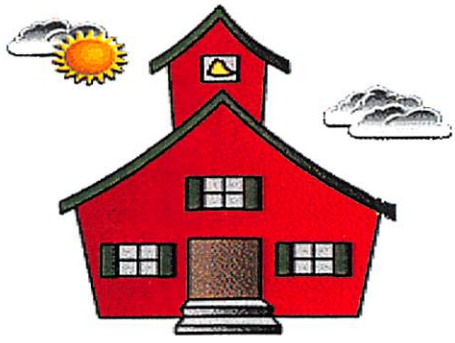
INDOOR AIR QUALITY IN CANADIAN SCHOOLS

FINAL REPORT



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FINAL REPORT
2003

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Executive Summary

The purpose of this project was to explore the need for a consistent approach to the management of indoor air quality (IAQ) in schools and to test a set of practical strategies for the implementation of IAQ guidelines in Canadian schools.

Children, along with teachers, administrators, custodians, and other school staff, spend a great deal of time in schools in Canada. It is, therefore, critical that schools provide a healthy environment for learning, of which good indoor air quality is an essential element. Air quality directly affects the capacity of students to concentrate and learn, the propensity for the spread of viral and bacterial infections and mould growth, and the prevalence of chronic health conditions such as asthma, allergies and other sensitivities. Indirect negative effects on students also result from teachers and other staff whose well-being and work quality is compromised by poor IAQ.

Some schools have devised strategies for addressing air quality issues as problems have arisen, but these efforts have largely been driven by grass roots or voluntary organizations. At the outset of this project, there had been no systematic investigation related to policy and practices, no comprehensive guideline development, and no outcome research to examine the efficacy of strategies to improve IAQ in schools. This study sought to address that situation.

This report gathered data on IAQ perspectives and experiences from a variety of key stakeholders - parents, students, teachers, school administrative staff, custodian/ maintenance staff, Teachers Federations/Unions, IAQ consultants, community-based advocacy groups, school boards/districts (both staff and elected officials), government policy makers and deputy ministers - from most jurisdictions across Canada. It includes a discussion of perceptions, issues, views, and experiences associated with IAQ; problems experienced with IAQ across the country; current policies or practices in place at the school board/district levels; an overview of current funding programs, policies and practices by federal, provincial, and territorial government jurisdictions as it relates to IAQ; a description of best practices and keys to successful IAQ management; barriers and contributing factors to good IAQ management; suggestions for implementation of good IAQ management practice and/or guidelines and the respective roles and mandates of stakeholders; and current and proposed communication practices.

The project also tested the USA Environmental Protection Agency's *Tools for Schools Kit* as a model for managing IAQ in schools. The critical factors that need to be in place to make implementation of this tool or any other set of IAQ management guidelines are documented herein. Through qualitative data, the report captures the voices and experiences of those working or learning within the school system and strategies suggested come from the voice of experience.

The report provides useful insights into the issues many departments and schools are grappling with as they attempt to respond to IAQ concerns in their respective

jurisdictions, as well as the perspectives of key stakeholders involved. Recommendations are made based on participant suggestions to achieve and maintain good IAQ in school environments.

Through four primary data collection methods - an on-line internet based survey, focus groups, key informant interviews, and pilot testing of a set of IAQ management practices (the US *Tools for Schools Kit* in eight pilot schools) - this project explored existing resources, knowledge, and experiences. The findings from the four primary data sets are remarkably similar. There appears to be greater awareness of this issue - the importance of IAQ and its impact on individuals - over the last decade and since project inception, and this awareness continues to grow. All share the goal that schools should be healthy learning and working environments for children/youth and staff.

Although there is some concern regarding the inadequacy of science in measuring and diagnosing IAQ problems, and questions related to the relationship between poor IAQ and poor health, by and large, IAQ is a genuine concern among government policy-makers. There is agreement as well, in principle, on the value of a preventive approach and support for an emphasis on preventive maintenance and good cleaning practices. Some jurisdictions have earmarked funds for capital (renovation, repair, and new construction) and operations (maintenance) to support this approach and one has introduced a complaint investigation protocol. While other jurisdictions have these protocols and procedures, they have been developed at the school board level and content varies even within a jurisdiction. The most significant issues identified in the interviews were, for some individuals, the perceived uncertainty and inexact nature of the science supporting IAQ, and therefore the resultant difficulty with problem definition, measurement, and response; the degree of fairness and objectivity of the process to address IAQ problems; the nature of the relationships among stakeholders and the degree of trust among those partners; and the (in)adequacy of communication mechanisms among stakeholders.

The challenge for governments is to ensure value for money to deliver cost-effective solutions for IAQ problems, fairness in the identification and response to needs, and balancing IAQ issues among the other priorities of the day. Managing public opinion and expectations and communicating knowledge about IAQ issues is also a challenge. This report demonstrates the value of open communication and the importance of acknowledging a problem where one exists. Enhancing communication between school boards, schools, and the Department of Education on the one hand and their constituents on the other is necessary, as are mechanisms by which to build public trust in these institutions. While school boards have responsibility for maintaining school buildings and therefore good IAQ within these structures, they are essentially entities created by provincial statue and delegated authority for management of schools. They also exercise their functions within the parameters of the budgets provided to them by the province, making IAQ essentially a shared responsibility.

The degree of success in achieving change in IAQ management practice at the school board level appears to hinge on leadership within and external to the district leadership of the provincial government in encouraging the adoption of such practices (and perhaps providing a model set) and providing the funds to do so; leadership at the board level to approve funds for such activities; leadership of the district - facility managers in supporting such practices and ensuring the work gets done; and leadership at the school level (principal) to support IAQ initiatives. Education and awareness influences the quality of decision-making and how this leadership is exercised. Changes in preventive maintenance - a key contributor to good IAQ - can largely be influenced by facility managers and their understanding of the value of these activities so training and sufficient funds to carry out the work at this level appear to be critical success factors. A shift in thinking needs to take place at the school board level - indeed at all levels - which places value on good IAQ and good IAQ management practices.

Governments need to be prepared to invest in both infrastructure (to repair and remediate structural problems, and ensure preventive maintenance) and staff (for preventive maintenance) to prevent IAQ problems. In order to implement good IAQ management practices, the following conditions are required: the necessary will, education/awareness about IAQ, training in how to identify and respond to IAQ problems as appropriate to individual roles, development of an IAQ management plan, involvement of all key stakeholders, preventive maintenance and structural remediation, and funding to support these efforts.

There are many players in this arena, emphasizing the need for a coordinated effort. This report outlines the sheer difficulty of this task. It also supports the introduction of policies and management guidelines or practices to promote good IAQ and healthy learning environments, particularly for children who may have greater sensitivity to poor IAQ; the input of stakeholders into the development and implementation of such practice guidelines; the delivery of IAQ training based on the roles of the various players/target audiences; the provision of access to resources and to expert consultation and advice both in IAQ and in the health profession; the adoption of a team approach to identification and resolution of IAQ problems; the adoption of explicit complaint investigation procedures and communication protocols; the promotion of relationship building efforts; the use of conferences to share findings, update findings, and promote cross-fertilization of perspectives; the provision of funding to fix the problems; and the development of long term IAQ management plans. There is some interest in the development of improved IAQ standards in the interests of objectivity but this is not universal; nor is this approach without its shortcomings.

The suggestions for implementation are similar from all study sources – and could apply to any set of guidelines including *Tools for Schools*. The routes of influence and leadership may differ among provinces/jurisdictions but the players who need to be involved are essentially representative of the same stakeholders. A flexible application of guidelines is necessary among jurisdictions. The time it takes to implement such guidelines (for IAQ management practice, for complaint investigation and response, and

for communication) and the level of effort required, will be influenced by the nature of the relationship already existing among parties and by the type of policies, practices employed, and guidelines already in place.

Low cost strategies that empower schools at the local level to act on their own initiative to solve their IAQ problems, provided the necessary supports are in place, are welcomed by all stakeholders.

There must be a supportive climate at the school board level for this type of initiative and Provincial Departments of education can be influential in that regard. However, if *Tools for Schools* or IAQ management practices are to be changed/enhanced to support good IAQ, then building maintenance staff must be supportive and school-based administration must exercise leadership. As demonstrated by the *Tools for Schools* pilot project, the principal or some such "champion" was the real driver of the process.

While there is disagreement on the need for and value of improved testing and standards for IAQ, there is a greater, although not unanimous, agreement about the need for guidelines for management practice, and complaint investigation protocols, and communication strategies that inform the community about IAQ efforts.

Tools for Schools was tested in eight schools as a model for diagnosing and solving problems, as well as preventing IAQ problems. The tool:

- encourages local ownership of the issue
- empowers schools to take action to promote healthy IAQ in their environment
- involves all stakeholders (potentially)
- encourages collective action and the adoption of a team approach to IAQ problem identification and resolution which increases both the sense of shared responsibility and communication among stakeholders
- offers practical, low cost strategies to address IAQ problems
- encourages routine visual inspection as a means of initial problem diagnosis and prevention
- gives the school some capacity for problem diagnosis and thereby avoids having to call a specialist at the outset, potentially saving costs
- provides, perhaps most importantly, a focal point of responsibility for acknowledging and acting on IAQ issues.

The primary difficulty is the time required to invest in such an approach. However, pilot school sites found unique ways to lessen the burden, on teaching staff in particular, and more fully utilize the expertise of the building manager/custodian to implement the *Kit* – key factors contributing to success. The report identifies critical success factors associated with positive outcomes achieved in this pilot, as well as factors which contributed to poor implementation at other sites. In particular, the merits of a "hands off" and "hands on" approach (with training and support) were explored. Training, school-based leadership, and school board support were critical success factors.

Prospects for sustainability of such an initiative are discussed, as are the supports required to implement such a tool on a long term basis.

Recommendations

Many ideas have been suggested to facilitate implementation of good IAQ in school environments within each section of the report. The following set of recommendations does not list each idea offered but rather, attempts to summarize, in a global way, the key recommendations made. Readers are directed to the suggestions and recommendations contained within the report for more detailed examples. The following are recommendations based on the study results.

1. **Coordinated IAQ Management Strategy** - It is recommended that each provincial/territorial jurisdiction implement a coordinated and integrated IAQ management strategy at multiple levels of governance. A range of efforts needs to be undertaken as part of an integrated and coordinated management strategy required to properly address IAQ in Canadian schools, the components of which should include, at minimum:

   - policies and practice guidelines
   - complaint investigation protocols and procedures
   - communication plans and protocols
   - methods to involve and build positive working relationships among all stakeholders to share ownership of the problem and responsibility for solutions
   - planning, management, monitoring and accountability measures
   - training and education
   - funding
   - leadership and coordination

   This includes development and implementation of IAQ management practice guidelines, development of IAQ management plans at the school level, and an approach to monitoring to ensure implementation. Each school should be required to develop an IAQ management plan that incorporates good IAQ management practices and guidelines, and ensures observance of same. Each school should be required to demonstrate how they will ensure the maintenance of good IAQ on their property.

   Provincial/territorial governments should identify a model set of guidelines and practices (see recommendation No.3) they strongly encourage school boards to follow and supply funding in support of implementation. School boards and schools should work with their regional/local stakeholders to refine these guidelines with respect to implementation, ensure they have the necessary expertise to diagnose and address IAQ problems as much as possible, implement an IAQ program and ensure training is delivered. Preventive approaches such as *Tools for Schools* should be considered as part of an overall IAQ management strategy or program. It is one program which school boards may wish to examine to determine if it is an approach they wish to use to implement good IAQ in

schools. Reporting, monitoring and accountability measures need to be put in place to ensure implementation. An accountability framework should be developed describing how implementation of IAQ management practices and plans will be monitored and to gauge progress in implementing the elements of the IAQ management strategy. This may involve various mechanisms such as audit; regular reporting to the school occupants, IAQ teams/OH&S Committees, the public, and the school board; reporting by the school board to the Department of Education; and others.

2. **Education and Awareness** – Enhance opportunities to increase awareness and knowledge about the importance of healthy IAQ, the potential effects of poor IAQ, the possible sources of poor IAQ, the types of steps (policies, practices, complaint protocols, and tools) that can be taken to ensure the maintenance of healthy IAQ in schools, the roles of stakeholders in supporting good IAQ, the value of open communication and shared understanding about the problem, and vehicles to support communication about this issue.

   Education and awareness must take place at all levels with multiple stakeholders. It is recommended that an initiative to educate all stakeholders about IAQ be undertaken and an education and training strategy developed. This includes target audiences of parents, students, teachers, custodians and maintenance managers, Occupational Health and Safety staff, school board representatives, unions, government staff in the relevant departments affected by IAQ issues (Education, Public Works/Infrastructure, Labour, Environment, and Health), health professionals, and others with an interest in this area. General awareness and education initiatives should also involve community-based interest groups and IAQ consultants where appropriate or those with expertise in the IAQ issues, and should be multi-disciplinary in nature. Training should be targeted by stakeholder group, should focus on the specific roles of parties in responding to the problem, and be tied to policies and practices they are expected to follow to ensure good IAQ.

   Seize opportunities at the local school level to increase awareness, knowledge and understanding among all stakeholders of the importance of healthy IAQ and good IAQ management practices, and the roles of stakeholders in addressing the problem. Activities and forums such as school assemblies, school newsletters, student council activities, staff meetings, memos, and presentations to the school board are suggested.

   Incorporating the issue into the curriculum in formal and informal ways is suggested by using teaching opportunities in the classroom and through project assignments or other IAQ focused activities. Making the *Tools for Schools Kit* available as a formally acknowledged resource endorsed by the Department of Education is also recommended

3. **Develop IAQ Management Guidelines** – Develop a set of policies and best practices for IAQ management which apply to both the design and new construction of school buildings and the maintenance of existing buildings. This could be developed with the leadership of the federal government (Health Canada) in cooperation with the provinces and other key stakeholders, or at the provincial level with the collaboration of other key departments (although this seems a duplication of effort). Most practice guidelines should have standard applicability across the country, with some flexibility for application at the regional, provincial, and local level. Once developed they can be adapted with local stakeholders for local use.

   Guidelines should cover topics such as: scented products, smoking, carpet removal, use of environmentally friendly cleaning products, cleaning schedules, replacement of air filters, inspection schedules of school ventilation and other operating equipment, temperature control and the like, preventive maintenance steps, design considerations and materials for new construction, renovation or repair guidelines (materials, off gassing and time required prior to occupancy) and other areas.

   These guidelines should reflect the importance of undertaking preventive maintenance and remedial measures early. It is critical to ensure sufficient routine monitoring systems are in place to enable early detection and repair of problems, engage in preventive maintenance practices, and undertake activities to remediate problems and improve IAQ through the observance of good management practices. Some examples include:

   - Employ a rigorous and continual cleaning regimen.
   - Use least toxic cleaning products.
   - Conduct routine monitoring and inspection, including air and mould checks.
   - Remove carpets.
   - Replace chalkboards with white boards or appropriate technology to display material.
   - Adopt reduced or no scent policies.
   - Improve air circulation; install proper functioning, well regulated and well maintained air exchange systems.
   - Arrange for routine maintenance (such as floor stripping and waxing), painting, repairs, new construction and renovations to be done when the school is not occupied and allow sufficient time for off gassing of new products.
   - Ensure regular cleaning of ducts and filters.
   - Train custodians on proper procedures to identify potential IAQ problems or increase inspections by trained staff to ensure proper vigilance in detecting and responding to problems early.

Involve key stakeholders in the process of development as well as implementation of guidelines so stakeholders do not see them as an imposition but rather as an opportunity to build or re-build trust relationships among partners.

4. **Training** – Accompany any guidelines, practices, policies, or tools introduced with general IAQ education and specific training including initial orientation and on-going in-service opportunities for those involved with implementation; and more advanced or specific technical training for maintenance staff or others where needed. Increase awareness about any existing guidelines, policies, practices, regulations and protocols as part of this process.

5. **IAQ Standards** - Explore development, at the national level, of IAQ standards for non-industrialized settings tailored to children which accounts for, or uses as its test standard, a typical six-year-old child rather than a 40-year-old adult male to determine sensitivity and acceptable limits for the school population, recognizing the increased sensitivity levels of children. The intent is to reduce subjectivity in the application of standards, and implement more refined and appropriate, if possible, standards for school settings. If developed, these standards should be accompanied by information and education as to their appropriate use, and the limits of their use, as well as how to interpret results. These should not be viewed as "stand alone" measures, but rather, be accompanied by other diagnostic steps (including visual inspection). Continue to improve the science supporting the relationship between air quality and health.

6. **Build Collaborative Relationships** - Develop/enhance mechanism to build positive working relationships among stakeholders at various levels in this area. Seek out opportunities to build partnerships to increase understanding of IAQ issues and problems, share perspectives and concerns, build trust and credibility among stakeholders, and seek solutions together. *Tools for Schools* and the *Supplemental Guide* developed by this Project are models of such an approach at the local level. However, a collaborative approach is also required at other levels of effort, influence, and decision-making. As policies and practices are developed and implemented and other elements of a coordinated strategy are executed (as identified in recommendation No.1), processes for involvement and meaningful input of stakeholders ought to be developed.

7. **Leadership, Coordination, and Responsibility** – Assign a focal point of responsibility for IAQ issues at various levels of influence and authority. It is critical that leadership be exercised to coordinate and implement the components of the management strategy or it is likely the effort will falter.

   Each level of governance should take a leadership role and identify a focal point of coordination for management of IAQ issues and implementation of healthy IAQ in schools. Each provincial/territorial jurisdiction should take a leadership

role, in collaboration with other relevant departments, to formalize an IAQ program in schools. It is important to assign a coordinator to take the lead role at the school board and school levels as well.

It is also suggested that any new practices or guidelines be incorporated into already existing procedures, structures, committee mandates, and staff roles to the degree possible to increase likelihood of sustainability. At the school level, many saw the Occupational Health and Safety Committees as being the most appropriate vehicles to assume responsibility for implementation of the *Kit* or guidelines as it was consistent with their current mandate. Others preferred a separate IAQ Committee with links to the OH&S Committee to retain the element of community participation and not dilute the focus on IAQ.
This is to also recognize the value of a team approach in terms of creating a sense of shared responsibility for IAQ, bringing the necessary expertise to bear on the problem, building credibility, and promoting joint problem solving. Whichever method is chosen, it is critical a point person be identified as coordinator to assume leadership of the effort.

Ensure the support and involvement of those strategically positioned to have a significant influence on implementation - such as principals, facilities operation personnel (who have knowledge of the building envelope) and the OH&S Committees (who have knowledge of industrial hygiene matters) at the school/school board levels.

8. **Complaint investigation protocol** - Develop and implement, for those jurisdictions or school boards/districts which have not done so already, a complaint investigation protocol which details, at minimum, how and to whom an IAQ complaint is to be made; what steps will be taken, and how individuals will be informed of the results or the outcome. As well, it identifies a process which helps to create a safe environment for a person to report a complaint without fear of retribution.

9. ***Tools for Schools Kit*** - Offer the *Tools for Schools Kit* as a resource to schools as a practical, low-cost strategy for implementing IAQ sensitive practices, along with the *Supplemental Guide*, but adopt a flexible approach to implementation. Particular attention should be paid to addressing the time constraint issue either by amending the checklists prior to distribution or suggesting this or other approaches to participants to minimize the burden on staff, and to including a cover briefing about the *Kit* and its placement within an integrated IAQ management strategy, and the requisite components of the strategy. The necessary supports - endorsement by the school board and Departments of Education, a "champion" to lead the effort at each school, training (initial orientation and on-going in-servicing), funding for coordination and for remediation associated with implementation, access to expertise at the school board level, prompt response to concerns, a planning and accountability framework, and others identified within

this report must be in place. Particular attention must be paid to how the *Kit* is introduced. The potential benefits, how to address barriers identified in this report such as time (e.g. reduction of checklists, that staff time be made available to conduct this work based on the OH&S model, and other measures), the critical success factors, and supports that will be provided.

It is recommended that the results of this project and pilot test of *Tools for Schools* be made available (via print, presentations, etc.) to school boards and principals throughout Nova Scotia and across the country, and to the Departments of Education in the various jurisdictions, to identify the merits of such an approach. Each jurisdiction/province should assume a leadership role in doing so. Health Canada might also assist in this regard. It is recommended that each school board consider implementing the *Tools for Schools Kit* along with a set of management practices, complaint investigation protocols, communications and partnership initiatives, and other elements of an effective response to manage IAQ as per recommendation No.7.

10. **Planning, Monitoring, and Accountability Framework** – Develop an IAQ management plan (as per recommendation No.7) and implement monitoring and accountability mechanisms to ensure not only adequate identification, reporting, and follow-up of problems but also monitor progress in implementing the elements of the IAQ management strategy. Various mechanisms are necessary complaint investigation protocols, communication plans, reporting of repairs made and budgets spent to school boards and provincial departments to improve planning, the development of IAQ plans, and mechanisms to report and track progress for example.

Undertake periodic monitoring and testing to ensure the maintenance of good IAQ and gather sufficient data to determine scope and depth of IAQ problems through monitoring the occurrence of poor health symptoms and the functioning of school building systems.

Activities such as conducting periodic air quality testing, surveying school occupants to identify the number of people with poor health symptoms potentially attributable to IAQ, and keeping an IAQ health log to enable identification of types of illnesses that may be associated with IAQ are suggested, as was development of baseline surveillance data to monitor the occurrence of illness and its patterns against the baseline rate of occurrence to detect any deviance from the norm. This would provide supporting data to indicate the types of problems that may exist in order to develop plans of action to address IAQ concerns in the school. An incident-based reporting system (of IAQ complaints) would provide a centralized mechanism of reporting to monitor trends and determine whether the problem is improving.

Develop a plan of action to ensure the implementation of good IAQ management practices and regularly track and report progress. Inform stakeholders about IAQ issues and concerns as they arise, the nature and cause of problems identified, the results of any testing done, the status of plans and actions taken or required to ameliorate the problem, and the results. Schools should inform their local stakeholders, and the school board, who should inform the province. Suggestions were made that this type of information is needed to improve planning at the school board and provincial levels with respect to the implantation of guidelines, the state of the asset stock, and funding allocations that may be needed. Mechanisms to regularly track and report progress toward achievement of IAQ goals and implementation of plans is needed. One suggestion was to implement an automated maintenance management system that would allow the department to monitor the quality of buildings on an annual basis, the amount of money put in to building repair and maintenance, and the overall condition of the asset base. Better planning tools would assist in identifying and justifying need based on hard evidence which, in many cases, is absent.

Consider integrating adoption and compliance with IAQ guidelines into the accreditation process to enhance accountability and ensure implementation.

