrator.
2. A single intake person for IAQ complaints should be designated for the entire school district.

To avoid frustrating delays, building occupants need to know how to express their complaints about IAQ. More importantly, they need to know how to locate responsible staff and where to obtain complaint forms. This information can be posted on bulletin boards, circulated in memos or newsletters, or publicized by some other means. Complaints should be handled promptly, with every incident given serious attention.

Step Two: Screening

1. The complaint is received by or relayed to a designated intake person, who will be familiar with the school district's IAQ complaint registration procedures. The complaint is registered using a standard form, such as the *IAQ Complaint Registration Form*. [See **Appendix**.] The systematic logging of IAQ complaints is important, as it will enable any patterns of problems to be identified.
2. The intake person conducts a brief interview with the complainant. A standard set of questions can be asked in order to provide a preliminary screening and streaming for action. If the complaint is clearly building-related (e.g., comfort issues with heat, humidity; odours; or visible evidence of moisture problems), the complaint is referred to the school district maintenance office for a work order and continuation to **Step Three: Building Performance Assessment**.
3. If the problem appears to be health symptom-related (i.e., the complainant is experiencing symptoms of ill health, allergy or chemical reaction), then the complaint is referred to either the worker health and safety representative or the public health officer. Health system complaints from staff go to the worker health and safety representative, while health symptom complaints from students or public go to the public health officer, as outlined in **Step Four: Health Symptoms**.
4. The completed *IAQ Complaint Registration Form* is to be filed in a school district IAQ Complaint file, held at the school district administration office. Copies of the completed *Form* are forwarded to the following:
 - building maintenance department; or
 - public health official; and
 - worker health and safety representative for the subject school.

Step Three: Building Performance Assessment

1. At the time of complaint registration, problems that were clearly identified to be building performance related are forwarded to the building maintenance office. A qualified member of the facilities staff then conducts a preliminary building performance assessment. This involves visiting the work area, meeting with the staff member who registered the complaint, and completing a standard building performance checklist, such as the *Quick Building Performance Assessment Form*. [See **Appendix**.]
2. The member of the facilities staff familiar with the standard building performance checklist will prepare for the visit to the complaint area, including reference to ventilation system maintenance records; conduct a walkthrough inspection of the affected area and mechanical systems serving that space; and talk with school staff. (Samples of maintenance tasks lists and an equipment preventive maintenance tasks schedule are provided in the **Appendix**.)
3. Following the initial assessment of building performance issues, a decision will be made as to whether or not a reasonable hypothesis is possible based on the results of the visual inspections. If the problem is identified at this stage, necessary mitigation actions can be taken immediately, or scheduled.
4. If no explanation is evident, the process continues to a more detailed investigation in **Step Five: Further Building Investigation**.
5. The person having conducted the initial building performance assessment must also complete the appropriate section of the *IAQ Complaint Registration Form*.
6. The *IAQ Complaint Registration Form* is then forwarded to the worker health and safety representative. The representative will be responsible for contacting the staff member who reported the incident in order to:
 - a) Report back on the mitigation actions; and,
 - b) Determine if the problem has been successfully resolved.The worker health and safety representative will also report on the incident at the monthly worker health and safety committee meeting.
7. Finally, when a problem has been successfully resolved, the worker health and safety representative forwards the finalized *IAQ Complaint Registration* form to the school district administration office where it will replace the original in the IAQ Complaint file.

Step Four: Health Symptoms

Both the worker health and safety representative and the environmental health officer should use a standard *Occupant Interview Form*. If the staff complainant believes that his/her symptoms are workplace related, then the existing *WCB First Aid Registration Form (7-A)* must also be completed by the worker health and safety representative. Whether completed by a worker health and safety representative or a public health officer, a copy of the *Occupant Interview Form* will be provided to the complainant, who then may wish to consult his/her private physician.

Step Five: Further Building Investigation

Where a quick inspection of the area and ventilation system did not find a cause for IAQ complaints, then further selective testing may be required. This could entail:

- Air quality measurements and monitoring (including sampling for suspected contaminants; comparing indoor and ambient levels of pollutants)

- Testing, balancing or commissioning of mechanical systems by a commissioning agent (including measurements of temperature, relative humidity and air flow)
- Investigation by qualified HVAC engineer.