11. **Communication and Participation** - Enhance communication among stakeholders and implement mechanisms to ensure broad-based participation and involvement of all stakeholders. Develop a communications plan at the school level which identifies what information should be shared with stakeholders (e.g., the status of current IAQ management initiatives, why IAQ is important, etc.) how they will be informed (periodic newsletters or bulletins, memos, public forums, committees, etc.), when (quarterly intervals?) and by whom. It identifies the goals of the plan, the intended audiences, and the various mechanisms by which information will be communicated to them. This is related to the complaint protocol, in that the investigation protocol should specify how complaints will be acted upon and communication mechanisms associated with the complaint (e.g. the process for making complaints, how and what information about the complaint will be shared and with whom, etc.). However, this is much broader than simply a complaint process.

Communication was universally identified as both an issue and a recommended solution to correct misinformation, promote trust among stakeholders, and a critical component of good IAQ management practice. A preventive pro-active approach includes both shaping public opinion through the promotion of education and awareness initiatives and open communication with stakeholders and mechanisms to encourage their involvement. This is a highly charged and emotional environment and improving trust relationships among parties will improve the outcome for all concerned. Governments, schools, and school boards need to learn how to work with each other internally, and with community externally, and do a better job of sharing responsibility for solutions.

Some suggested examples of a participatory approach at the school board/school level included:

- Involve everyone in the development of policy, approaches, and plans, including students, to encourage buy-in from all stakeholders. Students in particular emphasized the need for inclusion on committees and in efforts undertaken to ensure the voice of students is heard and to shape peer attitudes and behaviour.
- Ensure student, parent, and teacher participation on IAQ committees or Occupational Health and Safety Committees; form a student-based IAQ Committee.
- Encourage adoption of a policy of open communication, transparency of decision-making, and feedback from the school board.
- Use memos in mailboxes to facilitate communication as well as a health and safety bulletin board to communicate IAQ issues; add IAQ information to the school newsletter.
- Encourage joint decision-making between OH&S Committee/IAQ Committee and School board.

12. **Funding and Support** – Ensure the necessary funding and support is in place to prevent and respond to IAQ problems in schools to ensure the maintenance of good IAQ in all schools.

All participants stated that, without funding to ameliorate IAQ problems and the support and willingness of the school board and others in authority to support healthy IAQ, efforts to improve IAQ would be compromised and would have little impact.

1. INTRODUCTION

The Atlantic Health Promotion Research Centre (AHPRC) at Dalhousie University in Halifax, Nova Scotia has long recognized that promoting good health and preventing illness must start an early age. Environmental health in schools and the need for healthy indoor air quality is a particular area of concern, given the amount of time children and staff spend in schools over the course of their lifetime and the greater susceptibility of children to the effects of poor air quality.

In 1999, some of the faculty partners involved with the Atlantic Health Promotion Research Centre and the Faculty of Medicine, in which the Department of Community Health and Epidemiology resides, were interested in conducting a joint project exploring this area further. The AHPRC entered into discussions with the Dean of the Faculty of Health Professions and with staff of the Environmental Health Centre to explore their level of interest in partnering on such a project.

Because the project partners wished to make the research national in scope, the Institute of Health Promotion Research and the School of Occupational and Environmental Hygiene (SOEH) at the University of British Columbia were approached as well. It was thought that indoor air quality issues might be similar due to the coastal climate and other conditions but would still provide an opportunity to explore some differences. As well, staff at the SOEH had conducted some research into indoor air quality in elementary schools.

Partnership was also explored with the Nova Scotia Department of Education and with the community-based organizations CASLE (Citizens for A Safe Learning Environment) and the Nova Scotia Lung Association that had been working in the area of the environmental health of schools. Based on these discussions, a research proposal was developed and submitted to the Population Health Fund of Health Canada for consideration in April of 1999.

A number of other key organizations and departments committed their support for the *Environmental Health in Schools* project. Letters of support were received from the Nova Scotia Department of Education and Culture, the Nova Scotia Department of Labour, and the Nova Scotia Teachers Union.

The Population Health Fund agreed to fund the Project, recognizing that environmental health and indoor air quality influences many of the primary determinants of health as it applies to the Canadian school population. The project also addresses three of the Population Health Fund's "childhood & adolescence" life stage priorities:

- Creating Optimal Conditions for the Healthy Development of Young Children.
- Creating Safe, Supportive and Violence-Free Physical and Social Environments
- Fostering Healthy Adolescent Development

Funding of approximately $300,000 was provided over a four year period (1999-2003) to conduct the research project and personnel were hired to undertake the work.

2. BACKGROUND/RATIONALE FOR PROJECT

Children, along with teachers, administrators, custodians, and other school staff, spend a significant amount of time in schools in Canada. Students spend approximately six hours per day for 40 weeks per year in primary and secondary schools. It is therefore critical that schools provide a healthy environment for learning.

An essential element of a healthy environment is good indoor air quality (IAQ). Air quality directly affects not only the level of health of school occupants – as it influences the spread of communicable diseases such as viral and bacterial infections and the prevalence of chronic health conditions such as asthma, allergies and other sensitivities – but also the capacity to concentrate and learn. Indirect negative effects on students also result from teachers and other staff whose well-being and work quality is compromised by poor IAQ.

Initial pre-project interviews with officials from provincial Departments and Ministries of Education suggested that poor IAQ in schools is an issue of national scope. Some schools have devised strategies for addressing air quality issues as problems have arisen, but these efforts have largely been driven by grass roots or voluntary organizations or have been reactive rather than pro-active or preventive in nature. At the time of the project's inception, there had been little work done with respect to a systematic investigation related to policy and practice, comprehensive guidelines development, and outcome research to examine the efficacy of strategies to improve school IAQ in Canada. Some related work has begun in the intervening period: in partnership with Health Canada, the New Brunswick Lung Association initiated a project to test a Canada-specific version of USA Environmental Protection Agency's (EPA) *Tools for Schools Kit* and the Canadian Association of Environmental and Occupational Health has also been exploring work in this area.

The project is timely in that there appears to be diminished public confidence in schools as healthy learning environments, as evidenced by conflicts that have emerged across Canada among parents, administrators, and school boards over IAQ issues. It is important to build public confidence in the capacity of schools to be supportive learning environments concerned with the health of students, teachers and staff. Schools are the only public institutions which serve virtually every citizen for upwards of thirteen of their formative years. Therefore, school environments possess great potential to impact the health and futures of the individuals within them, and the strength and productivity of society itself.

3. PROJECT GOALS, OBJECTIVES, and OVERVIEW

3.1 Goals and Objectives

The overall goal of the project was to provide a consistent, national approach to indoor air quality (IAQ) in schools by developing and testing a set of practical strategies for the implementation of IAQ guidelines in Canadian schools.

More precisely, the objectives of the project were as follows:

1. to expand the knowledge and resource base regarding implementation of IAQ guidelines in schools
2. to identify and understand the factors that facilitate or hinder the use of existing knowledge about IAQ issues and the implementation of existing guidelines
3. to develop guidelines and implementation strategies for use in the pilot testing of IAQ guidelines and implementation strategies that allow buy-in from current infrastructure
4. to pilot test the implementation of IAQ guidelines
5. to conduct a global evaluation of the project and evaluate process and outcomes of pilot testing of guidelines and implementation strategies in at least four sites.

The project's long term goal was to explore current practices related to the maintenance of healthy IAQ in schools; introduce policies and practices that support good IAQ; and modify the roles that students, teachers, administrators, maintenance staff, and school boards play in maintaining healthy IAQ in schools. The lessons learned, issues identified, and best practices explored might also have applicability to homes and other institutions (public libraries, community centres for example).

3.2 Overview of Program of Work

A number of activities associated with these objectives were undertaken and are described below.

Project Start-up, Consultation

A Committee was formed to oversee the project comprised of representatives from the partner organizations. (See Appendix A for a list of Committee members).
A project coordinator and research staff were hired to undertake the work. Resource people and organizations in various sectors, including construction (architecture, engineering), government (education, health, labour), academia, and the voluntary sector (special interest/advocacy groups, parent/teacher organizations) were identified. A proposal was also developed and submitted to a national funding agency to support a National Symposium on the issue of IAQ in schools in an attempt to increase knowledge

and awareness of IAQ issues and to disseminate the findings of this study. However, the proposal was not funded.

Environmental Scan

An information scan of materials on IAQ issues and guidelines in schools was undertaken through using computerized databases, internet searches, and referral by key informants. Strategies developed to date by different jurisdictions at the school board, provincial, and federal government levels were identified and policy implementation strategies in relevant areas (schools, workplaces) documented. A literature review was also conducted. The survey instruments subsequently developed by the project were based partly on the results of the information scan.

Web Site/Public Awareness

A web site was established with links to other relevant web sites as a means of promoting awareness of IAQ issues and the project itself. This site was also used to administer an on-line survey to gather information from all provinces on current policies and practices related to IAQ (see methodology).

Expert Review

Although the original proposal called for the establishment of three ad hoc groups of experts to review IAQ guidelines developed by the project, this was deemed not necessary as the project made the decision to use the already existing EPA *Tools for Schools Kit* and concentrate on developing an IAQ Coordinator's Supplement to guide efforts to engage stakeholders in the process. Experts were consulted as part of the research undertaken to identify best practices and keys to successful management of IAQ issues.

Selection of IAQ Guidelines

Although initially the project intended to develop its own set of IAQ guidelines, based on the results of the environmental scan, a review of existing guidelines, and preliminary results from the research, it was decided that the United States Environmental Protection Agency's *Tools for Schools Kit* would be used. This *Kit* was found to be inclusive of the elements recommended in terms of content and process, was widely supported, and had been used by some schools in Canada, although it had never been formally validated. The project was aware in its very early stages that another group - the Canadian Environmental and Occupational Health Committee (CEOH) - was attempting to develop a Canadian version of the *Tools for Schools Kit* and make it applicable to the Canadian context. The project connected with this group to ensure there was no duplication of effort and that the work undertaken would complement that of the Committee. As a result, a decision was made to concentrate efforts on pilot testing the EPA version and on developing strategies and materials to assist in implementation.

Participants in the initial focus groups and interviews stated that scientific guidelines or measures for rating IAQ should not be the central focus; rather, practical strategies, practices, or ways to implement good IAQ were a more urgent need. Rather than develop new guidelines, it was seen to be more important to identify effective implementation strategies for guidelines that already existed. Study participants identified a number of supports necessary for successful implementation of IAQ guidelines and described activities such as open communication among stakeholders, regular meetings, monitoring, and involvement of all stakeholders (from students, to parents, to teachers, to administrators) as critical elements of an effective response. The *Tools for Schools Kit* appeared to meet these needs for the most part. Where it was deemed deficient was primarily the area of enlisting stakeholder support for use of the *Kit* and for implementation of IAQ management practices in general. As well, since the *Tools for Schools Kit* had not been evaluated, it was decided that the project should pilot test the *Kit* and evaluate its use.

Development of the Supplemental Guide

The Project developed a *Supplemental Guide* (under separate cover) to assist schools in addressing implementation challenges and issues. The *Guide* contains implementation strategies to engage stakeholders in the process and encourage their support. It also offers suggestions on communicating key messages such as the importance of IAQ, and promotes the notion of shared ownership and responsibility for the problem. This *Guide* was tested as part of the pilot test and the results appear in the findings of this report.

Research Design

Four primary research activities were undertaken by the Project, namely the web site survey, the focus groups, individual interviews, and pilot testing of the *Tools for Schools Kit* and Project *Supplemental Guide*. This is explained in the Methodology section of this report.

Ethics approval was sought and obtained from relevant institutions for all research activities involving participants, consistent with the Tri-council Policy Statement for Ethical Conduct for Research Involving Humans, 1998. Adult participant consent forms (and parental consent forms for use in the case of minors) were used to obtain informed consent from study participants. This was also re-confirmed on tape at the start of each telephone interview.

Evaluation

In the final year of the project, an external evaluator was hired to work with the Project Coordinator to undertake an evaluation of the project process and outcomes as it pertained to completion of the project itself. Data regarding the outcomes of the research are reported in the findings of this report. An Evaluation Framework was prepared

describing project objectives and activities, potential data sources, probable outcomes, and potential indicators/measures. It provided an overview of the focus for the evaluation. Data was obtained through a focus group held with key project stakeholders, and by telephone interview from all key players in the project, as defined in the evaluation framework. Survey instruments were developed for this purpose for use with these multiple stakeholders. Lessons learned, the extent of participation of project partners, and their satisfaction with project outcomes, were examined through individual interviews, a focus group, and a review of minutes, progress reports, and other relevant documents. Part of the evaluation focused on the challenges of partnership and collaboration. An evaluation report was prepared and appears under separate cover.

Dissemination Plan

A communications and dissemination plan was developed for the project which identified target audiences/potential recipients of the report (i.e., key stakeholders and others with an interest in the findings of this project). Particular attention was paid to those who would have a role in implementation of findings of the report.

Members of the collaborating organizations involved in the project will also share responsibility for dissemination in their respective jurisdictions. It is anticipated that Health Canada will assist in ensuring the findings are widely distributed through their networks. Project staff and partners have presented information about the project and its findings at local, provincial, national and international workshops, meetings, and conferences. Since a number of the partners are major players in the infrastructure related to schools, they are well positioned to facilitate further action on the guidelines and implementation strategies.

Project Sustainability Plan

The prospects for sustainability are addressed in the post-pilot interview findings reported later.

4. LITERATURE REVIEW

This section provides a review of the literature as it pertains to the impact of poor IAQ on children's health and the greater vulnerability of children to poor IAQ relative to adults (why IAQ is a concern in schools); sources and environmental determinants of poor IAQ; methods for improving IAQ in schools; and the case for guidelines in schools.

4.1 Why is IAQ a concern?

The Effects of Poor IAQ on Children's Health

According to the Statistics Canada National Population Health Survey Overview 1996/1997, the top three chronic illnesses among Canadian children are non-food allergies (which affect 14% of children), asthma (11%; 13% according to the Sentinel Report, 1998), and food allergies (6%). The dominant allergens and respiratory irritants which are known to be associated with these chronic conditions are frequently found in indoor environments where children spend, on average, 90% of their time (Etzel, 1995). Asthma morbidity has increased steadily in Canada over the last 20 years, especially in children. In Nova Scotia, for instance, the prevalence of asthma in children is now 17% (Sentinel Report, 1998). The rate of hospitalization for asthma has increased by 27% for boys and 18% for girls in the last decade (Health Canada, 1997). Studies suggest that this increase is due, at least in part, to increased exposure and increased sensitivity to indoor allergens (Dekker, Dales, Bartlett, Brunekreef & Zwanburg, 1991; Etzel, 1995). Exposure to these contaminants is especially high in countries such as Canada with long cold winters that increase the need to stay indoors and the need for well-insulated indoor environments (Dekker et al., 1991).

Asthma is the leading cause of absenteeism in school children in both Canada and the U.S. (Majer & Joy, 1993; O'Neill 1996). Frequent, short absences from school due to asthma seem more detrimental to academic performance than occasional long absences for other reasons (Landras & Axcel, 1990). While there appears to be a deficiency of studies looking at the association between poor IAQ in schools and asthma in children, there are studies of children in other environments (homes, day care centres) that consider the association between the two variables. Increased rates of asthma in children have been found in indoor environments where there are high levels of humidity, high carbon monoxide levels, higher than average levels of volatile organic compounds, high levels of dust, mould, and bacteria, and high levels of environmental tobacco smoke (Henley, 1996; Bates, 1995; Malveaux & Fletcher-Vincent, 1995; Schmidt, 1994; Dekker et al., 1991). These conditions were found in indoor environments where there was inadequate ventilation, where man-made synthetic materials were commonly found (including carpets), and where non-organic cleaning supplies were used.

Symptoms associated with poor IAQ include classic irritation symptoms - headaches, dizziness, hyperactivity, lethargy, memory loss, short attention span, and moodiness. These symptoms, at the very least, are believed to interfere with students' concentration

and hence their school performance (Landras & Axcel, 1990; Hansen, 1993). One study found that 21% of students in a multi-school study believed that their mental performance was suffering because of poor IAQ. The students who complained of mental impairment were in schools with measurable IAQ problems caused by poor ventilation, volatile organic compounds (VOCs), and mould (Smedge, Norback, & Edling, 1996). Upper respiratory infections, one health problem related to poor IAQ, often impair children's auditory functions, which in turn impairs success in school. Unfortunately, children often act out when they feel ill or uncomfortable, causing teachers to misinterpret their symptoms as simple misbehaviour.

Most studies of IAQ as it relates to children's health refer to other possible contributing factors. Other environments (home, play areas, etc.) could be contributing to the health problems or a child may have a genetic predisposition for a particular illness. Thus, it is important when investigating the effects of poor IAQ in schools to consider the context in which the child is living. However, if we can eliminate or control poor IAQ in schools, we can at least ensure that children have a better environment in which to learn and grow.

It is not only students in schools with poor IAQ who suffer from related health problems. In a recent survey of school teachers, 8-10 % of those surveyed reported headaches, fatigue, congestion, and dry or sore throat "frequently or always", due to poor IAQ (Godish, Godish & Akers, 1996). As well, teachers and other staff working in schools with high concentrations of moulds and VOCs have a higher prevalence of asthma than teachers in schools with good IAQ (Smedge et al., 1996). These symptoms result in lost productivity and general dissatisfaction with the work environment, neither of which is conducive to a positive learning environment for children.

The number of complaints related to IAQ has increased dramatically since the 1970s due to the increased use of products, equipment, furnishings, and building materials that emit air contaminants indoors, the reduction of ventilation in many buildings to conserve energy, and reduced building maintenance due to cutbacks in operating budgets (Clarke & Nikkel, 1993; Etkin & Vogt, 1996; Smedje et al., 1996). As a result of these changes, concentrations of indoor hazardous contaminants are often 2-5 times higher than concentrations outdoors (EPA, 1990). In the absence of preventive practices such as practical guidelines for IAQ, conditions related to the exacerbation of chronic illness will go unchecked, and poor IAQ will continue to affect the health and learning potential for both vulnerable and general populations of children and others in schools. Poor IAQ not only keeps some children out of school, but has also adverse affects on those children who remain in school, whether they have pre-existing respiratory conditions or not.

Children are More Vulnerable to IAQ than Adults

While environmental hazards like poor IAQ in schools affect people of all ages, children are at greater risk from environmental contaminants than adults (Chance & Harmsen, 1998; Wilson, 1996; Bearer, 1995a; Bearer, 1995b; Landrigan & Carlson, 1995; Noyes, 1987). A number of factors contribute to children's greater vulnerability to toxins relative

to adults: larger body surface relative to weight; higher metabolic rate, oxygen consumption, and intake of air per unit of body weight; different body composition; greater energy and fluid requirements per unit of body weight; special dietary needs; rapid growth during which chemicals may affect growth or become incorporated into tissues; and functionally immature organs. Children's breathing zones are closer to the ground, putting them at a greater risk for breathing heavy chemicals such as mercury, or large, settled respirable particles such as fibres, dust, or smoke (Bearer, 1995b). As well, children breathe a greater volume of air relative to their body weights than adults and their metabolic rates are higher than adults' (Chance & Harmsen, 1998) with the result that they are exposed to higher concentrations of air pollutants (Bearer, 1995b; EPA, 1990; Etkin & Vogt, 1996).

As well, young children engage in more hand-to-mouth contact. If children are exposed to a dusty environment where they constantly touch things with their hands and then put their hands in their mouth (or eyes or nose), they are potentially increasing their exposure to harmful environmental pollutants.

Children are undergoing rapid growth and development and are therefore more vulnerable to disruptions of the process with potentially serious long-term effects. Damage caused to children's respiratory and nervous systems can be especially devastating because their bodies are still developing; furthermore, longer latency periods mean that children may have to cope with the health effects of environmental exposures decades after the fact (Goldman, 1995; Ornstein, 1993).

4.2 Sources and Environmental Determinants of Poor IAQ

Poor IAQ is present in buildings (offices and schools) which are heavily populated, poorly ventilated, contain carpets, and have reduced cleaning budgets (Gravesen, Larsen, Gyntelberg & Skov, 1986). These environmental determinants allow dust and other environmental contaminants to accumulate, which are the sources of poor IAQ.

Sources of poor IAQ can be divided into outdoor and indoor sources. Outdoor sources of poor IAQ are often the result of combustion processes. These processes include carbon monoxide from vehicles, as well as particulate matter and oxides of sulphur and nitrogen from plants and factories (Raizenne et al., 1998; Health Canada, 1995; Ornstein, 1994; Ruhl, Chang, Halpern & Gershwin, 1993; Wulf, 1993). Ozone and other photochemical oxidants are also thought to contribute to poor IAQ (Raizenne et al., 1998; Health Canada, 1995). Other outdoor sources of poor IAQ include pollen, fungi, bacteria, lead, radon, and pesticides and herbicides sprayed near schools and other buildings (Mitchell, 1998; Raizenne et al., 1998; Health Canada, 1995; Ornstein, 1994; Ornstein, 1993; Ruhl et al., 1993; Probart, 1989). Location of the school influences the degree to which outdoor sources affect indoor air quality, not surprisingly. Proximity to high flows of vehicular traffic, or to factories or industrial plants, the presence of busses running idle close to the school, and the absence of natural vegetation around the school (which helps

to purify the air) are among the features in the outdoor environments of schools with IAQ problems.

The association between indoor exposure to NO2 and respiratory illness was examined by Pilotto et al (1997) in 388 children aged 6-11 years (the NO2 levels were monitored during winter in 41 classrooms, from four schools) with the result that exposure to NO2 at peak levels was associated with a significant increase in sore throat, colds, and absences from school and other adverse respiratory effects.

Health Canada (1995) defines three categories of indoor sources of poor IAQ: combustion processes, building products and furnishings, and human activity. The most common combustion products are those from improperly installed heating systems. Studies have found that carbon monoxide levels in buildings with non-airtight heating systems are 3 PPM (parts per million) higher than buildings with airtight heating units (Raizenne et al., 1998).

Synthetic, man-made materials, found in many building materials, furnishings, draperies, carpets and underpadding, often break down over time and release volatile organic by-products (VOCs) and chemicals such as formaldehyde into the air (Mitchell, 1998; Raizenne et al., 1998; Health Canada, 1995; Ruhl et al., 1993; Wulf, 1993). Building materials and furniture may give off various VOCs, which have been shown to cause upper respiratory symptoms, headaches, and eye irritation (Norback, Torgen & Edling, 1990). Wantke et al. (1996) found gaseous formaldehyde, besides its irritant action, leads to IgE-mediated sensitization in school children. Headache, nose bleeding, rhinitis, fatigue, cough, dry nasal mucosa and burning eyes were found in the affected children. As children are more sensitive to toxic substances than adults, the authors recommend that threshold levels for indoor formaldehyde should be reduced for children. Further, furnishings and textiles in the classroom act as significant reservoirs of irritants and allergens and have an impact on the indoor air quality at school (Smedje and Norback, 2001).