Communicating to Resolve IAQ Problems

The Importance of Responding to IAQ Complaints

Indoor air quality problems can sometimes be identified and resolved quickly. On other occasions, complaints originate from the interaction of several variables, and detailed investigation may be necessary in order to resolve the problem. Listening and responding to building occupants is critical to achieving a successful resolution of IAQ complaints.

IAQ complaints may be grounded in poor indoor air quality, thermal conditions, noise, glare, or even job stresses. However, it is in the building manager's best interest to take all complaints about the indoor environment seriously, and to respond promptly, and to establish credibility through open communication with building occupants. The biggest mistake that building managers can make in the face of an IAQ complaint is to underestimate the problems that can result if building occupants believe that no action is being taken or that important information is being withheld. Without open communication, any IAQ problem can become complicated by anxiety, frustration, and distrust, delaying its resolution.

Paying attention to communication, as well as problem solving, helps to ensure the support and cooperation of building occupants as the complaint is investigated and resolved. The messages to convey are that school management believes it is important to provide a healthy and safe building, that good indoor air quality is an essential component of a productive work and learning environment, and that complaints about indoor air quality are taken seriously.

Communications, whether they occur in conversations or in writing, should include the following information:

- What types of complaints the school administrator or district official has received;
- School/school district policy in regard to providing a healthy and safe environment, and responding to occupant complaints;
- What has been done to date (e.g., collecting data, responding to the problem);
- What will be done in order to further investigate and correct the problem (including whether outside consultants have been called in);
- The names and telephone numbers of appropriate facility management, medical, or health and safety staff whom occupants should contact if they have additional complaints or questions, or information that may help in resolving the complaints.

Maintaining the Lines of Communication

Make certain that school staff, students and visitors know how to contact the responsible personnel who can receive and respond to IAQ complaints. If the problem seems to be widespread or potentially serious, it is advisable to work with the school or district health and safety committee.

It is also advisable to explain the nature of investigative activities, so that rumors and suspicions can be countered with factual information. Notices or memoranda can be delivered directly to selected

occupants or posted in general use areas. Newsletter articles or other established communication channels can also be used to keep building occupants and the public up-to-date.

Next Steps - IAQ Problem Remediation

It is essential that school districts carry out a building investigation and learn the specific facts in each case, rather than adopt a mitigation approach that might not be appropriate. Attempting to correct IAQ problems without understanding the cause of those problems can be both ineffective and expensive.

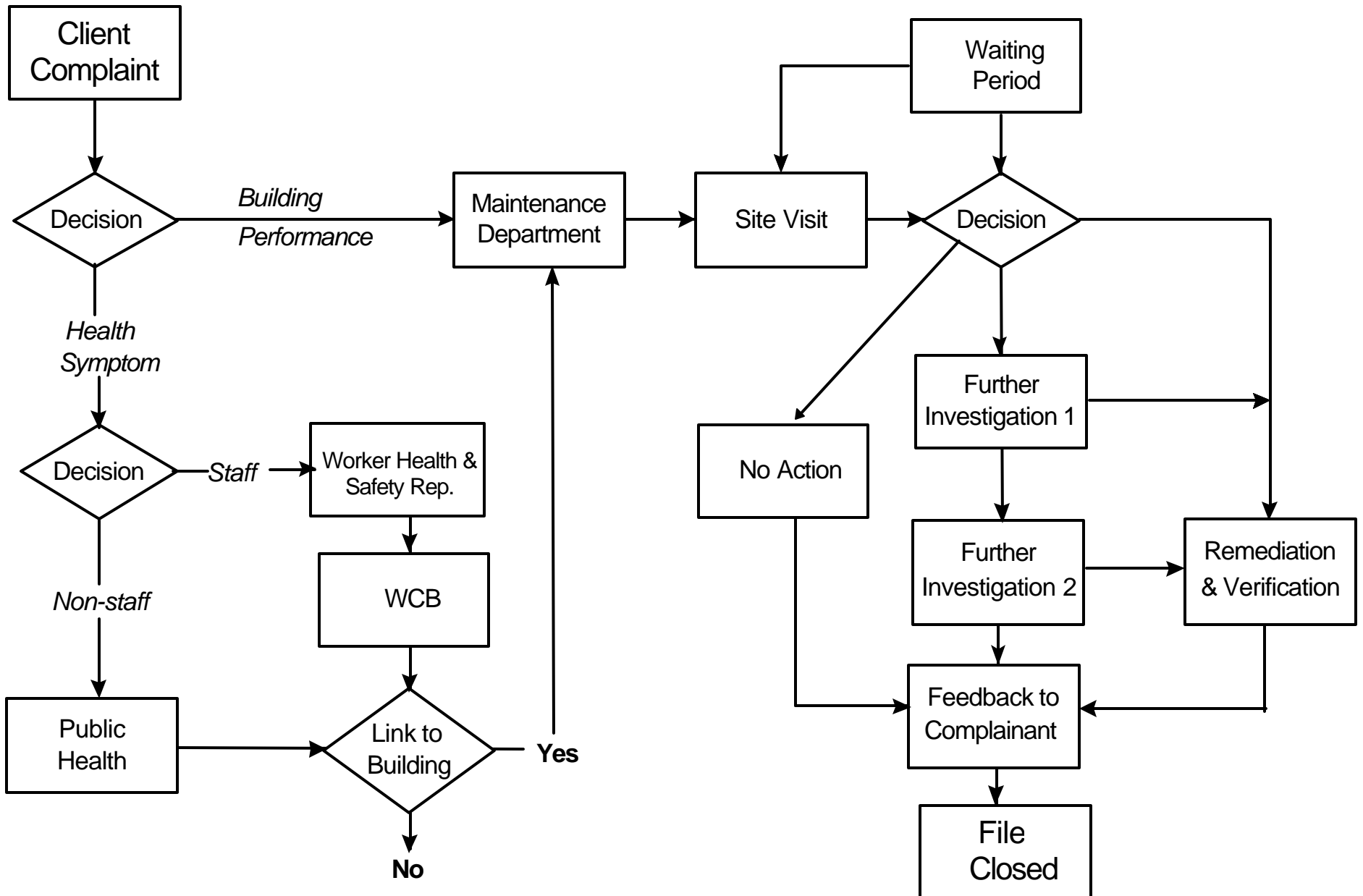
Notably, an estimated 50 percent of all indoor air quality problems can be linked to inadequate maintenance practices - including those problems related to ventilation effectiveness. As a first step, school district should review available maintenance records for the school. These records should include all inspections, adjustments, cleaning, calibrating and replacing as warranted or specified in operating manuals. Included in Appendix A, are samples of maintenance tasks lists and an equipment preventive maintenance tasks schedule, which can be employed as part of the school district's building maintenance program. Where maintenance tasks have been deferred, school districts will be expected to institute an immediate plan for undertaking any incomplete tasks in an effort to mitigate the reported IAQ problems.

Otherwise, results of the building inspection will generate a short-term plan for the remediation of IAQ problems. Only under exceptional circumstances can the Ministry of Education consider the provision of emergent capital funding for IAQ remediation. The favoured approach is to include funding requests as part of the school board's five-year capital plan submission for an upcoming capital year. Such requests can then be evaluated based on standard capital project approval criteria and appropriate documentation, including

- facility audit results
- evidence of compliance with the *Workers' Compensation Board Occupational Health and Safety Regulation* with respect to ventilation, preventive maintenance program, and indoor air quality investigation protocol
- verification by a qualified independent technician that such a capital improvement is necessary to provide acceptable indoor air quality

Appendix

Indoor Air Quality Complaint Process



IAQ COMPLAINT REGISTRATION FORM # _____

SCHOOL:	ROOM NUMBER/ AREA:	DATE:
CONTACT PERSON: (NAME AND TITLE)	PHONE:	
FORM COMPLETED BY: (NAME AND TITLE)		
INCIDENT/ CONDITION:		
<input type="checkbox"/> HEALTH <input type="checkbox"/> FACILITIES		
REFERRED TO: <input type="checkbox"/> WORKER HEALTH & SAFETY REPRESENTATIVE <input type="checkbox"/> PUBLIC HEALTH		