Studies show that wall-to-wall carpeting, often used in schools, both gives off VOCs and accumulates other organic contaminants, including dust mites and large respirable particles, mould and mildew (Graveson et al., 1986). These carpet-related contaminants are known to trigger allergic reactions and to increase children's risk of asthma (Brunekreef, 1992; Dekker et al., 1991; Djikstra et al., 1990). Fibrous materials such as asbestos and fibrous glass are present in many building materials and may be released into the indoor air environment when they are disturbed, as has been seen in many school renovations (Health Canada, 1995; Ornstein, 1993; Ruhl et al., 1993).

Microbial contaminants, such as fungi, moulds, bacteria, and their by-products, can have very serious health effects when present in large amounts. Bacterial endotoxins, for example, are known to exacerbate asthma symptoms (Lawton, Dales & White, 1998). Microbial agents proliferate in warm, moist environments (Brunekreef, 1992; Djikstra et al., 1990; EPA, 1990). They are most often found in water-damaged buildings and

furnishings, and in improperly cleaned or maintained ventilation systems. Moulds have been a dominant problem in school environments and have proven negative health effects for both adults and children. In one study of day-care centres, children in damp and mouldy facilities had a far greater prevalence of both immediate and chronic respiratory symptoms than children in a day-care centre without dampness or mould (Koskinen, Husman, Hyvarinen, Reponen & Nevalainen, 1995). In another study of 24 schools in Finland, the presence of moisture damage was a significant risk factor for respiratory symptoms in school children (Meklin et al., 2002; 2003). Interestingly, in this study the effect of moisture damage on concentrations of fungi was clearly seen in buildings of concrete/brick construction but not in wooden school buildings. The highest symptom prevalence was found during spring seasons after a long exposure period in damaged schools.

Sentilli (2003) evaluated the effects of mould contaminated schools on students and teachers using multiple air quality testing methods in two public schools in Conneticut. He found not only immediate significant allergic symptoms but, more than two years after exposure ended, a number of occupants of the school continued to have elevated symptoms compared with before their exposure to the school. He concluded that because of the negative and potentially long term impact of indoor mould exposure on health, particularly in atopic patients, schools should be routinely tested for fungal contamination. He recommended that total mould spore counts be performed using volumetric air sampling because testing air quality via semiquantitative culture sampling alone does not give a true reflection of the extent of fungal contamination. Further, he argued the standard for a healthy indoor environment should be defined as having <1,000 spores/m3.

Su, Wu, and Lin (2001) investigated airborne fungal exposures in matched pairs of asthmatic and nonasthmatic children in home and school settings and found higher symptom scores for children in homes with higher fungal exposures.

With respect to long term implications, Haverin et al (1999) found, in their study of a school with mould problems, that the prevalence of asthma was high (13%) among the upper secondary school students and that, during the last 4 years, the incidence of asthma was 3-fold that of the previous 4-year period. The authors describe an approach to resolution of the problem that involved investigation by a multi-disciplinary team (experts in civil engineering, indoor mycology, and epidemiology) in close cooperation with government and administrative officials, physical examination of the structures and microbial testing, the administration of health questionnaires to school occupants, and the release of information of the measurements and results to the public (employees, students, parents, media) as a suggested means of addressing this public concern.

Human activity contributes a broad range of contaminants to indoor air. Human metabolic activity, for example, reduces oxygen levels and increases carbon dioxide levels (Raizenne et al., 1998; Health Canada, 1995; Ruhl, et al., 1993). Respiration, perspiration, and food preparation add water vapour as well as odour producing

substances to the indoor air (Health Canada, 1995). Products used for personal, aesthetic, and cleaning purposes, including scented personal care products, cleaning products, paints, air fresheners and others, contribute to a higher level of chemicals to the air (Raizenne et al., 1998; Health Canada, 1995; Miller, 1993; Ruhl et al., 1993). Other products specific to the school environment, including arts and crafts supplies, photocopy and laminating machines, ink jet computer printers, chemicals in chemistry labs, animals in biology labs, and chalk and chalk dust (Ornstein, 1994; Schmidt, 1994; Miller, 1993; Wulf, 1993) are also sources of poor IAQ.

Environmental determinants of these indoor sources of poor IAQ include improper ventilation and construction, as well as inadequately maintained buildings (Ornstein, 1994; Schmidt, 1994; Wulf, 1993). Problems with heating, ventilation, and air conditioning systems (HVAC) cause 50% of all IAQ problems in all types of non-industrial buildings (Boxer, 1990; Jones, 1994; Sim & Abramson, 1991). The main reason that HVAC concerns account for the majority of cases is that poor ventilation can be both a problem in itself (causing physical discomfort due to stuffiness, humidity, and heat/cold) and can exacerbate other contamination problems (Sim & Abramson, 1991). Malfunctioning or inadequate HVAC systems can cause poor air distribution and mixing, extremes of temperature and/or humidity, inadequate fresh air intake, and filtration problems (EPA, 1990; Sim & Abramson, 1991). Furthermore, ventilation systems can easily become a source of microbial contamination themselves if they are not properly cleaned and maintained (EPA, 1990; Thorne, 1993). Problems with HVAC in schools can be particularly damaging because schools, on average, have an occupation density four times higher than office buildings, making the demand for proper ventilation and air circulation that much greater and more difficult to satisfy (Etkin & Vogt, 1996).

Sick building syndrome (SBS) is the most widely used and commonly accepted term for illness patterns related to the health of indoor environments. The World Health Organization (WHO) estimates that up to 30% of the world's new and renovated buildings generate "sick building" syndromes. The WHO describes SBS symptoms as "a complex of eye, nose and throat irritation, mucosal dryness, erythema, mental fatigue and headaches, upper respiratory infections, hoarseness, wheezing and cough, itching, nausea, and dizziness" (Sim & Abramson, 1991). Up to 20% of schools in the U.S. display the characteristics of SBS (Etkin & Vogt, 1996). Despite the extensive list of possible symptoms (and causes) of SBS, health problems related to poor IAQ do reveal consistent patterns. Symptoms are generally worse in the mornings, and are rapidly relieved following departure from the building, and on weekends and vacations (Montz, 1997; Hicks, 1994).

Sick building symptoms are rarely reported by everyone in an affected building (Hicks, 1994). Often affected individuals are those most sensitive to respiratory irritants, the "canaries in a coal mine": those with pre-existing respiratory problems such as allergies or asthma, children, the elderly, and those whose immune systems are suppressed (e.g., from chemotherapy) (Clarke & Nikkel, 1993; Etkin & Vogt, 1995).

Environmental sensitivities have also been associated with poor IAQ (Stutt & Rotor, 1994) who describe environmental sensitivities as occurring when individuals become unable to tolerate exposure to common substances in their everyday surroundings or environment. Symptoms may develop suddenly or slowly and their severity can change from mild discomfort to total disability or chronic health problems. Environmental sensitivities can develop in individuals of any age regardless of whether they have a history of allergies.

The evidence suggests that many schools are not particularly healthy environments for children, or adults for that matter. Tortolero et al. (2002), collected environmental data from 385 classrooms in 60 elementary schools in southeast Texas and found excessive amounts in many categories: CO2 levels > 1,000 ppm were found in 86% of rooms; 69% had indoor humidity above recommended levels. Der p I dust mite allergen levels > 2,000 ng/g were present in 20% of rooms. Detectable levels of cockroach allergen were found in all schools with 10% of rooms over the recommended threshold. Almost two-thirds of classrooms had mould spore counts > 10,000 col/g (median, 14,400 col/g; range, 2,000-52,000 col/g).

Further, recent studies indicate strong evidence of a causal relationship between exposure to certain indoor environmental pollutants and development and/or exacerbation of asthma in susceptible individuals. Allergens of concern include those produced by dust mites, cockroaches, cats, dogs, and moulds. It is important to better understand this relationship and take preventive and corrective steps to reduce or eliminate these sources in schools, homes, and day care centers. Measures suggested include tracking of asthma and allergic response incidents; monitoring for the presence of allergens and moulds; effective cleaning procedures; prompt repair of water leaks and/or moisture problems; control of indoor relative humidity; and proper operation of heating, ventilation, and air conditioning (HVAC) systems (Epstien, 2001).

In a four year follow-up study of school children, Smedge and Norback (2001) found that a school environment with more dust, cat allergen, formaldehyde, and moulds is likely to affect the incidence of asthma and sensitivity to furry pets.

More recently, Daisey, Angell, and Apte (2003) at the Indoor Environment Department, at Berkeley, California, completed a meta-analysis by reviewing the literature on IAQ, ventilation, and building-related health problems in schools and identified commonly reported building-related health symptoms involving schools until 1999. They collected existing data on ventilation rates, carbon dioxide (CO2) concentrations, and symptom-relevant indoor air contaminants, and evaluated information on causal relationships between pollutant exposures and health symptoms. They found that reported ventilation and CO2 data strongly indicate that ventilation is inadequate in many classrooms, possibly leading to health symptoms and recommended that adequate ventilation be a major focus of design or remediation efforts. They also reported total volatile organic compounds, formaldehyde (HCHO) and microbiological contaminants and found that low HCHO concentrations were unlikely to cause acute irritant symptoms (<0.05 ppm), but

possibly increased risks for allergen sensitivities, chronic irritation, and cancer. Reported microbiological contaminants included allergens in deposited dust, fungi, and bacteria. Levels of specific allergens were sufficient to cause symptoms in allergic occupants. Measurements of airborne bacteria and airborne and surface fungal spores were reported in schoolrooms. Asthma and 'sick building syndrome' symptoms are commonly reported. The few studies investigating causal relationships between health symptoms and exposures to specific pollutants suggest that such symptoms in schools are related to exposures to volatile organic compounds (VOCs), moulds and microbial VOCs, and allergens.

Scientific literature on the effects of ventilation on health, comfort, and productivity in non-industrial indoor environments (offices, schools, homes, and the like) was also reviewed by a multidisciplinary group of European scientists, called EUROVEN, with expertise in medicine, epidemiology, toxicology, and engineering (Wargocki et al., 2002). The group reviewed 105 papers published in peer-reviewed scientific journals and, based on the data in the 30 papers judged conclusive, the group agreed that ventilation was strongly associated with comfort (perceived air quality) and health [Sick Building Syndrome (SBS) symptoms, inflammation, infections, asthma, allergy, short-term sick leave], and that an association between ventilation and productivity (performance of office work) is indicated. The group also concluded that increasing outdoor air supply rates in non-industrial environments improves perceived air quality; that outdoor air supply rates below 25 l/s per person increase the risk of SBS symptoms, increase short-term sick leave, and decrease productivity among occupants of office buildings; and that ventilation rates above 0.5 air changes per hour in homes reduce infestation of house dust mites in Nordic countries. The group concluded additionally that the literature indicates that in buildings with air-conditioning systems there may be an increased risk of SBS symptoms compared with naturally or mechanically ventilated buildings, and that improper maintenance, design, and functioning of air-conditioning systems contributes to increased prevalence of SBS symptoms.

With respect to testing standards, some suggest that the requirements specified in these standards are rather low, allowing a substantial group of people to become dissatisfied and be adversely affected, and that a paradigm shift from "rather mediocre to excellent indoor environments" is needed (Fangor, 2000). Field studies demonstrate that there are substantial numbers of dissatisfied people in many buildings, among them those suffering from SBS, even though existing standards and guidelines are met.

4.3 Methods for Improving IAQ in Schools

Methods for controlling or eliminating IAQ problems in schools range from easy-to-implement and low-cost strategies, to planning for extensive change requiring significant financial resources. Improving IAQ can frequently be achieved inexpensively and effectively, and often through the actions of the schools' students and staff themselves (Clarke & Nikkel, 1993). At the school level, positive actions that can be quickly implemented include avoiding the use of materials in the classroom that can emit VOCs

such as scented markers, certain art materials, and correction fluids; avoiding the use of volatile organic cleaning products, and instead using least toxic products; cleaning classrooms and furniture regularly; regulating indoor temperature and humidity levels; and avoiding scented personal care products and laundry products (Henley, 1996; O'Neill, 1996; Etzel, 1995). Individual accommodations may be made for students or teachers who are known to be affected by poor IAQ, but students may be stigmatized for the special attention they receive (Henley, 1996; O'Neill, 1996), underlining the need for more general policies and practices.

If easy-to-implement measures are not effective, more intensive and longer-term plans may be needed. This might include installing a new ventilation system or repairing an existing one, so that it effectively cleans and circulates both indoor and outdoor air. Considerations for installing ventilation systems include: the size of the building, the occupant load, the location of air exchange vents throughout the building, and recognizing any known contaminants that cannot be avoided but that can be controlled by such a system (Henley, 1996; Janczewski & Caldeira, 1995; Kerbel, 1995; Schmidt, 1994; Ruhl et al., 1993; Woods, 1991). Once the system is installed, maintenance staff should be trained on how to monitor the efficient operation of the system (Schmidt, 1994). One study examined ventilation system types and found that schools using variable air volume (VAV) systems had a significantly lower prevalence of red and watery eyes while schools with unit ventilator (UV) systems had an elevated prevalence of nasal congestion, sore throat, headache, and dustiness complaints. This increased prevalence of complaints in buildings with UV systems may be due to the increased particulate levels (Kinshella et al., 2001).

Other effective measures include removing building materials that are known to cause IAQ problems and replacing them with safe, alternative materials. For example, carpets can be replaced with tiles; furniture made with synthetic materials can be replaced or encapsulated so that harmful chemicals are not being released; and asbestos can be replaced with gyprock (Henley, 1996; Ruhl et al., 1993; Wulf, 1993).

Most actions taken on IAQ are reactive. The actions which have taken place in Atlantic Canada were provoked by a mould "crisis" in schools in the region, mainly due to reductions in school maintenance budgets. Poor IAQ resulted in health problems for many students and staff. Since 1994, maintenance practices have improved and mould problems have decreased significantly (due in part to the implementation of the *Federal and Provincial Policy on Mould Contamination and Remediation in Public Buildings*). Mould-related IAQ complaints in Atlantic Canadian schools have dropped from 22% in 1994 to 8% in 1998. As well, the average cost of mould-related repairs to schools has dropped from millions of dollars per school in 1994 to $10,000 per school today (T. Rand, Mycologist, personal communication, Nov. 1998). This drop is consistent with recent study findings which suggest that although schools in Canada have collectively deferred $1 billion in maintenance, they could save $300 million per year in operating expenses if they improved and upgraded their buildings sooner rather than later (Rogers, 1995).

Proactive "prevention" measures include involving teachers, students, and staff in identifying environmental sensitivities so that action can be taken immediately; using building material, furniture, and other classroom materials that are environmentally friendly; and building schools using least toxic materials in areas where the risk of outdoor pollution is minimal (Henley, 1996; Carlson & Sokoloff, 1995; Ruhl et al., 1993; Wulf, 1993). Prevention measures can be taken in schools, in the planning and design of schools, and at the level of policy and implementation strategies, for which this project is designed.

With respect to health, nurses also have a role to play in addressing this issue in schools to support students with asthma, allergies, and or anaphylaxis. School administrators and educators are often unprepared to deal with medical challenges of students with chronic illness and often school policies restrict children's rights to carry prescribed lifesaving medications while at or traveling to and from school or while on field trips (Sander, 2002) Nurses can act as educators and advocates empowering families to ensure the health of their children. Physicians must also be aware of the effect of indoor pollutants in homes and schools on children - potentially illness and fatality - and take appropriate steps. Etzel (2001) offers a set of proposed guidelines to assist paediatricians faced with an indoor air problem affecting their patients.

4.4 The Case for Guidelines for IAQ in Schools

Policy development is an essential action in dealing with existing IAQ problems and in moving toward school environments that are more conducive to good learning. Guidelines have been developed for other types of buildings, e.g., Health Canada's *IAQ in Office Buildings: a Technical Guide* (1995) and *Exposure Guidelines for Residential Indoor Air Quality* (1995). However, there are no examples of Canadian IAQ policies or guidelines that recognize the differences between children and adults in relation to their vulnerability to poor IAQ. The American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE) Standard 62-1989, *Ventilation for Acceptable Indoor Air Quality*, is generally regarded as the standard for buildings in Canada.

More action on policy development for improving IAQ in schools is evident in the U.S. One example is New York's *Policy on Environmental Quality in Schools*, which refers to the right of children to an environmentally safe and healthy learning environment. The policy also includes the right of children, parents, and school employees to be informed about, and to be knowledgeable of, environmental contamination. It holds schools and government accountable for protecting the environmental rights of children (Landrigan & Carlson, 1995). A second example is the United States Environmental Protection Agency's *IAQ Tools for Schools Kit*, which contains background information on IAQ, a comprehensive set of checklists for everyone involved in schools and school maintenance, and an IAQ "wheel" which allows the user to link symptoms with possible causes and possible solutions. An on-line version of the tools is also available. At the

outset of this project, no equivalent set of tools or guidelines existed in Canada at a national level. However, an effort to adapt these tools for Canadian use is underway.

The issue of children's greater vulnerability to poor IAQ must be addressed in policy and implementation. According to the widely used ASHRAE 62-1989 standard, irritant levels are considered "acceptable" even if 20% of adults react adversely to the irritant. Research indicates that levels of certain pollutants are regularly as much as 100 times greater in some buildings and up to 1,000 times higher during times of increased exposure, such as when an office building has just been renovated (Environmental & Occupational Health Sciences Institute, 1992). This level, which may be acceptable in an industrial setting, is clearly unacceptable for children in schools.

If a school has no discernible IAQ problems, steps should still be taken by school personnel to ensure that future problems are prevented and that an optimum learning environment is provided. The U.S. EPA's *IAQ Tools for Schools Kit* suggests prevention plans for teachers (including general cleanliness, maintaining thermal comfort, and monitoring ventilation); administrators (ensuring that all equipment is functioning properly); school health officers (keeping a log of all complaints and providing information on IAQ and health); maintenance staff (maintaining HVAC equipment; using non-contaminating supplies); kitchen staff (waste management and ventilation); and renovators (special cautions pertaining to painting, flooring, and roofing). Still, such strategies have not been widely adopted.

Health hazards related to poor IAQ can often be avoided when staff, students, parents and administrators are well-informed and educated about possible causes of indoor air pollution, and when actions are taken in policy and practice. There is overwhelming evidence that improving IAQ in schools using current knowledge and experience, and building on available guidelines, can make a major difference in the health and learning environment of school children and staff. There is also evidence that past initiatives at the national level, such as the *Federal and Provincial Policy on Mould Contamination and Remediation in Public Buildings*, can make a major global difference. A national approach is needed to produce IAQ guidelines with implementation strategies that are grounded in experiences in three key areas: school design and construction, school and school ground maintenance, and personal practices of teachers, staff and children in schools.

5. METHODOLOGY

The research design and methodology, along with early drafts of the data collection instruments, were subject to an ethics review process. Ethics approval was sought and obtained from relevant institutions for all research activities involving participants, consistent with the Tri-council Policy Statement for Ethical Conduct for Research Involving Humans, 1998.

5.1 Web Site Survey

In 2001, a web site survey, in both English and French, was developed to capture information across the country on the existence, type, and frequency of IAQ issues in Canadian schools in an attempt to determine whether IAQ issues were indeed of national concern and to assess whether these issues were similar in nature across the country. Information on facilitators and barriers to implementing strategies to improve IAQ in schools were also a focus of inquiry. (See Appendix B for the Web Site Survey). While anyone could access the survey, it was targeted to school occupants and other stakeholders such as teachers, administrators, school boards, students, parents, Department of Education staff, and others with an interest.

A web site was constructed for the IAQ project which had, as a secondary objective, increasing knowledge and awareness of IAQ issues in school environments. Information about the IAQ project itself was also contained on the web site, along with contact information for those wishing to learn more about the project, a list of references and other information, and hot links to other relevant sites.

The web site survey was promoted and publicized in several ways. Individuals in focus groups were told of the web site and notices were distributed to stakeholders across Canada including Canadian School Board Association, Canadian Teachers Federation, Canadian Association of Principals, Canadian Home and School Association and provincial Departments of Education, various teachers unions, and others inviting them to participate in the project by providing their views on line. They were also asked to inform others with an interest in the subject to encourage broad-based participation.

The web site and survey was on line for an approximate three month period from April 4/2001 to June/July of 2001 during which time it could be accessed via a search engine by anyone searching for key words similar to the project's subject (indoor air quality, schools, etc.). Responses were received from 88 individuals representing a variety of school stakeholders.

5.2 Focus Groups

Overview of Focus Group Methodology

In order to get a diverse range of opinion and broad representation of views and experience about IAQ within schools, a series of focus groups were conducted with five key stakeholder groups – parents; teachers; administrative staff; custodial staff, maintenance or facility managers; and students. These were conducted in both British Columbia and Nova Scotia.

A total of 25 focus groups were conducted in seven different schools. Although separate focus groups were expected to be conducted in each school comprised of the five stakeholder groups, in some locations focus groups were combined at the schools' request, for reasons of time and convenience. Specifically, there were combined focus groups of teaching and administrative staff in Windsor, NS, Pleasant Valley, BC, and Middleton, NS.

In Nova Scotia, focus groups were conducted from November 2000 until June 2001. All BC focus groups were conducted in June 2001.

School Site Selection

In Nova Scotia, prior to selecting schools for participation in the focus group phase of the project, project staff attended a School Board Superintendents' meeting to create awareness about the project and to elicit support for participation. At this time no schools were chosen. With the support of the Nova Scotia Department of Education, also a participant on the Project Committee, Occupational Health and Safety representatives from each school board were approached with the project criteria for school selection and, through those officers, each school board was asked to provide a list of potential schools that could be contacted for participation.

The desired criteria for school selection was to have two urban schools and two rural schools and, within each geographic location, one school was to have perceived IAQ problems and the other was to have no identified IAQ problems. However, school willingness and ability to participate became the deciding factor. As a result, two schools were identified from the Annapolis Valley Regional School Board, one from the Chignecto-Central Regional School Board, and one from the Halifax Regional School Board.

Once schools were identified, the process for contacting these schools was as follows:

1. A letter of information was sent out to each school principal.

2. A meeting was arranged with the facility managers from each school board, the main purpose of which was to familiarize managers with the project and garner

their assistance in any way possible. Facility managers contacted their school principals to indicate that they were in support of the project initiative.