TO BE COMPLETED BY MAINTENANCE STAFF
DATE OF SITE VISIT: _____
BUILDING CONDITION: _____
ACTION: _____

TO BE COMPLETED BY WORKER HEALTH & SAFETY REPRESENTATIVE	
FOLLOW-UP WITH CONTACT: YES <input type="checkbox"/> NO <input type="checkbox"/>	
COMMENTS: _____	
REVIEWED BY WORKER HEALTH & SAFETY COMMITTEE? YES <input type="checkbox"/> NO <input type="checkbox"/>	DATE OF REVIEW: _____
	DATE CLOSED: _____

Sample 1 - Maintenance Task List

**STUDENT UNION BUILDING
MECHANICAL MAINTENANCE SCHEDULE**

LEGEND: D=DAILY, W=WEEKLY, M=MONTHLY, Q=QUARTERLY, H=HALF-YEARLY, Y=YEARLY

EQUIPMENT: AIR HANDLING UNIT: AHU-1
MAKE: HAAKON
MODEL: AIRPAC

FREQ.	CHECK	MAINTENANCE ITEM
M	<input type="checkbox"/>	-CHECK CONDITION OF AIR FILTERS
Q	<input type="checkbox"/>	-CHECK FAN BELTS FOR TENSION & WEAR
Q	<input type="checkbox"/>	-CHECK OPERATION OF MOTORIZED DAMPERS
H	<input type="checkbox"/>	-CHECK FAN BEARINGS FOR WEAR & VIBRATION
H	<input type="checkbox"/>	-CHECK ALL SET SCREWS FOR TIGHTNESS
H	<input type="checkbox"/>	-LUBRICATE BEARINGS AS REQUIRED
Y	<input type="checkbox"/>	-CLEAN FAN MOTOR & FAN BLADES AS REQUIRED
Y	<input type="checkbox"/>	-CLEAN HEATING COILS
Y	<input type="checkbox"/>	-CHECK CONTROLS & ALARM OPERATIONS

EQUIPMENT: HEAT PUMP HP-I
MAKE: TRANE
MODEL: WCCO24

FREQ.	CHECK	MAINTENANCE ITEM
M	<input type="checkbox"/>	-CHECK CONDITION OF AIR FILTERS
H	<input type="checkbox"/>	-CHECK FAN BEARINGS FOR WEAR & VIBRATION
H	<input type="checkbox"/>	-CHECK & CLEAN CONDENSATE DRAIN
Y	<input type="checkbox"/>	-CLEAN FAN BLADES AS REQUIRED
Y	<input type="checkbox"/>	-CLEAN CONDENSER COIL
Y	<input type="checkbox"/>	-CLEAN COOLING COIL AND CONDENSATE PAN
Y	<input type="checkbox"/>	-CHECK COOLING EQUIPMENT AND CONTROLS
Y	<input type="checkbox"/>	-CHECK ELECTRIC REHEAT OPERATION

EQUIPMENT: RETURN FAN: RF-1
MAKE: GREENHECK
MODEL: BSQ-180-20

FREQ.	CHECK	MAINTENANCE ITEM
M	<input type="checkbox"/>	-CHECK FAN BELT FOR TENSION & WEAR
H	<input type="checkbox"/>	-LUBRICATE BEARINGS IF REQUIRED
H	<input type="checkbox"/>	-CHECK ALL SET SCREWS FOR TIGHTNESS
Y	<input type="checkbox"/>	-CLEAN FAN MOTOR & FAN BLADES AS REQUIRED
Y	<input type="checkbox"/>	-CHECK BEARINGS FOR WEAR & VIBRATION
Y	<input type="checkbox"/>	-CHECK CONTROL OPERATION

Sample 2 - Equipment Preventive Maintenance Tasks Schedule

Building Number 300
Building Name Administration/Cafeteria
Equipment Tag AC-12
Equipment Type Air Handling Unit
Equipment Bar-code 3000120028