3. Each school principal was then contacted via telephone and a face-to-face meeting planned to arrange focus groups.

A similar process for identifying schools was carried out in British Columbia. In the absence of the involvement of a British Columbia Department of Education representative, project partners at the University of British Columbia acted as the focal point of contact and coordinated the organization and identification of schools in that province.

Schools selected for participation included:

- Belmont Secondary School , BC – urban/suburban
- Pleasant Valley Secondary School, Armstrong, BC – rural
- Seaquam Secondary School, BC – urban
- Cobequid Educational Centre, Truro, NS – rural/town
- Middleton High School, NS – rural/town
- Sackville Regional High School , NS – urban/suburban
- Windsor Regional High School, NS – rural/town

In total, 13 rural and three urban focus groups were conducted in Nova Scotia, while five rural and ten urban focus groups were conducted in BC to ensure a mix of representation in the geographic character of the community. Pleasant Valley is a rural school located in Armstrong in the BC interior, Seaquam is urban within the Vancouver delta region, and Belmont is just outside of Victoria. The Cobequid Educational Centre is located in the town of Truro, an hour outside of Halifax, and takes in outlying rural areas. Similarly, Windsor is an hour outside of Halifax located at the north eastern end of the Annapolis Valley and takes in both town and rural students. Middleton is a small town located in the heart of the primarily agricultural Annapolis Valley which is largely rural in nature. Sackville Regional High School is housed within the metropolitan area of the Halifax Regional Municipality, but is located on the outskirts of this urban/suburban centre.

Participant Selection

Once schools were identified and contact made with school principals, the next step involved the selection of focus group participants. For most schools, five focus groups were conducted, one each involving parents, students, teachers, administration, and maintenance staff. A letter of information and consent form was given to the school principal for distribution to potential participants. The school principal then solicited focus group participants and arranged times for the session that would be convenient for each participant group. For students, teachers, and administration, focus groups were usually arranged during free periods at the school. Maintenance staff and parent focus groups were usually arranged after the regular school period. No contact prior to the

focus group had been made with participants by the focus group facilitators – responsibility for selection and contact with participants was assumed by the principal.

Focus Group Activities

Project staff and professors from the Project Team in Nova Scotia and British Columbia facilitated all the focus groups. Upon arrival to the focus group, participants were asked if they had read the information letter and were asked to submit their signed consent forms. Participants and the focus group facilitators then introduced themselves to the group. This was followed by a brief overview of the project and the focus group process. Participants were then asked if they had any questions before the focus group process began. There was no prior knowledge by participants of the questions to be asked.

There were two focus group facilitators who took turns asking questions of the participants. A semi-structured interview guide was used for this purpose (see Appendix C) with probing questions interjected at appropriate times so as to encourage participants to expand upon a point in their discussion.

The range of questions asked of participants in British Columbia differed slightly compared to those conducted in Nova Scotia. In Nova Scotia, the primary focus of questioning was on awareness of IAQ issues and problems encountered in schools and how these issues are handled. Because focus groups in British Columbia were conducted after those in Nova Scotia, participants in British Columbia were also given an opportunity to reflect upon findings from Nova Scotia. As such, participants in British Columbia were provided with a summary of Nova Scotia findings during the focus group. In addition, participants were provided with a summary of the *Tools for Schools Action Kit*, and potential strategies for guideline implementation (both of these appear in Appendix C). Therefore, the focus in British Columbia was on finding solutions for IAQ problems that could involve use of the *Tools for Schools Action Kit* and strategies for guideline implementation.

Focus groups in both British Columbia and Nova Scotia were recorded on tape with the consent of the participants and later transcribed for analysis. In addition, flip chart and field notes were recorded at most focus group sessions. In British Columbia, additional flip chart notes were recorded concerning guideline implementation strategies and the usefulness of the *Tools for Schools Action Kit*. The time for each focus group ranged from 45 minutes to two hours in length.

The tapes were transcribed and recorded in NVIVO. Themes were first extracted for each focus group. Data were first organized by school and comparisons were then made based on school stakeholder group (teacher, student, parent, maintenance, and administration) and by province. NVIVO is a software program specially designed to manage large volumes of qualitative data and the links between them relevant to the research task. Links are made among data elements based upon themes that emerge from the research

and any observations of the researcher. NVIVO was used to record and manage data from both the focus groups and subsequent individual interviews.

5.3 Individual Stakeholder Interviews

One-on-one interviews were also conducted with individuals to capture a broad range of opinion and knowledge about IAQ from key informants. These included:

- experts on the subject who work on IAQ issues in a variety of environments, either in building design and construction or environmental issues as it relates to schools or air quality, for which an Expert Interview Guide was prepared (see Appendix D for interview guides);
- key stakeholders such as staff in provincial Departments of Education, Health, Environment, or Labor; community-based groups with an interest in this subject area (e.g., CASLE); and others for which a "General Interview Guide" was developed (See Appendix C); and,
- individuals who were thought to have differing or opposing views to those of the Project Advisory Committee about the importance of IAQ and the significance of the problem in schools.

The intent of these interviews was to capture as broad a range of opinion, experience, expertise, and viewpoint as possible in order to identify key issues and concerns and develop strategies for resolution. There was also an intent to fill in perceived gaps in information derived from the focus groups.

A letter of invitation was sent to prospective interview candidates explaining the goal of the project (to develop a set of cost-effective, user-friendly strategies that would help facilitate the successful implementation of IAQ guidelines in schools), and requesting their participation in a telephone interview. Interviews lasted an average of one to 1.5 hours and were arranged at the convenience of the person being interviewed.

The interviews were designed to capture information about their knowledge and experience with IAQ issues, how these issues are currently addressed, barriers and solutions to promoting good IAQ, and recommendations for best practice.

Key informants were identified by contacting school boards, provincial Departments of Education, and others and requesting the person most knowledgeable about and able to speak to the issue of IAQ. Interviews were conducted by the project coordinator and research analyst over the time period of April 3, 2001 to January 21, 2002. A total of 25 individuals were interviewed.

Interviews were taped with the informed consent of the interviewee obtained verbally prior to the commencement of the interview. The tapes were transcribed and recorded in NVIVO as per the listing of themes generated for the focus groups.

5.4 Pilot Test of *Tools for Schools Action Kit*

Site Selection

A pilot test was designed to test the utility of the *Tools for Schools Kit*, along with the *Supplemental Guide* produced by the Project. The original plan called for a one year pilot test period in eight schools - four in Nova Scotia and four in British Columbia. However, despite efforts to secure the participation of schools in BC, the project was unable to conduct the pilot there due to a labour dispute between teachers and the provincial government and a "work to rule" campaign staged by teachers which precluded their participation in extra curricular activities and studies of this nature. Consequently, all eight pilot sites were based in Nova Scotia within the jurisdiction of two different regional school boards.

While the initial project design suggested that the criteria for site selection include such factors as urban vs. rural setting, presence/absence of unaddressed IAQ problem(s), and willingness to participate, schools were largely chosen based on receptivity and interest in the project. Initial attempts were made to enlist the support of a school board representative of a large urban area but efforts were unsuccessful in this regard. These school board members were concerned about their ability to manage public expectations about the project should they participate, given that they were already dealing with environmental concerns at several school sites within their jurisdictions, and the Board had other priorities such as school closures to address.

Other school boards were approached on the advice of the Nova Scotia Department of Education. Presentations were made to representatives of the Southwest Regional School Board area (including board members and principals from several interested schools) in February, 2002, to enlist their participation. A presentation was also made to principals and senior management of the Strait Regional School Board in May of 2002 to explain the project and the scope of their involvement, should they participate. Two schools from the Southwest Regional School Board and six from the Strait Regional School Board volunteered to participate. As well, a small amount of funding, shared equally between the project and the NS Department of Education, was provided to each school board as an incentive to defer costs associated with replacement of teachers while on training for the project or participating in the Indoor Air Quality Management Team, and for minor expenditures incurred to remediate IAQ problems within the schools.

Participating school sites included:

Southwest Regional School Board

- Yarmouth Consolidated Memorial High School
- New Germany Rural High School

Strait Regional School Board

- Strait Area Education Recreation Centre (SAERC), Mulgrave
- St. Andrew Junior High School, Antigonish
- Inverness Academy, Inverness, Cape Breton
- Guysborough Academy
- Cape Breton Highlands Academy/Education Centre
- East Richmond Education Centre, St. Peter's

All eight sites draw their school population from primarily small towns or rural areas. Yarmouth (town population 7320), Antigonish (4754), and Port Hawkesbury (3991) would comprise the largest population centres within the districts, according to Census Canada 2001 data, although all would draw from a larger catchment area in the outlying areas surrounding the towns. All sites were secondary high schools serving grades seven to twelve. Some had new schools while others were 15 or more years old so represented a potential mix of IAQ issues (ranging from leaking roofs and mould, to poor air exchange, to off gassing from new construction).

The pilot was comprised of:

- pre-interviews with the IAQ Team in each school
- delivery of training (for "hands-on " schools only)
- support of the Project research staff via telephone upon request
- post-interviews

Consistent with the approach outlined in the *Tools for Schools Kit*, the process was as follows:

Selection of IAQ Team

Each school was asked to select roughly a five member team to implement the project. The team could be comprised of any or all of the following - administration, teaching staff, students, parents, custodial staff, occupational health and safety committee members (the choice of membership was up to the school). The team was to be responsible for an initial assessment of their school environment, for development of an IAQ Management plan, and for implementation of the *Tools for Schools Kit* which was supplied by the Project. The *Supplemental Guide* designed by the Project was also provided to assist in implementation. The team was to select a chair responsible for coordinating the work of the team. Schools' principals, as the primary contact with the project, were asked to select their team and forward the names and phone numbers of the members to Project staff. In most cases, the principal or a teacher acted as IAQ Team Coordinator.

Pre-interviews

Short (15-20 minute) telephone interviews were conducted with individual team members prior to implementation of the pilot using a semi-structured interview guide (see Appendix E). Information was faxed out to the team members in advance to inform them of the study and secure their consent to participate in the interviews. Two consent forms were prepared – one for adult participants and one for parents where a student was a team member. Interviews were conducted by two Project staff between May 6 and 15, 2002. Since many team members were in school teaching or in class, schools (usually through the principal or school secretary) were asked to help to expedite matters by suggesting a tentative interview schedule at times when they were most likely to be available.

Pilot Design

In order to test the likelihood of implementation and sustainability, a model was designed which incorporated two approaches - a "hands-on" and a "hands-off" approach. The "hands on" approach provided a one-day training workshop to orient IAQ Teams to the *Tools for Schools Kit* and begin the process of developing a work plan while the "hands-off" approach consisted of mailing out the *Kit* to the school with notice that staff were available for support upon request (to be initiated by the school itself). This had real practical application because the degree to which schools would implement the *Kit* without initial support was not known. From a policy perspective, would it be sufficient to encourage schools to adopt good IAQ practices by simply mailing out the *Kit* to schools with a letter encouraging them to implement the *Kit*? Or was more effort required to increase the likelihood of both implementation and ongoing sustainability of the effort? Schools had the ability to self-select which model they wished to follow, although an equal number of each was required for comparison. Four were "hands-on" schools and four "hands-off".

Training

For those receiving the "hands-on" approach, a one-day training (five-hour session) was delivered at a central point to school IAQ teams to assist them to implement the *Tools for Schools Kit*. Each school site was eligible for re-imbursement of travel and other costs, such as substitute teachers, associated with attendance at this training. Training was delivered to the five IAQ team members from Yarmouth School on April 9, 2002, and to the Strait Region school teams (15 participants) at the Mulgrave Professional Centre on May 22, 2002.

The purpose of the training was to familiarize IAQ teams with the *Tools for Schools Kit* and the procedures to be undertaken to assess their school environment, and to begin development of an IAQ management plan. It was intended to better equip the teams with

the tools necessary to implement the *Kit*. An agenda of the day's activities was forwarded in advance and hand-out materials prepared.

The training consisted of:

- an initial outline of the workshop, its purpose, and review of participant expectations
- a PowerPoint presentation on the broader IAQ in Canadian Schools project itself
- viewing of the *Tools for Schools* video which demonstrates one school's success with the *Kit*, followed by a facilitated discussion of issues, barriers and opportunities for implementation of the *Kit* and the potential for application in their schools
- an overview of the pilot project and the requirements of participation – specifically the *Tools for Schools Kit* and supplement, followed by a facilitated question and answer session in large group discussion format
- development of an action plan – in which each IAQ team began to develop a work plan incorporating steps within the *Kit*, suggestions offered by the Supplement in enlisting further stakeholder support to implement the *Kit*, review of existing relevant policies (e.g., the existence of any scent-reduced or scent-free policies, etc.) and any other steps they wished to take to support implementation.

Evaluation of the training was incorporated into the post-pilot interviews.

"Hands-off" schools were provided with the *Tools for Schools Kit* following the pre-interviews and the team was asked to follow the steps to implement the *Kit*. Support was available from the Project staff, should they have any questions or concerns.

Pilot Implementation

The pilot phase began in April in Yarmouth and New Germany (with training occurring for Yarmouth April 9) and in May for Strait school sites (with training for three hands on schools occurring May 22). The project concluded November 1, although schools were encouraged to continue using the *Kit* on an ongoing basis integrating it into the regular school process. Interviews were conducted through the month of November according to participant availability. Given the summer break, this meant an active pilot test period of about 4-6 months.

Post-interviews

IAQ team members were contacted for a 30-45 minute follow-up interview to inquire about the utility of the *Tool Kit* and seek their input on implementation strategies and

suggestions for change using a semi-structured interview guide (see Appendix E for instrument). Informed consent was obtained from participants (or parents in the case of student participants) in advance and confirmed at the time of both the pre- and post-pilot interviews. Participants were advised they could refuse to answer any questions which made them uncomfortable, could choose whether or not they wished to be tape recorded (one respondent chose not be recorded), and were advised the information would not be used to identify them in any way.

The intent of the pre- and post-tests was to identify changes in knowledge and awareness of issues, current practices, and policies related to IAQ as a result of their participation in the pilot. The interviews focused on the factors influencing the implementation process, its successes and failures, as well as its prospects for sustainability.

As well, key informant interviews with school board officials were conducted at the end of the pilot period, again to focus on the factors influencing the implementation and prospects for sustainability. As with the other interviews, they were advised the information would not be used to identify them in any way and they could refuse to answer any or all questions should they become uncomfortable. Consent was also obtained on tape for those who agreed to be recorded.

5.5 Data Collection and Analyses Methodology

This study was guided by the principles and methodology of grounded theory (Strauss & Corbin, 1994). Informants included all the individuals who had agreed to participate in the study from the focus groups and individuals interviews described above.

Interviews were based on a list of semi-structured and open-ended questions. The research coordinators and team members developed the interview guide, which was pilot-tested and revised following respondents' suggestions. Interviews were taped and transcribed verbatim following data collection. Data were coded on an ongoing basis to allow maximum reflexivity. Data coding was done via NVivo (Qualitative Solutions and Research http://www.qsr-software.com). This code-based software combines management of textual data with processes for indexing, linking, and searching the data (http://www.qsr-software.com/products/productoverview/NVivo%20brochure.pdf). Coding included breaking down the data into meaningful pieces, assigning them a code, and categorizing them. Codes or categories were grounded into the themes that emerged from the data. Sub-categories reflecting the properties or different dimensions of each main category and illuminating the data in ways not provided by the main categories were attached to these categories. Transcripts were reviewed by different analysts to ensure that all relevant data were systematically coded under the appropriate categories and sub-categories. Field notes made by the researchers throughout the study were also used to provide context or elaborate on a point or theme.

As recommended by Lincoln and Guba (1981, 1985) and LeCompte and Goetz (1982), the credibility, transferability, dependability, and confirmability of the findings were

ensured through regular peer debriefing with experts from the team, inter-informants' triangulation of data, and audit trails. Debriefing sessions primarily occurred after the focus groups and some interviews. Preliminary findings where presented to the research team for feedback. Audit trails were kept throughout the study.

This study was conducted in conformity with the ethical guidelines of Dalhousie University. At the beginning of each interview, participants were advised that they could personally withdraw or withdraw information at any time during the interviews, and that the information they shared would be confidential. Each respondent (or parent in the case of a student participant) signed a consent form prior to the beginning of the interview. A copy of the report will be made available to all study participants.

In analyzing the data and in order to "quantify" terms for this qualitative study, the term "a few" is generally used to refer to two to three; the term "some" is used to mean one third to one half of the respondents; the term "many" refers to half or more; and the term "most" refers to three quarters or almost all respondents. The exception to this is the web site survey section where more specific numbers are provided.

5.6 Study Limitations

The following outlines the limitations of each study in this report.

Web Site Survey

The data from the web site survey was influenced by both the routes of dissemination of survey notice and by those who chose to respond. Although notice of the survey was provided to all schools across Canada, and effort was made by the project to disseminate awareness broadly, the project could not control either subsequent distribution of the notices once sent to the schools nor who responded. Given the number of potential respondents, the response to this survey was very low (88) and secondly, could not be said to be representative of the opinions of all school stakeholders. Most participants (44%) found this survey by professional notification, usually via a Teachers Association newsletter or notice. Therefore, teachers formed the largest group of respondents.

Secondly, for the most part, only individuals who had particular concerns about IAQ in their school environments were motivated to respond. The response from others with no particular personal experience with air quality appears low.

However, it is indicative of the strong views and personal experiences of some school stakeholders. It is most helpful in describing the range of responses of experiences of school occupants, which is very similar to the experiences of participants in the other studies within this project and provides further evidence of the degree to which some people are affected by poor IAQ. It is also instructive from the point of view of hearing the types of concerns raised and the sense of frustration that emerges from the comments.

The qualitative comments provide an additional level of understanding of some of the issues.

Focus Groups

It is important to note that the focus group data is derived from participant perceptions and experiences as mentioned earlier; it is not based on general survey data and cannot be said to be representative of the entire school population or district/region or province. However, it was not intended to be representative in the statistical sense, but meant to give the reader a sense of some of the key stakeholder opinions and experiences. Five key stakeholder groups - teachers, students, custodians/maintenance staff, parents, and school administration - were represented in all locations. Again, the groups provided an opportunity to share concerns and discuss experiences and issues in an open way, allowing areas of common experience to emerge. This provided more depth to the analysis and greater understanding of views than would have been possible. The sources of data are also different in terms of an urban/rural configuration, and geographic distribution by province. It is striking that peer stakeholders have common concerns despite living at different ends of the country.

Individual Interviews

Although interviews were conducted with representatives of the federal and provincial governments at very senior levels, this was largely dependent upon the availability of potential respondents at the time. Some provincial/territorial jurisdictions were not interviewed as a result.

Further, readers are cautioned that this does not represent the totality of effort that may be undertaken to address IAQ issues in any given jurisdiction for the following reasons:

- In every jurisdiction surveyed, primary responsibility for IAQ management practice is delegated to local school boards/districts, with the exception of the Yukon where the Department of Education retains responsibilities normally delegated to school boards in provinces. Because practices differ from site to site, and it was not practical or within the scope of the project to survey each school board, this report does not capture the initiatives of all sites.

- Information is limited to that gleaned from the specific representatives interviewed. Further, the opinions expressed are not necessarily the official positions of the agency or department.

- These data were collected largely in 2001 and additional initiatives may have been undertaken since that time.

- Information pertaining to capital projects, policies, protocols, procedures, or other initiatives undertaken by jurisdictions but not mentioned by respondents do not

appear here. In other words, if other initiatives are not identified, it is because they were not mentioned by those interviewed. However, the primary intent is to identify what jurisdictions think are the most significant issues and what is most needed in the way of best practice and related initiatives; not to identify gaps by any particular province. It is not intended to provide an exhaustive list of activities by province, but rather those items judged significant in the discussion of issues and initiatives recommended by respondents.

The objective of this study component was to get as broad a base of policy approaches, views, and experiences as possible from experts, federal and provincial government staff, and provincial associations representing the key stakeholder groups. There was also an attempt to seek out those with differing views about the issue to ensure a divergence of opinion was captured. This section of the report provides a useful insight into the issues many departments and schools are grappling with as they attempt to respond to IAQ concerns in their respective jurisdictions, as well as the perspectives of key stakeholders involved. The replication of findings among jurisdictions is striking and confirms identification of the primary issues.

Pilot Test of 'Tools for Schools Action Kit'

As described earlier in the methodology section of this report, the pilot test of the USA EPA *Tools for Schools Action Kit* was implemented from the spring of 2002 (April/May) to October/November 2002. Although the project would have preferred a September start, schools originally approached in both BC and Nova Scotia did not wish to participate, and time securing alternate study sites made a later start necessary. Project time limits did not permit a longer evaluation period. However, while more time may have produced additional outcomes, it is unlikely that additional learnings regarding critical success factors and efforts required to address barriers and support implementation of the Kit would have emerged.

The original plan called for a one year pilot test period in eight schools four in Nova Scotia and four in British Columbia. However, despite efforts to secure the participation of schools in BC, the project was unable to conduct the pilot there due to a labour dispute between teachers and the provincial government and a "work to rule" campaign staged by teachers which precluded their participation in extra curricular activities and studies of this nature. Consequently, all eight pilot sites were based in Nova Scotia within the jurisdiction of two different regional school boards.

While the initial project design suggested that the criteria for site selection include such factors as urban versus rural setting, presence/absence of unaddressed IAQ problem(s), and willingness to participate, schools were largely chosen based on receptivity and interest in the project. Initial attempts were made to enlist the support of a school board representative of a large urban area but efforts were unsuccessful in this regard. These school board members were concerned about their ability to manage public expectations about the project should they participate, given that they were already dealing with

environmental concerns at several school sites within their jurisdictions, and the Board had other priorities such as school closures to address.

The other limitation was that no school which was recognized as having a "problem" with IAQ was a study participant. However, all acknowledged some IAQ issues in the course of the study which may be more representative of the range of actual experience and more consistent with the state of schools in the province.

This study does not seek to be statistically representative of the general population of school occupants and stakeholders; it is not a quantitative research design. Rather, it is an in-depth, descriptive study of stakeholder perspectives and experiences from various areas of the country – and all stakeholders are represented in the studies.

Despite these limitations, the project found remarkable similarities among all four study efforts. Themes were repeated throughout the study adding weight and credence to the findings of the report. This supports that the results of this study may be meaningful for other schools/jurisdictions across the country.