Task No.	Task Description	Trade	Season	Frequency	Man-hours	Check
1	Check with operating or area personnel for deficiencies. Record supply air temp., outside temp. and inside air temp. Record action of controller.	General Maint	Any Time	Annual	0.20	<input type="checkbox"/>
2	Check for unusual noise or vibration.	General Maint	Any Time	Monthly	0.03	<input type="checkbox"/>
3	Shut down and isolate unit. Tag and lock out all energy sources to unit.	General Maint	Any Time	Quarterly	0.10	<input type="checkbox"/>
4	Check tension, condition and alignment of belts, adjust as necessary.	General Maint	Any Time	Quarterly	0.03	<input type="checkbox"/>
5	Clean heat recovery coil, pump, blower, motors.	General Maint	Any Time	Annual	0.38	<input type="checkbox"/>
6	Inspect fan shaft and bearings, lubricate as necessary.	General Maint	Any Time	Semi-Annual	0.20	<input type="checkbox"/>
7	Replace air filters. Dispose of old filters.	General Maint	Any Time	Quarterly	0.40	<input type="checkbox"/>
8	Clean casing, fan, motor.	General Maint	Any Time	Annual	0.70	<input type="checkbox"/>
9	Inspect exterior piping and valves for leaks; tighten connections as required.	General Maint	Any Time	Quarterly	0.08	<input type="checkbox"/>
10	Check, adjust and lubricate all motorized dampers.	General Maint	Any Time	Semi-Annual	0.10	<input type="checkbox"/>
11	Check electrical wiring and connections; tighten loose connections.	General Maint	Any Time	Semi-Annual	0.04	<input type="checkbox"/>
12	Check that action of controller is appropriate with the season, occupancy and use of space.	General Maint	Any Time	Semi-Annual	1.20	<input type="checkbox"/>
13	Clean area around equipment.	General Maint	Any Time	Monthly	0.07	<input type="checkbox"/>
14	Restart the unit. Check for noise, vibration and proper operation of dampers and controls.	General Maint	Any Time	Quarterly	0.10	<input type="checkbox"/>
15	Fill out maintenance checklist and report deficiencies.	General Maint	Any Time	Monthly	0.02	<input type="checkbox"/>
Total Hours					3.65	

Sample 3 - Maintenance Task List

Component	OK	Needs Attention	Not Applicable	Comments
Central Air Handler Outside Air Intake Mid-Season & Annually				
Open during occupied hours?				
Unobstructed?				
Standing water, bird droppings in vicinity?				
Odors from outdoors? (describe)				
Bird Screen: General condition? Size of mesh? (1 1/2" minimum)				
Clean outside air intake screen				
Clean and paint external surfaces, as required				
Outside Air Dampers				
Operation acceptable?				
Sealed when closed?				
Actuators operational?				
Lubricate and adjust dampers and linkage connected to operators.				
Mixing Plenum				
Clean?				
Floor drain trapped?				
Airtightness - of outside air dampers - of return air dampers - of exhaust air dampers				
All damper motors connected?				
All damper motors operational?				
Air mixers or opposed blades?				
Is mixing plenum under negative pressure?				

SINGLE-ZONE PACKAGED ROOFTOP AIR CONDITIONING SYSTEM

Component	OK	Needs Attention	Not Applicable	Comments
Packaged rooftop unit air-side - Pre-season				
Test operation of motorized dampers; clean, lubricate, adjust linkages, or repair as needed.				
Check operation of gravity (backdraft) dampers; clean, lubricate, or repair as needed.				
Check fan and fan motor bearings; repair/replace as needed.				
Packaged rooftop unit air-side - Mid-season				
Change filters.				
Check all portions of unit through which air flows for cleanliness, and evidence of standing water or biological growth. Clean as required, and repair any leaks or other uncontrolled sources of water.				
Packaged rooftop unit cooling system (if applicable) - Pre-season				
Check cooling coil.				
Check condensate tray and drain - clean as necessary.				
Check that condensate drains completely from tray; drain is not blocked; and there is no evidence of biological growth. If condensate tray or drain does not drain completely, modify as necessary to ensure proper drainage. If biological growth is evident, clean thoroughly and disinfect.				
Check air-cooled condenser and clean, as necessary.				
Check refrigeration system operation; monitor refrigerant leakage (if any); and service/repair as necessary.				
Ensure documentation of refrigerant leakage, usage, etc., is completed, as required by Provincial Regulation.				
Packaged rooftop unit heating system - Pre-season				
Inspect, calibrate, repair as needed.				
Test fuel burners, including induced draft fan (if applicable).				
Check the furnace combustion chamber, and clean as needed.				