6. WEB SITE SURVEY FINDINGS

6.1 Participant Relationship to School System

There were a total of 88 participants in the online survey. As indicated in Table 1, by far the majority of participants were teachers (60%), followed by parents (15%), and administrative staff (9%), with further representation coming from five primary stakeholder groups within the school system. Some teachers and administrative staff also identified themselves as parents. Those in the 'other' category included: school counselor, environmental/health and safety representatives, community liaison, secretary/school support staff, facility manager, and an official from the public health department.

Given the number of potential respondents (as notice of this survey was provided to all schools across Canada), the response to this survey was very low and certainly could not be said to be representative of the opinions of school stakeholders. It should be noted that those who responded to the survey (see question19) heard about it most often from a Teachers Association newsletter or notice. It appears, for the most part, that individuals who had particular concerns about IAQ in their school environments were motivated to respond. The response from others with no particular personal experience with air quality appears low. Students had very low participation rates which may be a function of their awareness of the survey.

Table 1 - Participant Relationship to School System

Participant Group	Number of Participants	Percent of Participants
Teacher	53	60 %
Parent	13	15 %
Administration	8	9 %
Other	7	8 %
Student	3	3 %
Operations	3	3 %
Custodian	1	1 %
School board	0	0 %
Total	88	100 %

6.2 School Location

Survey respondents were all associated with schools in Canada, two thirds of which were located in Ontario (38%) and Manitoba (25%). Again, this is not to suggest that schools in these two provinces have more problems with IAQ; rather, this is more likely an artifact of distribution and promotion of the survey and individual choice to respond.

Table 2 indicates the school location by province with which survey respondents were associated. In terms of geographical location (city, town, rural), the majority of respondents are associated with schools located either in cities (40%) or towns (38%). Twenty percent come from rural areas.

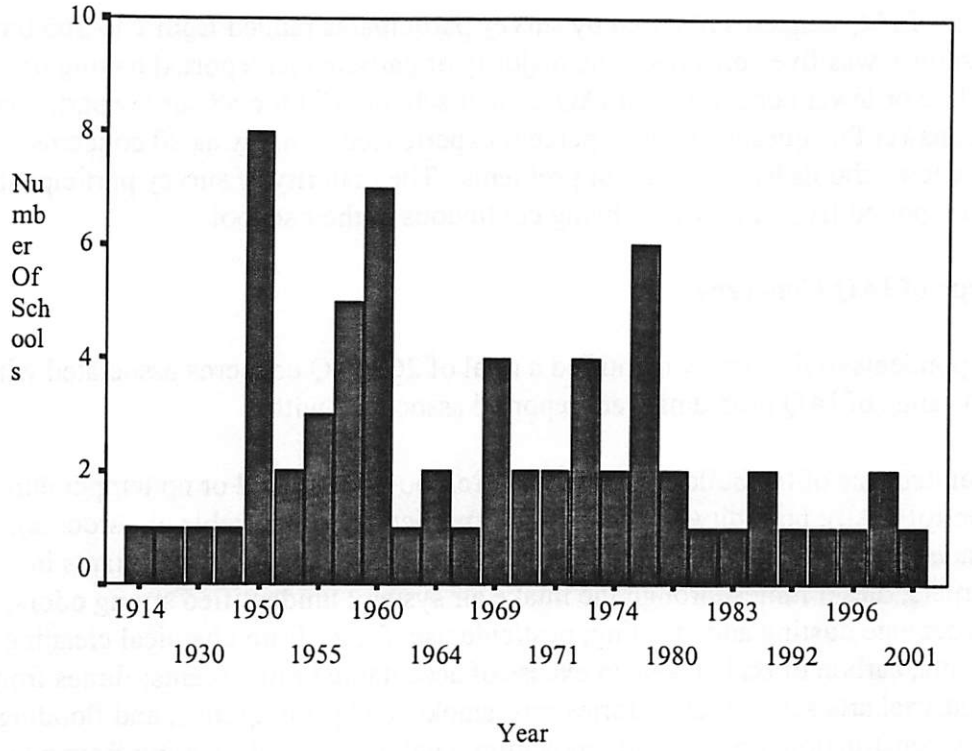
Table 2 - School Location by Province

Province	Number of Schools	Percent of Schools
Ontario	33	38 %
Manitoba	22	25 %
Nova Scotia	13	14 %
Alberta	10	11 %
New Brunswick	7	8 %
British Columbia	2	2 %
Newfoundland	1	1 %
Total	88	100 %

6.3 Age of Schools

Schools in this survey were built over a broad range of time from 1914 to 2001. Over 80% of the schools were built on or before 1975. In particular, 1950, 1960, and 1975 were peak periods of new construction seeing 9%, 8%, and 7% of the total school construction (of schools in this survey) take place during those post-war baby boom years. The year 1975 likely coincides with the entry of the children of baby boomers into the school system. (Of the 88 respondents to the survey, 23 of them did not know the age of the school). The average year of construction for schools in the survey was 1966 while the median school construction date was 1965.

Figure 1 - Year School Was Built



6.4 Renovations

Not surprisingly, given the age of school buildings in this survey, over half (57%) of the schools had undergone major renovations. 28% (25) had not been renovated while 12% (11) of respondents could not be sure.

6.5 School Population Size

The school populations in this survey range from very small (10) to very large (20,000), the latter reflecting presumably the population for those with multiple schools within a jurisdiction. In total, 73 of the 88 survey respondents indicated the population size of their school(s) - the median number of students is 600 (the average is approximately 1090).

6.6 Presence of IAQ Concerns

The majority of survey respondents (88%) said that their school has or has had IAQ concerns. Again, the reader is cautioned that this is not representative of schools in Canada; rather, indicative of the experiences of survey respondents. This supports the view that having an air quality problem promoted participation in the survey.

6.7 Number and Duration of Concerns

The number of IAQ concerns reported by survey participants ranged from 1 to 365 but the median response was five concerns. The majority of participants reported having or having had 10 or fewer concerns with IAQ at their school. (Of the 88 survey participants 28 did not answer this question). Nine percent experienced as many as 20 concerns indicating a few schools had a wealth of problems. The majority of survey participants (75%) also reported IAQ concerns as being continuous at their school.

6.8 Type of IAQ Concerns

The 88 respondents to the survey identified a total of 267 IAQ concerns associated with schools. A range of IAQ problems were reported associated with:

- maintenance of the building – temperature (too hot/too cold or no temperature control at all); humidity/dryness; mould (particularly in portable classrooms); inadequate air circulation and improper ventilation; roof leaks; pollutants in carpets; diesel fumes through the intake air system; unidentified strong odors; inadequate dusting and cleaning; pesticide use; fumes from chemical cleaning agents; carbon dioxide levels in excess of acceptable limits; scents; fumes from industrial arts/science laboratories/arts, smoke, and printing inks; and flooding
- new construction, repairs, and renovation – paint fumes, off gassing from new cabinets and carpets, air pollutants /dust produced by construction or repair, and occupancy during construction, asbestos tiles, construction dust and glues
- health symptoms – headaches, nausea, asthma, allergies, chronic throat problems, severe sinus infections, respiratory illness, skin rashes, eye infections, and the like.

For greater specificity, the range of IAQ concerns can also be divided into 10 categories as follows:

- **Ventilation/Air Circulation** – lack of, poor, or improper ventilation especially in the winter months; inadequate or no fresh air intake; no windows that open; poor air circulation in certain areas such as the gymnasium, art class, industrial arts room, and chemistry labs
- **Mould/Bacteria/Fungus/Dust** – reported both in school rooms and portables; mould, bacteria, and fungus found mostly in carpets as a result of spills and flooding; dust found in carpets, vents, and flat surfaces as a result of improper cleaning
- **Illness** - headaches, nausea, asthma, allergies, chronic throat problems, severe sinus infections, respiratory illness, skin rashes, eye infections, watery eyes, cold-like symptoms, drowsiness, and mental confusion
- **Temperature/Humidity** – temperature reported as too hot or too cold; humidity was either too damp or too dry

- **Odours/Scents/Cleaning Products/Other VOCs** – fumes from vehicles; perfume; air fresheners; Volatile Organic Compounds (VOCs) from wallboard, furniture, and building materials; smelly markers; chlorine smell in water; sewer smells; musty stale air; photocopier ink; furnace fumes; cafeteria odours; smoke and gas smells; laundry soap smells on clothing; cleaning product fumes; floor wax
- **CO2/CO Levels** – levels in general were reported to be high, some instances which were caused by malfunctioning monitoring devices
- **Maintenance/Custodial/Construction Practices** – reports of improper maintenance and custodial practices included not changing air filters regularly; improper cleaning and use of cleaning products; poor maintenance of ventilation system; construction practices included not cleaning air ducts after construction; roof tarring, painting, and construction during school occupancy
- **Carpets** – both old and new carpet caused problems; old carpet was dirty and mouldy; VOCs resulted from installation of new carpet
- **Asbestos** – some schools were reported to still have asbestos tiles and other construction materials
- **Other** – pesticides; rat feces/urine; improper land drainage; leaky roofs and foundations

A summary of the number of IAQ concerns is presented in the following table. The most common concerns focused on ventilation/air circulation, mould/bacteria/fungus/dust, and illness.

Table 3 – IAQ Concerns

IAQ Concern	Number of Concerns	Percent of Concerns
Ventilation/Air Circulation	65	24 %
Mould/Bacteria/Fungus/Dust	46	17 %
Illness	44	16 %
Temperature/Humidity	29	11 %
Odours/Scents/Cleaning Products/Other VOCs	27	10 %
CO2/CO Levels	17	6 %
Construction/Maintenance/Custodial Practices	13	5 %
Carpets	12	4 %
Asbestos	7	3 %
Other	7	3 %
Total Number of IAQ Concerns	267	100 %

N = 88

6.9 Who Reports IAQ Concerns?

About 41% of the time (n=34 of 88), respondents stated they themselves reported IAQ concerns.

When asked who usually reports IAQ concerns in schools, 202 multiple responses were given by the 88 survey respondents. This included the respondent identifying himself or herself as the person reporting IAQ concerns. As shown in the following table, IAQ concerns were usually reported by teachers (41%) and administrative staff (21%). This may or may not be typical of the average school environment. Parents and maintenance staff were equally likely to report concerns 14% of the time. Five responses of 'other' included a union representative, support staff person, cafeteria worker, the community at large, and a response of 'nobody in particular'.

Table 4 - Who Reports IAQ Concerns?

Stakeholder Group	Number of Responses	Percent of Responses
Teachers	82	41 %
Administration	42	21 %
Parents	28	14 %
Maintenance	28	14 %
Students	13	6 %
Other	5	2 %
Health & Safety Committee/Person	4	2 %
Total Number of Positive Responses	202	100 %

N = 88

Note: Maintenance includes custodians and building operators/managers. Administration includes principals, secretaries, and other school level personnel.

6.10 To Whom are IAQ Concerns Reported?

In total, 168 multiple responses were given by the 88 survey respondents when asked 'to whom are IAQ concerns reported'. This included the 10% (n=11 of 88) respondents who identified himself or herself as the person to whom IAQ concerns are reported. IAQ concerns are most often reported to school administration (42%) and maintenance staff (26%). Teachers also received complaints regarding air quality 14% of the time and Occupational Health and Safety Committees/representatives 7% of the time. Some spoke about a process where a work order or report was completed and forwarded to the appropriate officials (OH&S Committee, custodial or school board administrative staff).

Four responses of 'other' included the Workers Compensation Board, provincial Public Health Department, building owner, and a response of 'nobody in particular'.

Table 5 – To Whom are IAQ Concerns Reported?

Stakeholder Group	Number of Responses	Percent of Responses
Administration	70	42 %
Maintenance	44	26 %
Teachers	23	14 %
Health & Safety Committee/Person	12	7 %
Parents	7	4 %
School board/District	6	4 %
Other	4	2 %
Union Representative	2	1 %
Total Number of Positive Responses	168	100 %

N = 88

Note: Maintenance includes custodians and building operators/managers. Administration includes principals, secretaries, and other school level administration.

6.11 Are IAQ Concerns Immediately Reported?

Of the 88 survey participants, 56% (49) said that problems were reported immediately, 32% (28) said they were not, and 11 gave no answer. Issues such as poor communication and relationships among stakeholders; lack of knowledge and awareness about the importance of IAQ; lack of knowledge of reporting procedures (or the absence of same); slow response time to complaints; attitudinal barriers; and a deep sense of fatigue and frustration are evident in many of the responses. The primary reason identified for not reporting is an expectation that nothing will be done.

Reasons offered for failure to report immediately included the following:

- an expectation of little or no response because of lack of support (usually from administration, school boards, and others who, it appeared, failed to recognize IAQ as a concern or viewed it as a low priority) as evidenced by comments such as...

  "complaints fall on deaf ears"

  "...administration practices and response to air quality issues are most often minimalized or [receive] an "air" of denial."

  "...people are tired of inquiring and complaining about problems so, often, people don't bother."

"Our experience has been that the parents must first recognize that the problem is at the school. School board personnel withhold information from parents."

"Efforts to test for IAQ are patronized but never followed through. When subsequently challenged about this, administration gets you going full circle again and again."

"There are many other things that are a priority and everyone knows it; teachers/students have been getting sick for years a little while longer is not such a big deal (attitude)."

- not sure anything can be done

"Systems do not seem very effective and I'm not sure anything can be done..."
"In many cases there is nothing that anyone can do to improve air quality..."

- vague symptoms which could not be directly attributable to poor IAQ

"...Very often problems are of questionable nature - such as flu-like symptoms, allergies..."

"...people do not always know the cause until they remove themselves from their environment."

"At first we thought our son was ill, but when he got home he seemed to be feeling better. After a while, it took him longer to recuperate from the bouts he was experiencing at school."

- personnel change in schools affect reporting practices

"...they [IAQ problems] used to be [reported], with a change in personnel in school council and teaching staff not [reported] so much anymore."

"This year was a good year for getting things done properly, thanks to a wonderful Principal. The last three years were hell. The principal would not co-operate ... Disregard for all concerns from parents and staff."

"These concerns had been voiced over a period of years but by different people in, either different wings of the building, or because of a change to personnel occupying the specific areas."

- uncertainty about to whom IAQ concerns should be addressed and how to report those problems

  "...Staff usually chat about it themselves, but we don't know who to address regarding "air" issues."

- Response time to complaints lengthy

  "It took two years to get air quality personnel to come in and check - say it is OK. Teachers are said be making these illnesses up. Second, two years later, find massive amounts of problems. This was another administrator. Janitor was replaced..."

  "Mais le processes de vérification est long."

6.12 Handling IAQ Concerns

Insufficient action (51%) or no action (33%) were reported as the most common ways of handling IAQ concerns in schools, followed by actions which addressed only the symptoms (27%) rather than the root causes of the problems. In only 24% of the cases did respondents believe that the root cause of the problem was identified and remedial action taken. In a few instances, successes were reported – such as a change in procedure or management strategies for dealing with IAQ concerns.

Table 5 displays these responses. The number of positive responses refers to a respondent's assertion that "yes, IAQ is being dealt with in this manner at my school." In this case, the total number of respondents is 88, meaning for example, that 29 out of 88 respondents or 33% believe that 'No Action' is being taken to deal with IAQ at their school.

Table 6 – Handling IAQ Concerns

Action Taken	Number of Positive Responses	Percent of Positive Responses
Insufficient Action	45	51 %
No Action	29	33 %
Symptoms Acted Upon	24	27 %
Cause of Problem Acted Upon	21	24 %
Unsure	10	11 %
Change in Procedure	9	10 %
Change in Management Strategies	7	8 %

N = 88

Many of the respondents described in narrative text that IAQ problems continued to be ongoing and a lack of funding for remedial action was raised repeatedly. No testing for IAQ, perceived lack of concern on the part of Board administration, poor communication, and concerns about the reliability of test readings suggesting a lack of confidence or trust among stakeholders were also mentioned.

In general, comments about the actions taken to address IAQ concerns can be summed up by the following participants' observations:

> *"There have been varying kinds of responses over the years. This has been a long-term systemic problem but generally there is no evidence to suggest that this is being treated systemically from a management perspective. Communication has always been poor."*
>
> *"It [action taken] depends on the circumstance and the particular problem. Is the problem transient or chronic? Is the problem severe or background? Can it be fixed? Can it wait? How much will it cost?"*
>
> *"We have only had a 'band-aid' approach to problems. The school does a minimum amount of action to achieve temporary results only."*
>
> *"This has been an on-going problem. At first, there was no action taken, in fact, the previous principal tried to stop me from finding out if something at the school was making my son ill."*

When talking about acting upon symptoms or the cause of a problem, participants had this to say:

> *"Sometimes problems get solved, probably by maintenance staff who make adjustments to the air exchange system -- Some other problems are chronic -- for example, strong, mysterious odors in certain parts of the building -- and no solution gets arrived at."*

Some participants commented that procedures and management strategies changed in order to address IAQ concerns:

> *"We developed an environment committee through school councils and we continue to educate ourselves and offer info to the rest of the school."*
>
> *"Our district has developed an Indoor Air Quality Protocol for Schools which is working quite well. We are also using the EPA's Tools for Schools Program in many of our schools."*

6.13 Reasons for Inadequate Action to IAQ Issues

Overwhelmingly, respondents believed a lack of financial resources contributed to an inadequate response to IAQ.

In addition to funding issues, respondents offered the following reasons why IAQ problems were dealt with inadequately:

- concern job would be at risk if reported concerns
- lack of knowledge/awareness of IAQ issues
- disbelief/denial of impact of IAQ concerns
- lack of procedures for appropriate handling of IAQ complaints
- lack of education/information on the part of custodians regarding the proper operation of ventilation systems
- inadequate or unsupportive administration

Some comments illustrative of these issues are:

> *"Money is an issue. Can't fix all at once."*
>
> *"My belief is that the school board feels that the dollar cost for correcting the problem far outweighs the health costs. This could be remedied if employees could sue employers."*
>
> *"No one wants to go up against the system - especially when there are more pressing professional concerns. Sure, your health is the most important thing, but if you live that way, you'll be out of a job."*
>
> *"...the custodian doesn't know how to fix the problem and doesn't care."*
>
> *"At the board level, we feel that obstacles are constantly being put in front of us. I feel that the board's attitude is to do as little as possible to try and help."*
>
> *"Persons to whom the "problem" is reported at a building level must understand that allergies and hypersensitivity are experienced in different ways..."I don't smell it!"...doesn't mean it is not happening. It may then be seen as NOT an important issue."*

6.14 Strategies to Prevent IAQ Problems

Building structure (78%), good maintenance (76%), and regular monitoring (67%) were identified as the primary ways of preventing IAQ concerns. Half of the participants identified administrative support as critical, and almost as many defined parental action along with education and training as important elements of an effective response.

Table 6 describes respondent suggestions for improved IAQ. The number of positive responses refers to a respondent's indication that a particular factor will help in the prevention of IAQ concerns. In this case, the total number of respondents is 88, meaning for example, that 44 out of 88 respondents or 50% believe that 'Administrative Support' is a factor that helps to prevent IAQ concerns in schools. The determination of IAQ policies and guidelines being factors in preventing IAQ concerns is based on analysis of respondents' qualitative responses to those questions. The one 'Other' prevention factor that was given concerned the availability of funding to adequately deal with IAQ concerns in schools.

Table 7 – Preventing IAQ Concerns

Prevention Factor	Number of Positive Responses	Percent of Positive Responses
Proper Building Structure	69	78 %
Good Maintenance	67	76 %
Regular IAQ Monitoring	59	67 %
Administrative Support	44	50 %
Parental Concern/Action	43	49 %
Education/Training	41	47 %
Use of IAQ Policies	24	27 %
Use of IAQ Guidelines	9	10 %
Other	1	1 %

N = 88

Survey participants were given the opportunity to elaborate upon the types of IAQ policies and guidelines that should be implemented in schools. Identified IAQ policies and guidelines focused on the following areas:

- regular IAQ testing
- testing for mould, moisture, and dust
- scents
- pesticides
- ventilation
- regular maintenance
- identifying stakeholder responsibility

As acknowledged by survey participants, no one factor alone can prevent IAQ concerns but rather many factors together must be in place to adequately address IAQ issues. No one or two item(s) can individually take care of all types of problems. Constant vigilance, monitoring, education, money, and assigned and voluntary responsibility were identified.

Some respondents were unsure as to the types of policies and guidelines that should be implemented. Also important to note was that there was little general awareness of the presence of policies or guidelines within their environments, or of the contents of such documents, suggesting improved information exchange about these policies is necessary.

6.15 Contributing Factors to Managing IAQ Concerns

There are many factors which contribute to good management of IAQ concerns; no one factor would adequately address the issue of IAQ. According to respondents, these factors include the following:

- open communication and trust between all stakeholders
- availability of funds to address IAQ concerns
- support from administration, school boards, and maintenance personnel
- good leadership, particularly by the principal
- training and education to increase knowledge about proper IAQ management
- prompt reporting of problems, in writing if possible so as to create a record of IAQ concerns
- immediate response to reported problems
- regular IAQ monitoring
- regular preventative maintenance and cleaning, including proper use of cleaning agents
- development of, and adherence to, proper policies and procedures
- access to qualified professionals as needed
- use of the *Tools for Schools Action Kit*
- presence of a health and safety committee
- involvement of parents
- press coverage
- teacher complaints
- the availability of qualified professionals as an important third party opinion

Some respondents did not know what would help to facilitate IAQ management and others believed that there was nothing that could help ensure good IAQ management practices.

6.16 Barriers to Managing IAQ Concerns

Respondents to this survey provided examples of many barriers that stand in the way of good IAQ management. In some cases there is only one barrier impeding the process, while in other instances there are many barriers that together prevent good IAQ management.

The most significant barrier mentioned by survey respondents is the absence of sufficient funding to adequately address IAQ concerns in schools. Other barriers to good IAQ management include the following:

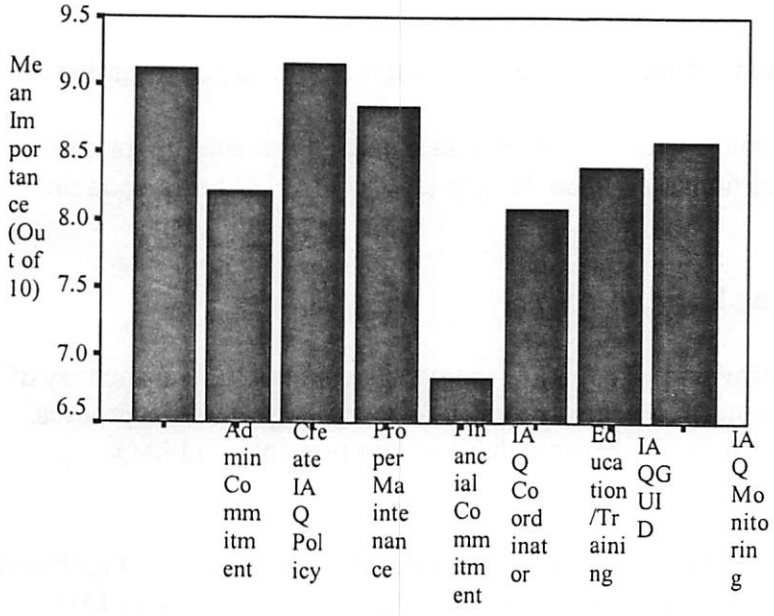
- lack of awareness, concern, and support from both administration and school boards
- scaling back of custodial and maintenance staff that leads to insufficient cleaning and maintenance procedures
- lack of training and education on IAQ issues
- lack of interest stemming from a disbelief that IAQ is a problem
- poor building construction
- poor air circulation
- the age of the building
- lack of communication and trust
- lack of parent involvement
- the fact that nobody is willing to take responsibility for the issue
- IAQ is a low priority issue
- lack of IAQ standards, policies, and testing
- limited time to deal with the issue

As in the identification of facilitators to IAQ management, some respondents were unaware or did not know of any barriers that contributed to a lack of action on IAQ concerns.

6.17 Ways to Maintain Good IAQ

As depicted in Diagram 2, on average, administrative commitment, maintenance, and funding were the three highest rated actions believed to help maintain good IAQ. Having an IAQ coordinator in place was rated the lowest.

Figure 2 - Maintaining Good IAQ



Put another way, when asked to rate these items on a scale of 0 (being not important) to 10 (being very important), 68% (60) of respondents rated administrative commitment as very important, 72% (63) rated proper maintenance as very important, 69% (61) rated finances as very important, and 59% (52) rated regular monitoring as very important. Education and training and the IAQ guidelines were rated very important by an equal number (44% or 39) of respondents.

6.18 General Comments

Respondents spoke a great deal about struggle and frustration at the lack of response to IAQ concerns, as evidenced by the following comments:

- *"Without the above (good IAQ management practices), it would be a struggle. We struggled for 3+ years to make our school a healthier and safer place for our children. No one person took responsibility for the H&S of our children."*

- *"This is a huge concern in our school. Numerous staff are contracting asthma for the first time. They are major complaints of breathing and lung diseases in our teachers and staff. We can visibly see mould and mildew on our walls and ceilings."*

- *"It would be good if teachers were not so self-sacrificial when it comes to their health. The assumption by teachers (and probably the public as a whole) is that since the school board is in the business of education people, the environment must be Health's (responsibility)..."*

- *"I look forward to the day when my child, and other children can safely attend their neighborhood school, without getting sick. It would help if more of the people we have tried to reach out to, would listen, and consider the information we have on IAQ..."*

- *"I have allergies and need to take regular medication. During school holidays, I can go off my medications almost altogether. When I am in school, my medication triples, and still I live with constant symptoms."*

- *"In this situation, we found that the longer my son stayed at the school, the longer it took for his symptoms to go away. He tried to attend school everyday until the end of October, when he collapsed in the school and was brought to the emergency room..."*

- *"IAQ in schools must be monitored regularly. Somebody has to care. As long as it is dealt with as just another thing to spend money on there will be a lack*

of political will, a lack of funding, and a serious lack of knowledge about the sad state of many of our schools..."

- *"The kids and teachers are the monitors ...believe and listen to them."*

They also offered further suggestions on good management practices and ways to promote healthy IAQ:

- *"Our experience has shown that 'guidelines', doing things voluntarily will not work. There must be 'standards' under the law regarding acceptable levels, based on children that must be followed. (regarding mould, CO2, ventilation rates, etc) ..."*
- *"There should also be monitoring of health concerns and complaints."*
- *"...IAQ policies sent out to each school or a web site address sent to each school so that people can access these policies...."*
- *"Because air quality is tied into expensive air supply systems and overall building design the need for education of architects is paramount. Find out what works in a building design and stick with those principles."*

6.19 How Did You Find Out About This Survey and Website?

Most participants (44.3%) found this survey by professional notification, usually via a Teachers Association newsletter or notice. How participants found out about the survey, of course, significantly influenced response to the survey.

Table 8 - How Did You Find This Survey?

Method	Number of Participants	Percent of Participants
Professional Notice	39	44 %
Other	18	21 %
Word of Mouth	14	16 %
Internet	11	12 %
School	6	7 %
Total	88	100 %

6.20 Summary

Of the 88 participants in the online survey, by far the majority of participants were teachers (60%). Given the number of potential respondents, the response to this survey was very low and certainly could not be said to be representative of the opinions of all school stakeholders. For the most part, only individuals who had concerns IAQ in their school environments responded so this cannot be said to reflect a balanced perspective; rather, the experience of a few people in schools with IAQ problems.

The type of concerns reported included:

- maintenance of the building – temperature; humidity/dryness; mould (particularly in portable classrooms); inadequate air circulation and improper ventilation; roof leaks; pollutants in carpets; inadequate dusting and cleaning; pesticide use; and a variety of other related complaints
- new construction, repairs, and renovation
- health symptoms – headaches, nausea, asthma, allergies, chronic throat problems, severe sinus infections, respiratory illness, skin rashes, eye infections, and the like.

Issues such as poor communication and relationships among stakeholders; lack of knowledge and awareness about the importance of IAQ; lack of knowledge of reporting procedures (or the absence of same); slow response time to complaints; attitudinal barriers; and a deep sense of fatigue and frustration are evident in many of the responses.

Insufficient action was reported as the most common way of handling IAQ concerns in schools; in only one quarter of the cases did respondents believe the root cause of the problem was identified and remedial action taken.

Overwhelmingly, respondents believed a lack of financial resources contributed to an inadequate response to IAQ, along with a lack of knowledge/awareness of IAQ issues, disbelief/denial of impact of IAQ concerns, lack of procedures for appropriate handling of IAQ complaints, lack of education/information on the part of custodians regarding the proper operation of ventilation systems, and an unsupportive administration.

Building structure, good maintenance, and regular monitoring were identified as the primary ways of preventing IAQ concerns. Half of the participants identified administrative support as critical, and almost as many defined parental action along with education and training as important elements of an effective response. There was little general awareness of the presence of policies or guidelines within their environments.

Many factors working together were identified as helpful to facilitate good IAQ management: open communication and trust between all stakeholders; availability of

funds to address IAQ concerns; support from administration, school boards, and maintenance personnel; good leadership, particularly by the principal; training and education to increase knowledge about proper IAQ management; prompt reporting of problems, in writing if possible so as to create a record of IAQ concerns and an immediate response to reported problems; regular IAQ monitoring; regular preventative maintenance and cleaning, including proper use of cleaning agents; development of, and adherence to, proper policies and procedures; access to qualified professionals as needed; use of the Tools for Schools Action Kit; presence of a health and safety committee; involvement of parents; press coverage; teacher complaints; and the availability of qualified professionals as an important third party opinion.

These themes are echoed in subsequent sections of this report.

7. FOCUS GROUP FINDINGS

7.1 Scope and Objectives

The purpose of the focus groups was to get a better understanding of stakeholder views and experiences with IAQ, their understanding of the issue, and their prescription for solutions to implement good IAQ practice in schools. As mentioned earlier, 25 focus groups were conducted separately with five primary school stakeholder groups (administration, teachers, students, maintenance and custodial staff, and parents) in Nova Scotia and British Columbia. The process for selection is described in the earlier section on methodology and instruments employed in both sites can be found in the Appendices.

Focus groups with various stakeholders were initially conducted in Nova Scotia and focused on an exploration of the following:

- perceptions, experiences, and issues regarding IAQ
- current practices, barriers, and facilitators of healthy IAQ
- roles of stakeholders in addressing IAQ
- ideas for solutions and implementation of good IAQ management practices

A summary of findings from the N.S focus groups was shared with the British Columbia focus groups in advance of the sessions. As the focus groups were proceeding, it became apparent that the development of a new set of guidelines, as was originally envisioned by the project, was not the greatest priority. Rather, ways to coordinate efforts within schools and encourage collaboration among school stakeholders on the implementation of good IAQ management practices appeared to be the more urgent need. At the same time, as a result of the project's exploration of IAQ guidelines and tools already available for use in a school context, the United States Environmental Protection Agency's *Tools for Schools Kit* was reviewed. A decision was made to use this *Kit* rather than develop a distinct set of guidelines for the project. Because the B.C. focus groups presented an opportunity to "test" the potential applicability of the *Tools for Schools Kit,* questions regarding its utility were also asked. A summary of the *Kit's* contents was provided to participants as well.

The American version of *Tools for Schools* provides, along with the checklists and overview, an *IAQ Coordinator's Guide* that includes:

- the basics of the program and how to get it off the ground
- the role and functions of the IAQ coordinator
- the steps to launching an IAQ team that works with the coordinator
- an overview of typical school-based IAQ problems and how to identify them
- steps on how to develop and implement an IAQ management plan
- the essentials to effective communication
- examples of IAQ policies, notices, and standards
- a resource guide to further information or services related to IAQ

The following is a summary of the focus group findings. It is important to note that this data is derived from participant perceptions and experiences; it is not based on general survey data and cannot be said to be representative of the entire school population, or district/region or province. Having said that, findings are remarkably similar across provinces, school board regions/districts, and schools in many key areas of concern.

7.2 Perceptions about IAQ

Beliefs and perceptions about IAQ, and participant levels of personal satisfaction or dissatisfaction with both the quality of the air and IAQ management practices within their particular school environment, were shaped largely by personal experience. All participants unanimously agreed, although for different reasons, that IAQ was not seen as a priority issue in schools. Most felt it was important for the health of school occupants and for the maintenance of a positive learning environment for students. There was a sense that, while current levels of awareness and understanding about the importance of good IAQ were not sufficient, they were growing and there was greater consciousness about the potential impact of poor IAQ.

The issue of IAQ is fraught with difficulty in the sense that it is difficult to measure. There are not industry-wide, observable, objective, agreed-upon measurable standards of air quality. Causes of poor health, often attributed to poor air quality, can be difficult to substantiate. This is compounded by an absence of agreement among health professionals as to causal relationships and consequently the relative importance of the problem. This makes resolution of problems difficult as well. The following discussion demonstrates this. The section sub headers are derived from the themes arising in the groups.

The Role of Personal Experience

Responses to questions about participant perceptions of IAQ in their school were positive if they had experienced few or no problems on a school level or individually. They were negative if their school had experienced significant problems with air quality or if they themselves, or someone they knew, had become ill due to air quality problems at their school. This generally held true regardless of stakeholder type and was more a function of school site.

There was general agreement that IAQ is given low priority - either because they had few IAQ problems or because of an inadequate response to the IAQ problems they had experienced.

Interestingly, even where problems had been fixed and all agreed there were no longer problems, the negative feelings persisted. Negative feelings appeared to stem from the initial response to the problems once identified - the sense of voicing concerns and not being heard. There was a great deal of frustration with a) the initial and prolonged lack of acknowledgment of the problem and b) the time it took to respond to the problem or lack

of an adequate response to the problem. One teacher brought in a 1996 newspaper article with the headline "____ (school) makes students sick" to illustrate how long these complaints had been an issue. Schools which had experienced a problem with air quality also experienced a great deal of frustration which characterized both the tone and content of the focus groups. The following comment illustrates this sense of frustration.

> *"Clearly, the school board is not interested; the Department of Education is not interested. Nobody gives a damn because it is only kids, and it is not right and it is not the way that it should be."*

Students, in particular, felt powerless to change poor IAQ. They expressed both frustration and a sense of resignation that one must simply learn to tolerate problems rather than take action (which may not be a helpful lesson from a societal point of view). Students most readily identified scented products as an issue, more so than other stakeholders.

Teaching staff complained of "band aid" approaches. School boards and principals were often the targets of criticism. Strong words like "cover up" were used by parents and teaching staff to denote a lack of trust and a sense that a real effort was not being made to remediate IAQ problems. Teachers believe the school boards do not wish to recognize poor IAQ as an occupational hazard because of the potential cost implications (increased claims for long-term disability and teacher replacement costs, for example).

Some mentioned that IAQ was a highly subjective concept; what suited some did not suit others. Maintenance and custodial staff mentioned it was often difficult to please everyone, particularly as it relates to temperature which seemed to sometimes be an issue of individual preference. At times, they admitted to frustration as a result of having no control over the situation or an ability to engage in preventive maintenance. It was merely their job to hunt down and fix complaints. They expressed feelings of satisfaction when they were able to find the problem but *"you feel like you are chasing a ghost when you can't find others". "All schools have complaints with IAQ and often that is all you have time for is chasing down the complaints, leaving little time for prevention."*

In general, custodians stated that IAQ was not something that they thought about on a day-to-day basis and that the demands of their job did not permit them to check IAQ. They commented they were unaware of any IAQ policies, guidelines, or standards (e.g., acceptable humidity levels) that existed within the school district. Custodians said that they generally lacked knowledge about IAQ and felt that if they had the expertise to address such issues, their ability to respond would increase.

> *"...the only time I think about it is when you get the odd smell coming through the school."*
>
> *"...we are too busy cleaning, we don't have time to think about that [IAQ]."*

While, in general, there was acceptance of IAQ as being an important issue among all stakeholders, there were underlying suspicions among stakeholders that suggested people had hidden and not-so-hidden agendas for identifying IAQ complaints (e.g., other workplace related problems resulting in stress and sick leave, a desire for a new school, not wanting to attend school, etc.). Others intimated that the root of some complaints was psychological in nature, undermining the legitimacy of IAQ complaints. However, others commented that this belief was unfounded as evidenced by the number of school occupants becoming ill.

> *"It comes right down to money. You can go until you are blue in the face but it comes down to money. I think that air quality is something that is invisible and we don't have set standards that this is acceptable and this is not acceptable. But it is not an invisible thing. People say that, but it is visible. You look at a child who is sick all the time or is in the hospital on a ventilator. You look at teachers who are off sick. Those are the images that you need to show to get something done about it."*

Some focus group participants struggled with the issue of IAQ as an individual versus a collective concern. Many school occupants were not adversely affected by the quality of air but could understand that some of their peers were, particularly those with asthma. The difficulty is that not everybody is affected by IAQ in the same way, while some are not affected at all. People respond differently to the same stimulus or exposure to poor IAQ. Participants, at times, struggled with how much effort should be spent on this issue if few are impacted and the causes and corrective measures are not easily discernible.

Other common comments were:

- IAQ is seen as a low priority (some mentioned it was viewed with less importance than water quality because it is invisible).
- It costs a lot to fix IAQ problems.
- IAQ is "like chasing shadows" because there is not an identifiable cause; it is difficult to prove cause and effect as there are so many factors that could be contributing to ill health – some questioned whether it is a physical or a psychological illness (or simply stress).
- There is an absence of awareness and public understanding about environmental sensitivity issues and the impact of poor air quality.
- A "coping attitude" prevails among school occupants.
- There is an absence of long-term solutions to IAQ problems.

IAQ and the impact of poor IAQ are not well understood.

Increasing Awareness

There was an acknowledgement that awareness of IAQ issues is gradually increasing – both as a result of media attention to schools and other sites experiencing problems, and

the introduction of workplace health and safety regulations. Some observed that IAQ has become more of a concern over the last decade or so as a result of IAQ issues at other sites, such as the Camp Hill Medical Hospital in Halifax, and recognition of the pitfalls involved with a sealed building design. Awareness was also believed to be heightened by Workplace Hazardous Material Information System (WHMIS) regulations for health and safety at the workplace and the fact that people are becoming more educated and conscious of the issue. However, there is still the perception that not enough is being done about IAQ, as evidenced by the poor conditions in some schools. It was said that these conditions would not be tolerated in office buildings.

> *"I think it is just that people are becoming more aware. It is not just schools but everywhere - around your house, your workplace, whatever ...There are just so many chemicals out there and pesticides that you get overloaded and then you just cannot handle it."*

Students felt that IAQ was an important issue and said that poor IAQ could have an impact on learning by decreasing concentration and attentiveness in class. Poor IAQ was also seen as something that could compromise the immune system, making people more susceptible to colds and flus, which may cause students to miss school. Students did caution that, although some students believe IAQ is important, others do not care because they believe it will not affect them.

> *"...if the air quality is bad, you won't be able to concentrate. And if you are sick already, then that adds to it and it can prolong your sickness... I've noticed that a lot of people are complaining about air quality in the last few years - about headaches ...when you turn on your television it is there...somebody is speaking of it and when you open the newspaper it is there, on the radio. It is a big issue...but it doesn't seem like anything is being done though."*

Reasons given for perceived inaction on IAQ issues were lack of money and an organized effort to deal with IAQ issues; the unknown nature of most IAQ problems that make finding a solution difficult; and the prevailing belief that IAQ is not taken seriously, particularly by the school board.

7.3 Types of IAQ Problems Experienced

When asked about IAQ problems experienced, participant responses broke down along school lines and were internally consistent most of the time. All respondents within a school reported the same set of problems, supporting internal validity.

Some of these problems were shared among schools while others were site specific. For example, all focus group participants from one school spoke of poor air quality due to incomplete construction where a ventilation system was not installed as a contractor went

bankrupt and funds have not been made available to install one. Sometimes poor IAQ was associated with only certain areas of the school.

Schools that did identify problems identified the following:

- temperature, humidity, dryness – temperature control, both related to the seasons (too hot in summer, too cold in winter) and to particular classrooms which were consistently too hot or cold; heat and airflow due the lack of an air exchange system
- odours - smells in the gym and locker room areas, odours from surrounding farm land, fumes from buses idling near intake vents, the use of scented products
- smoking (tobacco)
- carpets
- chalkboard dust
- mould
- flooding, leaks – and associated problems such as sewer back-up, the accumulation of mould and bacteria underneath floor tiles and carpet and in the ceiling, green 'ooze' seeping through the floor in some classrooms, followed up by inadequate cleaning of the property
- rodents in the building and the use of fumigation methods to remove them
- repair and renovation - painting, roof tarring, construction, and window caulking during or shortly before school hours without allowing sufficient time to clear the air before the school was occupied; potential exposure to harmful chemicals
- spraying of pesticides on nearby properties

Even participants who said they did not have an IAQ problem at their school, did identify some of these as part of their experience.

Lack of air circulation seemed to be a common complaint. Ventilation and cleaning of the filters were factors frequently cited.

> *"We don't know. We just kept getting headaches and everybody was getting really bad headaches in that classroom. We didn't even realize it at first then every time we were in there, people would get headaches... and during last year when all that stuff was going on and they told everybody to make sure you tell your home room teacher. Every day, somebody had something, and they had forms where you would write your name, how old you were, and symptoms as well. Grade seven and eights were worse though [as they were in] the middle wing of the school. You come to school, get this headache, feel really miserable, go home and as soon as you are out in the fresh air for five minutes, you are fine."*

With respect to air circulation, some discussion of the preference for windows that open occurred. It was felt that air tight windows and buildings result in decreased air flow. In areas where air circulation and ventilation were problems, participants expressed a preference for the ability to open windows to let in fresh air. Yet other systems are meant

to operate with windows closed to maintain air flow patterns and even temperature. Maintenance staff felt that this was not well understood. This appears to be partly an educational issue.

The trend to larger class sizes associated with declining budgets seemed to exacerbate the problem. Crowded classrooms made the air seem very stuffy. Some spoke of classrooms overloaded beyond capacity to the point where the school had to "shuffle kids around in order to maintain a comfort level to learn."

The issue of scented products received comment. Students had a particularly strong view about the issue of scents. They were among those to most readily identify it as an issue but strongly preferred an educational and awareness approach to changing behaviour rather than punitive measures. It was acknowledged that some enforcement was necessary but the preferred route was education to increase understanding of the impact of scent on others and the potential health consequences for some.

Relationship issues such as lack of trust and communication also arose. There was a lack of faith expressed by teachers and parents in particular, in the objectivity of the Board and administration related to IAQ testing. This related to who was sought to do the tests, what tests were conducted, what the results were, and disclosure of the results. It was recommended that an independent appraiser be secured to conduct testing, that it include more than just carbon dioxide (CO2) testing, that someone with scientific knowledge address the meaning and implications of the testing, and that the results, along with this explanatory information, be disclosed to all stakeholders - parents, students, teachers, and other occupants of the school. Issues of trust also were raised in relationship to the Occupational Health and Safety (OH&S) Committee and the membership selection process. Some expressed an interest in membership on the Committee but barriers were erected to prevent that.

7.4 Symptoms

Symptoms reported associated with these IAQ problems included:

- environmental sensitivities
- difficulty learning, lack of concentration, physical and mental fatigue
- weeping eyes or dry eyes
- sore throats
- respiratory difficulties - difficulty breathing, allergies, sneezing, stuffy nose, congestion, worsened asthmatic conditions, and bronchitis-like symptoms
- headaches, migraines
- dizziness and nausea

Consistent with literature, a frequent complaint was that one would feel fine outside the school but, once inside for any length of time, would begin to feel ill. Some expressed concern about the cumulative effect of exposure to poor IAQ and the possible long term

effects. Over time, health may become compromised resulting in increased susceptibility to illness. Some also said there was a lack of awareness of the possible symptoms of poor IAQ.

7.5 Current IAQ Management Practices in the School

Current practices related to carpets, cleaning, and ventilation were raised in the focus groups.

Custodians felt that there was not enough preventative maintenance of the ventilation system and that air filters were not changed as often as they should be. In some sites, custodians were only given enough supplies to change the filters twice a year when they should be changed every three months. There was also mention that filters were not changed in the winter because of dangerous conditions on the roof caused by snow.

Often custodians commented that they were not familiar with the proper operation of the ventilation system and that, when something went wrong, there was little they could do, other than report it to the maintenance supervisor. There was also a concern that other occupants in the school are not aware of how the ventilation system functions as doors and windows are left open in the summer, defeating the purpose of the air-conditioning component of the system. Inadequate ventilation in portable classrooms was also seen as an issue related to inadequate design (not enough airflow because of few windows).

In terms of changing the air filters, reference was made to a change in job responsibility after the amalgamation of school districts in BC. Before amalgamation, changing of the filters was the responsibility of maintenance personnel at the school. After amalgamation, maintenance personnel were cut back to one 'roaming' supervisor for the district and changing of filters became the responsibility of custodians. While the custodians felt comfortable in changing the filters, they did not have the expertise to identify and prevent problems with the ventilation system. They also spoke of the impact of budget reductions:

> *"We used to have a guy coming every month to check the air and it stopped and they don't do it anymore. I mean, I think to me, that should be something that they should be looking at carrying on again and picking up."*

Some custodians also reported various IAQ health effects that they themselves or others known to them had experienced. These symptoms included headaches, allergies, asthma, and running and burning eyes, the result of which was absenteeism.

There was mention of a new policy to remove carpets in BC schools over the next few years. As well, there was discussion by other stakeholders, usually teachers and students, of inadequate cleaning practices.

7.6 Barriers and Contributing Factors to Healthy IAQ

If they did **not** report a problem with IAQ, focus groups identified the following factors and practices as contributing to good IAQ:

- proper design of building at the outset (with adequate ventilation and temperature control systems)
- renovations done at the "right" time so as to prevent larger problems from occurring later
- early identification and response to problems (problems were addressed immediately), preventive maintenance practices
- good cleaning practices
- chalkboard and carpets replaced with white boards and tile
- reduced scent policies

Practices such as scheduling construction, renovations, and repairs at a time when the school is not occupied (such after school hours, on weekends, or summer holidays) as well as allowing sufficient time for odors and chemicals from construction materials to dissipate before occupants return, were also associated with good IAQ. Summer cleaning of the school was also suggested.

Conversely, if they did report a problem, contributing factors included the absence of many of the aforementioned factors, as follows:

- poorly designed buildings
- poor maintenance practices
- lack of enforcement of scent policies
- insufficient funds to repair, remediate problems
- lack of willingness to ameliorate problems

There is a belief, shared by many participants, that problems have persisted because of inattention and ignorance on the part of school administration and/or the absence of funds to improve the situation. Money is seen as a determining factor for how well IAQ issues are handled, as well as the priority given to IAQ at the school by the school board. Contributing to this perceived lack of priority is the fact that *"people at this school do not complain enough and are not militant in getting something done"* in terms of IAQ improvements. As a result, instead of fixing problems at the school, students with sensitivities are often sent to other schools.

> *"I had concerns when my kids were little, just initially. My concern was not just with the day-to-day quality but, when my daughter was in primary, they painted her classroom with that horrible oil-based paint that really smells bad and they did it at night and they were in there the next day and that was sort of my first concern. How could they do stuff like that? Because it bothered me so much that I couldn't even fathom how little kids could learn in that type of environment."*

"Well, the water was flooding in and there is no way that the water can't come in and if you get water coming in, you will get mould and you get mildew and that costs money. I do not think it was identified as a problem until the last couple of years or so. I do not think that people realized that the water and the mould and mildew.... And anybody who has any problems breathing or anything like that, people are educating themselves now that this is a problem."

Facilitators of good IAQ were:

- support from school administration and school boards who recognize the importance of good IAQ
- teamwork (e.g. school board maintenance staff working closely with school maintenance staff to ensure issues are addressed as adequately as possible, consistent with resources available)
- proactive, responsive administration and OH&S Committee

Barriers were:

- lack of early identification and reporting of problems to maintenance staff
- time to repair the problem
- money
- lack of support from school administration and school boards
- particular barriers such as the school cannot assign maintenance staff to take care of IAQ issues
- Most school occupants are unaware of guidelines or policies in place.

7.7 Stakeholder Roles and Responsibilities

There was unanimous agreement among all participants that all stakeholders had a role to play in preventing, identifying and responding to IAQ problems, and recognizing the importance of good IAQ.

"...everyone in the school has something to do with the air quality. It involves everyone there so it is pretty much everyone. You can't really single out a single group in the school. The school board, they are the ones that have the money. They are the ones who tell us that we have to come here so they should be the ones that have to make sure it is safe for us to be here."

The role of students tends to be largely ignored by other stakeholders, yet they have a tremendous capacity to influence peer beliefs and behaviour. Students felt that everybody was responsible for dealing with and promoting awareness of IAQ in schools. Students saw themselves as responsible for reporting problems by bringing issues forward in a constructive manner and for increasing awareness among their peers.

Parents saw a role for themselves in advocating for and supporting good IAQ management practices in order to protect their children from harm but this was often greeted with some hesitation and concern on the part of administration.

Maintenance staff would like to see their role shift to one that is more proactive and less crisis response/reactive with the opportunity to engage in more preventive maintenance. This would also somewhat increase their sense of control and ability to "do something" about the problems. Custodians viewed their role as one of problem finding, identification, and reporting. School districts were seen to provide support to schools while principals and maintenance personnel were seen as leaders and communicators within the school.

The school board and the Department of Education were seen as responsible for providing adequate funds to ensure proper maintenance and repair of buildings and response to IAQ problems, as well as for educating teachers about IAQ who then have the responsibility to educate students about IAQ. The principal was identified as having direct responsibility for overall health and safety within the school. The principal needs to work with the school board and be supportive of school occupants when dealing with IAQ issues. The principal is seen as being an important liaison between the school and the school board to convince all involved that IAQ is an important school issue. Teachers, students, staff, and school administration need to be vigilant about reporting problems.

There was emphasis placed on the need for enhanced responsibility and accountability, which was defined in practical terms to mean fixing a problem in a timely fashion. In terms of identifying problems and imposing standards, some thought this should be the responsibility of the Department of the Environment. It was suggested that this department would provide more expertise and an unbiased view when identifying problems.

The current process of problem identification and resolution usually followed these steps: students inform teachers of an IAQ problem; teachers inform the principal (or sometimes a custodian directly); principals resolve the issue with maintenance; or, custodial staff on site. Failing that, either the principal would discuss the matter with the school board/district or informally with maintenance staff of the school board/district, or the OH&S Committee would send a formal letter to the school board/superintendent whose responsibility was to reply within 21 days. In Nova Scotia, at every workplace where 20 or more persons are employed regularly, the employer is required by law to establish and maintain a joint OH&S Committee which is required to meet at least once a month (unless a different frequency is prescribed by the regulations, or the committee alters the required frequency of meetings in its rules of procedure).

With respect to current practices in B.C., a complaint form is the beginning of the process of IAQ problem resolution. Participants thought the checklists housed within the *Kit* could precede the completion of an IAQ form as a proactive means of identifying

problems early. Procedures in place are reactive in nature and complaint driven. Testing was reported to be done periodically but mostly in hallways and not in the classrooms. Lack of disclosure of testing results contributes to a heightened suspicion and lack of trust about the intent to remediate problems. As well, there is a concern that testing results may not reveal all existing problems.

7.8 Communication

Communication issues were raised in the focus groups as well. Usually, parents and students felt the absence of communication about IAQ issues most acutely. Parents felt they were informed far too late in the process and only when a problem had become very serious. They did not feel acknowledged as having a legitimate stake in the outcome or in process of problem identification and resolution. They complained of the lack of open communication between parents and the school/school board, the absence of transparency of the process of testing/data gathering and decision-making, the lack of disclosure of test results, and the lack of feedback as to when and how a complaint is acted upon. Parents usually did not know if a problem had been solved or how this was done.

Students felt largely uninformed as well. While there may be a mechanism for reporting problems, students were not always aware of the existence of a problem, or if they were, what steps were being taken to correct the problem and if this resulted in improvement. Again, there was a lack of disclosure about testing results.

> *"...We get no feedback whatsoever...I would like to be informed. We might be students and teenagers but we are not dense. It is affecting us and the teachers and the staff of the school much more than the people at the school board...We have a newspaper that goes out every month. Can't they at least put something in there that says the air quality is whatever or what is going on with the school? Maybe have an assembly or something? What we're doing now is a pretty good idea, why couldn't we have the whole body of students in the gym and have a discussion about it?"*

School administration and teachers also complained about insufficient disclosure of testing results and feedback on plans or actions taken by school boards. This contributed to a climate of mistrust and lack of faith in school boards resolve to address IAQ concerns.

Custodians felt that there was a lack of communication between themselves and the school district when it came to school renovations. In general, they were not made aware of any decisions regarding renovations and felt that they should. Other communications concerned the reporting of IAQ problems. When problems are reported to the district, custodians felt there should be a follow-up report from the district to them outlining what the problem is, what needs to be fixed and how. Custodians felt these reports could come from the maintenance supervisor via the district.

"Send something to us? If it gets to our box! Because sometimes it gets to the office and we never find out what the office staff may know. We don't necessarily know."

7.9 Solutions to IAQ Issues

Participants generally thought IAQ should receive greater focus, even to maintain the current levels in school sites where air quality was said to be good. A variety of solutions to IAQ issues were suggested that could be categorized as follows:

1. **Education and Awareness** – Seize opportunities to increase awareness, knowledge and understanding among all stakeholders of the importance of healthy IAQ and good IAQ management practices, and the roles of stakeholders in addressing the problem. Activities and forums such as school assemblies, school newsletters, student council activities, staff meetings, memos, and presentations to the school board were suggested. Incorporating the issue into the curriculum in formal and informal ways was suggested by using teaching opportunities in the classroom and through project assignments or other IAQ focused activities in science class or current events. Making the *Tools for Schools Kit* available as a formally acknowledged resource by the Department of Education was also suggested.

2. **Preventive Maintenance and Remedial Measures** – ensure sufficient routine monitoring systems are in place to enable early detection and repair of problems, engage in preventive maintenance practices, and undertake activities to remediate problems and improve IAQ through the following management practices:

   - Employ a rigorous and continual cleaning regimen.
   - Use environmentally friendly cleaning products.
   - Conduct routine monitoring and inspection, including air and mould checks.
   - Remove carpets.
   - Replace chalkboards with white boards.
   - Adopt reduced or no scent policies.
   - Improve air circulation; install proper functioning, well regulated and well maintained air exchange systems.
   - Arrange for painting, repairs, new construction and renovations to be done when the school is not occupied and allow sufficient time for off gassing of new products.
   - Ensure regular cleaning of ducts and filters.
   - Train custodians on proper procedures to identify potential IAQ problems or increase inspections by trained staff to ensure proper vigilance in detecting and responding to problems early.

3. **Testing, Information Gathering, and Needs Assessment** - undertake periodic monitoring and testing to ensure the maintenance of good IAQ and gather

sufficient data to determine the scope and depth of IAQ problems through such activities as:

- Conduct IAQ testing periodically when the school is occupied and report results publicly, explaining what they mean, to encourage people to deal with the issue. Ensure the correct tests are done.
- Continue to improve the science supporting the relationship between air quality and health.
- Conduct a survey of school occupants within a region/district to identify the number of people with poor health symptoms potentially attributable to IAQ and supply the results to schools. Use the survey results to facilitate class discussion about these issues, to provide supporting data to indicate the types of problems that may exist, and to develop plans of action to address IAQ concerns in the school.
- Solicit expert advice and consultation on issues where needed; ensure that the medical community has an advisory role.
- Keep an IAQ health log to enable identification of types of illnesses that may be associated with IAQ.

4. **Monitoring and Accountability Mechanisms** – Implement monitoring and accountability mechanisms to ensure adequate identification, reporting, and follow-up of problems.
   - Advocate for improvements (e.g., hold demonstrations to lobby for changes in IAQ).
   - Distribute IAQ policies, standards, and guidelines in all schools and have consequences for non-compliance.
   - Inform stakeholders about IAQ issues and concerns as they arise, the nature and cause of problems identified, the results of any testing done, the status of plans and actions taken or required to ameliorate the problem, and the results.
   - Develop a plan of action to ensure the implementation of good IAQ management practices and regularly track and report progress.

5. **Leadership, Coordination, and Responsibility** – Assign a focal point of responsibility for IAQ issues.
   - Incorporate any new practices or guidelines into already existing procedures and structures to the degree possible.
   - Set up an IAQ committee or use existing OH&S Committees as a locus of responsibility (or a subcommittee thereof) for IAQ management
   - Assign leadership/appoint a coordinator to take the lead role.

6. **Proper School Design** – Involve IAQ specialists in the design of new schools to ensure observance of good IAQ management practices.
   - Secure the proper expertise and consult with air quality experts in building design.

8. **Policies, Standards and Best Practices** – Adopt policies, standards, and best practices to ensure the maintenance of healthy IAQ in all schools.

   - Create strict IAQ standards that are enforceable and that meet with consequences for not being followed.
   - Create increased awareness of the importance of good IAQ and of observing reduced scent policies among students using non-punitive approaches.

9. **Communication and Participation** Enhance communication among stakeholders and implement mechanisms to ensure broad-based participation and involvement of all stakeholders. Some suggested examples include:

   - Involve everyone in the development of policy, approaches, and plans, including students, to encourage buy-in from all stakeholders. Students in particular emphasized the need for inclusion on committees and in efforts undertaken to ensure the voice of students is heard and to shape peer attitudes and behaviour.
   - Ensure student, parent, and teacher participation on IAQ committees or Occupational Health and Safety Committees; form a student-based IAQ Committee.
   - Encourage adoption of a policy of open communication, transparency of decision-making, and feedback from the school board.
   - Use memos in mailboxes to facilitate communication as well as a health and safety bulletin board to communicate IAQ issues; add IAQ information to the school newsletter.
   - Encourage joint decision-making between OH&S Committee/IAQ Committee and School board.

10. **Funding and Support** – Ensure the necessary funding and support is in place to prevent and respond to IAQ problems in schools to ensure the maintenance of good IAQ in all schools.

    All participants stated that, without funding to ameliorate IAQ problems and the support and willingness of the school board and others in authority to support healthy IAQ, efforts to improve IAQ would be compromised and would have little impact.

    "It is just like anything else, it takes a long time to get the money and the organization to get an end result that actually solves the problem. Plus, you need people to actually believe you. It is hard to convince people what is going on..."

7.10 Comments Regarding the *Tools for Schools Kit*

The B.C. focus groups were asked about the utility of the *Tools for Schools Kit* in addressing some of these problems. The *Kit* was seen by some to be a "good fit" with the quarterly inspection process already undertaken and by a few others as a waste of time "looking for problems that don't exist". Some felt that their school was "beyond *Tools for Schools*", that is, the problems that existed were larger in scope than what could be addressed by the *Kit*. The general opinion by those consulted in the BC focus groups was that it could be helpful but they worried it might be time consuming potentially requiring additional resources to implement it. There was concern about how it would be implemented and by whom.

There is sensitivity about placing additional burdens on staff - teaching staff in particular - and eroding teaching time in the classroom. Who would assume the role of coordinator was a concern because all felt overwhelmed with existing responsibilities and work load demands. Some suggestions for resolution of this problem were that, to the extent possible, it be placed within existing structures and individuals' roles, such as using OH&S Committees or district OH&S staff to coordinate implementation. Any guidelines could be incorporated into what already exists. For example, in one province a building inspection is completed every three months and a hazards checklist is completed monthly, so any further guidelines or strategies could easily be incorporated into those practices.

Stakeholders commented that there were a lot of items in the *Action Kit* and because of this, it may be difficult and time-consuming to implement. In general, they thought the content was appropriate and that it would be useful for IAQ management if there was someone to take charge of its implementation. Some suggested that implementation be coordinated by maintenance personnel with support from the school district. It was also suggested that a training component and test of the school's IAQ were two factors that could contribute to successful implementation of the *Action Kit*. The absence of funding to implement the *Kit* and support for a coordinator were seen as barriers to implementation of the *Action Kit*.

Positive comments about the *Kit* were as follows:

- The *Kit* gives a good representation from every person in the school system.
- The content seems all inclusive.
- The *Kit* could help because IAQ is not a big issue and it would be a good place to start.
- Its use would draw attention to, and heighten the profile of, the issue. It would become more of a public issue.
- Showing how poor IAQ can affect your health could facilitate students' awareness.
- It demonstrates and promotes a positive, proactive approach.
- Implementation of *Tools for Schools* will help to create clarity on the issue of IAQ.

- The *Kit* could increase awareness and provide opportunity for discussion of the issues among staff and would promote a positive working environment, which would, in turn, increase efficiency and productivity in the workplace.

Negative comments or concerns expressed about the *Kit* were:

- Implementation will be a time consuming process – who will have the time to take on this task?
- The *Kit* is not affordable or practical; it assumes there is already an IAQ problem. It is a waste of valuable resources to look for a problem that is not there. IAQ coordinator and training all cost money – is training really necessary if you have no IAQ problems?
- There would be a lot of teacher time demands. There is no time for teachers to add IAQ duties without detracting from the basics of reading and writing which should not be done.
- School could promote good IAQ practices rather than implement a manual like *Tools for Schools*.
- The *Kit* needs to be simpler.
- There is no mention about how to involve the school system.

The following suggestions were made as necessary to supplement or support implementation of the *Kit*:

- There is a need for education about IAQ, the *Kit*, and what is expected.
- An independent person is/may be needed to perform IAQ checks.
- Recommendations for bi-annual testing of the schools may be needed.
- The findings from the checklists should be made public.
- Measure IAQ and collect data before and after the implementation of the *Kit*.
- A professional could give a presentation in an assembly to heighten awareness further and increase the impact and effectiveness of the *Tools for Schools Kit*.
- There needs to be a documentation of problems and illnesses when people are not feeling well.
- In-service time is needed to educate staff on *Tools for Schools*.
- Administrative support is needed.
- Each level is responsible for implementation.
- The school nurse and IAQ committee should be responsible for IAQ issues.
- IAQ coordinator should be someone at the district level with knowledge about IAQ issues.
- School districts/boards should appoint the proper people to deal with the IAQ issue and to implement the *Tools for Schools* program.
- Funds are needed to support implementation.
- The entire school system needs to support and be involved in the implementation of *Tools for Schools*.

Suggestions were also made to enhance the specific content of the *Kit*:

- Bioaerosol counts should be taken into consideration.
- Describe the potential health symptoms associated with specific aspects of poor IAQ.
- Add an educational component to the *Tools for Schools Kit.*
- Define adequate IAQ.
- Define healthy construction materials.
- Include cleaning recommendations.
- Add issues around chalk inhalation and reference to the need to use appropriate chalkboards.
- Add a parent checklist.
- Simplify the *Kit.*
- Add a component on how to enlist the support of all stakeholders within the school system.

Other ideas were mentioned as critical to support implementation of such a tool.

There needs to be a ***Locus of Responsibility*** for implementation of the Tool. It would be necessary to find people to put the program in place. Those who already have an interest or a concern about IAQ in the school would be good place to start, capitalizing on their pre-existing interest in the issue.

Communication is an essential element. Participants emphasized it would be important to inform all stakeholders from the start of the initiative and to continue to inform them throughout various stages of the project. They suggested the following routes of communication: parents could be informed via Parent Advisory Committee meetings, teachers could be informed by the administration, and students by their teachers.

Involvement of all five primary stakeholder groups in the school is pivotal. They should be represented on any committees that are formed, especially those students who are adversely affected by IAQ.

Forming an IAQ Committee was recommended to help to ensure the successful implementation of *Tools for Schools.*

- Establish an ongoing committee; otherwise, interest will be lost over time.
- Recruit people who are willing to work towards a goal of good IAQ.
- Involve school administration staff to ensure contact with the school district on a continuous basis.
- There needs to be a shared sense of responsibility for the IAQ issue and for the implementation of *Tools for Schools* – students should be involved in the implementation process as much as possible.

Enforcement for non-compliance is also an important element of implementation. There must be consequences for not following IAQ guidelines – something like *Tools for*

Schools needs to be mandatory in order to be effective. At the same time, it was felt that enforcement of something like a scent policy would be difficult, especially for things like cologne and perfume.

Other more specific ideas about the *process* of implementing *Tools for Schools* included:

- Determine interest levels and provide back up research.
- Form a committee at the district level and have it filter out to the schools.
- Get feedback from teachers and students about the issues that need to be addressed.
- Identify the issues and the resources available to address them.
- Get parents involved to apply pressure at the Ministry/Department or school district/region level. A plan would then be needed to address their concerns.
- Need plans for new school designs.
- Environmental studies class could address and study associated issues. This would create momentum around IAQ and provide rewards for their efforts.
- Need a bottom up and a top down approach going simultaneously.
- Could use a video to educate students.

In summary, comments about the *Tools for Schools Kit* included:

- Funding and support – there are costs associated with use of the tool in coordination, time, and funds to remediate problems found so support would be required. There was support for "starting small" and the tool was seen by some as a means to do this. Others saw it as time consuming. There would be a need to prioritize the issues and problems found in terms of a plan to respond. It was emphasized that funds and a genuine intent to address IAQ problems would be necessary pre-requisites or it would simply undermine any work undertaken.

- Locus of responsibility – someone needs to be assigned responsibility for ensuring good IAQ management practices and implementation of the *Tools for Schools Kit*. Many saw the Occupational Health and Safety Committees as being the most appropriate vehicles to assume responsibility for implementation of the *Kit* as it was consistent with their current mandate. Concerns were expressed about the role of the coordinator, specifically who would assume this role and the time required to fulfill this role. It was recommended that this Tool be integrated into already existing structures, procedures, and work roles to improve the likelihood of success.

- Flexibility - There would need to be a great deal of flexibility as to how the tool would be implemented, partially or fully. It should be part of a district-wide or region-wide effort and part of regular duties. Implementation of the tool itself would have to be flexible enough to incorporate additional site specific "extras" such as old couches in classrooms, animal visits to the classroom, and other unique items which may impact IAQ.

- Shared responsibility – all acknowledged there would need be buy-in from many stakeholders to make implementation successful. Options offered for achieving this included making implementation of the Tool mandatory, the imposition of disciplinary action for negligence in addressing IAQ problems, and increasing education and awareness among all stakeholders.

There is skepticism about management support for IAQ so indications of a lack of follow-up are likely to undermine efforts and render implementation ineffective.

7.11 British Columbia Compared to Nova Scotia

Comparisons were made to explore differences among participants between provinces, between rural and urban schools, and among stakeholders with the following results.

The BC experience appeared to parallel that of Nova Scotia. IAQ issues seem to be important to those affected but not to those unaffected, symptoms of ill health and IAQ problems seem similar in nature to those of Nova Scotia participants, the perception that not enough was being done to ensure healthy air quality was prevalent, and funding constraints and lack of awareness were identified as key barriers to good IAQ practice.

In general, the IAQ problems and the associated health symptoms were similar. As well, barriers and contributing factors to good IAQ were similarly identified.

In BC, the applicable guidelines mentioned most frequently were Worker's Compensation Board (WCB) guidelines for occupational health and safety. It was also noted that the BC Teachers Federation had passed a policy supporting the removal of carpets in all schools across the province over the next few years. In both provinces, workplace occupational health and safety committees were mentioned and some saw these vehicles as being in the best position to take on responsibility for IAQ and for implementation of the *Tools for Schools Kit.*

The issue of environmental sensitivities received more discussion in Nova Scotia than in BC. The level at which IAQ guideline implementation should occur differed slightly between the two provinces. In BC, it was suggested that guidelines should be implemented at the district level where, in NS, the primary focus of implementation was at the school level. BC focus groups discussed implementation strategies in a bit more detail than in NS.

Aside from specific procedures and the division of responsibilities assigned to district/regional level staff, there were few differences between Nova Scotia and BC.

7.12 Rural Schools Compared to Urban Schools

The differences in issues identified by rural and urban schools fell under three main areas. Note that this reflects participant *perceptions;* this may not be the case in reality and there was no attempt made to verify actual distribution of resources.

- Priority for Action on IAQ Issues- Rural school participants perceived their school as having a lower priority level than urban schools. Rural school occupants felt isolated and low on the list of priorities due to lower population numbers, lower tax brackets and less political influence. Urban schools did not mention this type of concern.

- Resources to Address IAQ Issues- Rural schools did not feel that they had the resources to adequately deal with IAQ issues. They had experienced significant reductions in facility maintenance and janitorial staff which contributed to poor IAQ. There are fewer individuals available in rural areas to work on committees to address important school issues and priorities need to be established. They also felt the finances needed to address IAQ issues were not available and that low cost solutions for large problems were more common in rural schools.

- Types of IAQ Issues- The issues in rural schools were somewhat different than those in urban schools. Most rural participants were located in farming communities. In general, outdoor air quality was thought to be better in rural areas and participants believed that opening windows was the best option for building ventilation. However, unique rural issues may also impact on rural school IAQ such as livestock odours, high pollen counts, moulding hay, and more animals in schools.

7.13 Differences in Stakeholder Viewpoints

The stakeholder groups participating in the focus groups were students, teachers, parents, administration and maintenance staff.

Student Perspectives

Students are aware of IAQ problems and the resultant impact of poor air quality on fellow students, if they themselves or someone they know suffers from asthma or the like. Otherwise, there is a belief it doesn't affect them. As with other stakeholders, personal experience with poor health shapes their views.

The types of air quality problems reported by students most frequently included scented products, smells in the gym or chemistry labs, and the state of cleanliness in the schools. They more readily identified scent as a potential problem than other stakeholders but tended to advocate an education and awareness approach to encourage reduced scent use among their peers. They offered perhaps the most useful and broadest range of peer-led

solutions to this issue: awareness campaigns, posters, school assemblies so the message reaches all students, class projects, surveys, student council action, student IAQ teams, and the like. For example, one suggestion offered to create awareness was to conduct a survey about IAQ in the school, compile the information, and present it to the school. The survey could ask such questions as: How many people have environmental sensitivities in the school? What are the symptoms? and so on.

They appear to feel powerless to change IAQ practice. However, they do believe the student body should be a participant in resolution of the issue by increasing awareness of the problem and its impact on others. As indicated, they express a preference for education/awareness rather than enforcement (punitive) measures in changing student behaviour as it applies to scented products.

In contrast, most other school stakeholders do not see students as having a role to play in healthy IAQ, which perhaps explains why students feel powerless to change practice. Yet, as they state, students are among those to first notice problems since they move throughout different areas of the school on a consistent basis. They also are in the best position to positively influence, through peer pressure and peer led education initiatives, a change in thinking and practice related to student use of scented products. This could also apply to food disposal practices and their understanding and acceptance of their role in helping to maintain pride in the facility and the state of cleanliness/appearance of the school (which could affect vandalism, destruction of property, graffiti, etc.). This represents untapped potential.

Parents

Parents are concerned that schools provide healthy indoor air quality environments for their children. Most parents encounter issues with IAQ indirectly through the experience of their children. They notice problems if their children experience prolonged illness or voice complaints about the IAQ in the school. Some parents reported that their children complained of not feeling well while in school classrooms but did not experience this outside the school. Experiences such excessive absences from school and teachers on long term disability due to air quality problems were cited as examples demonstrating outcomes of poor IAQ. Typical symptoms of these illnesses include headaches, physical and mental fatigue, congestion, nausea, asthma and bronchitis-like symptoms. Parents believe that experiencing these types of symptoms while at school impacts on a student's ability to learn and a teacher's ability to teach. From a parent perspective, the school has a responsibility to ensure their children are safe while in the school's care.

From a school system perspective, parents tend to be seen more as potential adversaries than supporters when it comes to air quality. There is a heightened sensitivity about drawing attention to air quality for fear it will become a "public relations" problem. Consequently, parents are also not viewed as having much of a role to play in healthy IAQ. However, they too can be an untapped source of support. They can apply both

tacit and overt pressure to school board representatives to advocate for improvements in IAQ.

Teachers

Teachers' views are also shaped by their personal experience with poor health as a result of poor IAQ. However, while they may feel powerless when stacked against the administrative bureaucracy of the school system, they tend to believe they have more influence than students in voicing their IAQ concerns and changing IAQ practice at the school. However, some express a fear of jeopardizing their jobs or a frustration if their concerns fall on deaf ears. They believe if there is money, will, and a guided effort, IAQ issues in schools can be adequately addressed.

Custodians and Maintenance Staff

Custodians and maintenance staff tend to feel sensitive and somewhat defensive about poor air quality complaints. This is not surprising since many complaints relate to a lack of cleanliness or poor cleaning practices in schools. There is an underlying sense of a power differential between (professionally educated) teaching and school administrative/management staff and maintenance or custodial staff, which may contribute to this. There is a sense that sometimes air quality is a highly subjective thing; what is a problem for one person may not be for another, and therefore it is difficult to ensure all are satisfied. They often feel they do not have the necessary information or training to identify or rectify ventilation problems. Custodial and maintenance staff tend to feel they are the target of IAQ complaints, particularly as it relates to the state of cleanliness and their diligence in monitoring and rectifying problems. They seemed to take criticisms of poor IAQ as a personal attack on their competence and reacted somewhat defensively. In some cases, this was true but in many cases, it was recognized that budgets determined the number of staff and time available to do the job adequately.

School Administration

School administrative/management staff may be sympathetic to the issue of IAQ. However, when it is stacked against the other issues of the day, if it is not a problem at the moment, it tends not to receive a high priority. Two critical factors were identified in ensuring the maintenance of good IAQ: school board support and sufficient funds to fix problems. They would also like to see an open policy for reporting back from the school board to the school. There was also mention that if the school does not know what the standards are, it is pretty difficult to follow them. They thought that school boards ought to provide schools with the level of acceptable IAQ standards.

7.14 Summary of Findings

The following summarizes the findings from the focus groups.

Perceptions and Experiences Related to IAQ

- Many people believe that IAQ is taken for granted and that it is only thought about when it becomes a problem. Most participants believe that this issue is becoming more common as schools age and maintenance needs increase. However, IAQ is generally viewed as a low priority amongst the range of other issues facing schools.

- Awareness of IAQ issues in schools is increasing due to increased media coverage of schools and other public sites experiencing IAQ or other environmental health problems and to the recent introduction of changes to occupational health and safety legislation.

- Indoor air quality is a subject that appears not to concern many people unless they are personally affected by it or they know someone who has suffered ill health as a result of poor IAQ, or the school has had a problem with poor IAQ. This generally holds true regardless of stakeholder type and is more a function of school site.

Symptoms

- Some of the symptoms participants identified as related to poor IAQ included: allergy and asthma-like symptoms; headaches and dizziness; fatigue; mental confusion; lowered immune systems; dry eyes, mouth, and nose; temperature-related discomfort; and difficulty learning and teaching in the school environment.

Contributing Factors and Responses to IAQ Problems

- Contributing factors to poor IAQ include: the design of the building; building materials; inadequate ventilation systems; cleanliness of the school; presence of carpet in the school; materials found/used in the school (furniture, teaching materials etc.); and the use of chemical fragrances/scented products.

- There are also those who believe not enough is being done to fix IAQ problems in schools. Some reasons for the lack of action include: lack of funds to fix the problem properly; IAQ is a low priority when compared to other school issues; lack of support from school boards and administration; only a minority of people become ill or attribute their illness or health symptoms to IAQ; and the difficulty of pinpointing the cause of someone's illness, which may be IAQ related.

- Communication of IAQ issues was identified as another area of concern, in particular, the communication process involved in reporting a problem through to its resolution. Complaints about the absence of feedback or inadequate feedback were common. Teachers, students, parents, and administration report problems most often, while principals, administration, the school board, and Occupational Health and Safety Committees most often receive reports of problems.

- Trust and disclosure of information were also concerns with regard to IAQ testing. Often school occupants were unaware of what is being tested, when it is being tested, what the results are, and what, if any, health effects the air quality may be causing.

Roles of Stakeholders

- Everyone who contributes to IAQ in schools must be involved in a cooperative effort and take on various roles and responsibilities. The following roles and responsibilities were identified: teachers, students, and administration should create more awareness of IAQ issues; parents and school committees should advocate for safe indoor air; teachers, students, parents, and administration should report IAQ problems; OHS committees, school boards, and maintenance personnel must ensure the health and safety of workers; administration, maintenance personnel, school boards, and government must ensure the health and safety of students; maintenance personnel, school boards, and government must fix IAQ problems; government must provide funds; and teachers, principals, and administration must act as champions for safe IAQ in schools.

Suggested Solutions

- Solutions for IAQ problems suggested by participants include: more money; a commitment from administration, school boards, and government to make IAQ a priority; a champion in the school to move IAQ issues forward; regular IAQ testing and monitoring; reduced scents; removal of carpets; increased emphasis on clean schools; creating more awareness of IAQ; incorporating IAQ into the curriculum; tighter IAQ regulations; regular preventative maintenance; proper design of (new) schools; keeping a log of IAQ issues/ complaints and their solutions; keeping a log of health issues; and the successful implementation of IAQ guidelines.

Implementation Ideas

- A trained IAQ coordinator is needed at each school to champion IAQ management. The coordinator should assume certain roles and responsibilities:
    - to collaborate with the principal and school board representatives on the implementation of guidelines

- to provide staff with background information on *Tools for Schools* to ensure buy-in
- to involve students in the process by initiating awareness activities and involving the student council in these efforts
- suggest ways of finding teaching opportunities to encourage teachers to address the issue in the classroom
- to create awareness of IAQ through education, having IAQ experts talk to the school occupants, arranging an IAQ day or week, or conducting a school wide survey on IAQ
- to involve custodial and maintenance staff who are key in developing an IAQ management plan
- to prioritize IAQ issues, train school occupants on IAQ checklist use and implementation

- Participants have suggested several keys to successful implementation of IAQ guidelines:
  - The entire school system must be prepared and committed to implement an IAQ management plan.
  - There must be support at the government and school board level. This includes not only a financial commitment but also direct contact with a school board representative who can ensure a prompt response to IAQ management issues.
  - Constructive communication must occur at all levels that includes an efficient reporting system of IAQ issues.
  - Setting goals to ensure early successes is helpful; a positive feeling about the program will help to ensure sustainability.
  - The IAQ management program should be implemented through existing mechanisms such as Occupational Health and Safety Committees.

- Participants have also suggested barriers to successful implementation which include:
  - the number of hours involved in the IAQ coordinator role
  - the need for financial commitment to solving potential IAQ management issues

8. INDIVIDUAL INTERVIEW FINDINGS

8.1 SCOPE AND OBJECTIVES

A total of 25 responses were gathered. Interviews were conducted by telephone with 24 respondents and one person preferred to supply a written response. All 24 telephone interviews conducted were recorded, with the exception of one respondent who requested that it not be taped so notes were taken by the interviewer. The bulk of the interviews occurred between April and December of 2001 with one taking place in January of 2002.

Interviews were conducted with representatives of the federal (Health Canada) and provincial governments at very senior levels, including staff of the departments of Education, Environment, Labour, Infrastructure, and Health. Respondents interviewed included senior education policy and planning officers, staff responsible for capital planning for school facilities, deputy ministers, provincial Medical Officers of Health, physicians in charge of Environmental Officers of Health, and others. Interviews were conducted with at least one, and sometimes more, government representative in each province, with the exception of Quebec, New Brunswick, PEI, the Northwest Territories, and Nunavut, to get a sense of policy approaches to the issue in each jurisdiction. This was largely dependent upon the availability of potential respondents at the time.

IAQ consultants, who were experts in the field of indoor air quality or environmental health in the private sector or in university-based settings, were consulted. Representatives of school boards/districts - Trustees/Councillors, administration, and facility managers/staff - were consulted, as were a Provincial Public School Employers Association and a Provincial Teachers Federation. Interviews were conducted with school staff at a more local level as well, including a high school teacher who had experience with the issue and with the *Tools for Schools Kit*. The objective was to get as broad a base of policy approaches, views, and experiences as possible from experts, federal and provincial government staff, and provincial associations representing the key stakeholder groups. There was also an attempt to seek out those with differing views about the issue to ensure a divergence of opinion was captured. Various interview guides were developed for this project component, all of which had similar content but were modified slightly to suit the specific target group/respondent.

Interviewees were asked about the following:

- perceptions and significant issues associated with IAQ
- problems experienced with IAQ
- current policies or practices
- best practices, keys to successful IAQ management
- barriers and contributing factors to good IAQ management
- recommended process to implement good IAQ management practice and/or guidelines, and the respective roles and mandates of stakeholders
- communication – current and proposed practices
- comments on *Tools for Schools* for those familiar with the *Kit*

The data in this section will be presented in the following way:

- a discussion of perceptions, issues, views, and experiences provided by all respondents regardless of jurisdiction or stakeholder group they represent

- an overview of current funding programs, policies and practices by federal, provincial, and territorial government jurisdiction as it relates to IAQ

- unique perspectives of other stakeholders school boards/districts, Teachers Federation, IAQ consultants, and a community-based advocacy group

This section of the report provides a useful insight into the issues many departments and schools are grappling with as they attempt to respond to IAQ concerns in their respective jurisdictions, as well as the perspectives of key stakeholders involved. However, readers are cautioned that this does not represent the totality of effort that may be undertaken to address IAQ issues in any given jurisdiction for the following reasons:

- In every jurisdiction surveyed, primary responsibility for IAQ management practice is delegated to local school boards/districts, with the exception of the Yukon where the Department of Education retains responsibilities normally delegated to school boards in provinces. Because practices differ from site to site, and it was not practical or within the scope of the project to survey each school board, this report does not capture the initiatives of all sites.

- Information is limited to that gleaned from the specific representatives interviewed. Further, the opinions expressed are not necessarily the official positions of the agency or department.

- These data were collected largely in 2001 and additional initiatives may have been undertaken since that time.

- Information pertaining to capital projects, policies, protocols, procedures, or other initiatives undertaken by jurisdictions but not mentioned by respondents do not appear here. In other words, if other initiatives are not identified, it is because they were not mentioned by those interviewed.

However, the primary intent is to identify what jurisdictions think are the most significant issues and what is most needed in the way of best practice and related initiatives; not to identify gaps by any particular province. It is not intended to provide an exhaustive list of activities by province, but rather those items judged significant in the discussion of issues and initiatives recommended by respondents.

The following table list shows the distribution of interviews across Canadian provinces and categories of stakeholders:

Table 9:

INTERVIEWEE PROVINCIAL DESIGNATION n = 25
Nova Scotia
School board – Facilities
Provincial Govt/IAQ Expert – Medical Officer of Health
Provincial Govt. – Dept of Labor & Environment
School – Teacher
Provincial Govt. – Dept of Education
Provincial Govt. – Dept of Health
BC
BC Public School Employers Assoc.
IAQ Expert – Private Consultant
Provincial Govt. – Occupational Physician, Ministry of Health & Environment
Provincial Govt. – Ministry of Education
School District – Facilities
BC Teachers Federation
Alberta
School District – Admin.
IAQ Expert – Private Consultant
Provincial Govt. – Dept of Infrastructure
IAQ Expert – University, Faculty of Environmental Design
Manitoba
Provincial Govt. – Dept of Education
Newfoundland
School board – Maintenance
Provincial Govt. – Dept of Education
Saskatchewan
Provincial Govt. – Dept of Education
School Trustees Assoc.
Ontario
Provincial Govt. – Ministry of Education
School board – Industrial Hygienist
Yukon
Territorial Govt. – Dept of Education
Canada
Health Canada – Air Health Effects Division, Indoor Environments

Table 10: Distribution of Interviews by Stakeholder Group

Distribution of Interviews by Stakeholder Group (n=25)	
School Board/District (Staff)*	5
IAQ Expert	3
Provincial/Territorial Government	
Education	7
Infrastructure	1
Health/Environment	3
Labour/Environment	1
Provincial Stakeholder Associations	3
School Level	1
Federal Government	1

*includes Trustees/councillors, administration, and facility maintenance staff.

8.2 GENERAL FINDINGS

8.2.1 Perceptions about IAQ

When asked about their perceptions of IAQ, respondents identified similar types of IAQ problems prevalent in their areas but had different perceptions about the matter of indoor air quality, depending upon the organization they represented as well as their particular role as it relates to IAQ.

IAQ was understood to be an important issue (although for different reasons) in all jurisdictions and at all levels of responsibility. It was universally seen as an issue of genuine concern that was increasing in importance and awareness. However, the process of defining and responding to an IAQ problem was more problematic. All agreed it was not an isolated problem – it was province and countrywide. Respondents felt that some of the IAQ problems identified could have a serious impact on the learning environment and sometimes on the health of individuals. Where they disagreed was whether most problems associated with IAQ presented a health concern or were primarily a comfort issue - which was still seen to be important and acknowledged to have a potential impact on learning, but not to the degree of having a significant impact on health. They also agreed that responsibility for addressing the issue was shared among all levels and that a proactive preventive response was preferred. Parental concerns; reduced health and productivity of staff; lower outcomes for students; strained relationships between parents and staff, between staff and boards, and governments and parents; as well as increased media attention were among the many concerns mentioned.

The most significant issues identified in the interviews were:

- the perceived uncertainty and inexact nature of the science supporting IAQ, and therefore the resultant difficulty with problem definition, measurement, and response
- the degree of fairness and objectivity of the process to address IAQ problems
- the nature of the relationships among stakeholders and the degree of trust among those partners
- the (in)adequacy of communication mechanisms among stakeholders

The Perceived Inexact Nature of the Science

While all acknowledged that IAQ could be a problem, difficulty arose when defining the nature and scope of the problem, its effects, and an appropriate response. It is a common view among respondents that the state of the science in this area is such that much remains unknown and/or unproven about the problem. For example, while it is known that poor ventilation and circulation of air can cause headaches, difficulty concentrating, lethargy, exhaustion, and the like, these symptoms are present in the general population and can be associated with many other factors respondents say. The non-specific nature of many of the symptoms compounds the problem. There is a perceived lack of a proven cause and effect relationship. As illustrated in the following comment, some respondents said that it is not known in what concentration carbon dioxide or other contaminants become unacceptable. This makes remediation difficult.

> *"There is not good scientific evidence linking an individual's exposure and a health outcome. So the science is not that good....There is not a lot of good toxicological work in terms of exposure effects. ...Some of the things that are mentioned in terms of I guess ability to learn, I guess concentrating, attention, behaviour issues- I don't think they can all be ascribed to just the physical environment. So you have that sort of compounding with the social, psychological, economic environment."*

There is a variance of opinion among scientists and health professionals in defining the illness, levels of acceptable and unacceptable exposure limits, and whether something is a health threat or merely a comfort issue (which still may be a priority). This has an impact on measurement, and creates or contributes to confusion about safety for parents, teachers, and other stakeholders.

The most significant issue is being able to distinguish between an illness that is caused by an identifiable and remediable exposure at the school and an illness that has no identifiable exposure and for which no amount of remediation will alleviate the symptoms. For the latter situation, there is no satisfactory solution from anyone's point of view, making it a very difficult situation to handle.

> *"I think we get three things. We get illness among staff and children where there is an exposure for which we could assign to the evidence, and usually we have remediated or have proven that. We get illness which is maybe associated with exposure to something for which we just don't have enough evidence yet to say that that exposure causes illness. But we also get a significant anxiety and emotional overlay which may make the illness worse, in both of those situations. And you are trying to distinguish between all of those features when dealing with the problem."*

A cited example illustrates this point.

> *"We have identified situations where there is significant mould that you would have an increase in respiratory symptoms, or an increase in things such as headaches, nosebleeds, etc., for which, when you look peer reviewed research papers, there is evidence of a causation or association, which in many factors implies causation. And so you have situations where you have significant problems with mould - where you have complaints or illness among children and staff which are compatible with exposure to mould - where you remediate that situation and basically you get an improvement in signs and symptoms from those who are exposed. You get other situations where you are not able to identify a contaminant of concern at a level that, using whatever guidelines are available - be they occupational, be they from Health Canada, be they from Environment Canada - where we can't identify an exposure and yet you continue to get illness. And it is very difficult to remediate that."*

From this point of view, while there may be illness, it is important to be careful with respect to what the etiology is attributed.

In the Nova Scotia interviews, the relationship of environmental illness to IAQ was also mentioned, specifically, its influence on defining the presence of IAQ related illness. (This is not to suggest that Nova Scotia is the only province with environmental illness; rather, it was the only province in which the issue was raised in interviews.)

> *"When we go away from the school air quality issue, we have the issue of environmental illness where there is a lot of concern from other jurisdictions as to why there is such a high incidence of environmental illness in Nova Scotia - why is that not occurring in other provinces and territories? - and a concern that perhaps the attention that has been placed on it is, in fact, creating an illness. Because remember ...we have different features....If you think of it classically, we always think that a person will have a disease, and that disease will manifest as an illness. How that disease manifests as an illness is not just the typical physical and biological interactions of pathology among the organisms. It is also how well that person is able to cope, their whole culture, their whole thoughts around this disease. And we have a bit of a culture of environmental illness in NS which may, in fact, have an effect on the situation in schools."*

There is also concern that the process must be fair and based on sound findings to avoid potential situations where whole school buildings are replaced in response to lobbying when it is not necessary or not the greatest area of need (perhaps another school has the greater need for replacement), resulting in a waste or unfair allocation of scarce resources. There is a sensitivity and disagreement over the definition of IAQ and the objectivity of the process. The following comments from different sources reflect this concern.

> *"We've had whole schools replaced for reasons that, you know, in another school district we have schools operating. There is no consistency but if it becomes political, government and the public end up paying for things that they don't necessarily have to pay for."*

> *"A lot of time and money has been put into IAQ. Unfortunately, a lot of that time and money has not been well spent. Often problems are solved with expensive solutions (like the building of a new school), not because the scientific evidence supports the solution but because of public pressure and politics – not that there isn't a problem but perhaps more cost effective measures could have been found. People are partly to blame as well because if they see something being done about one school, they wonder why this isn't being done in my school."*

There is also disagreement over the definition of IAQ with regard to whether it is seen as primarily a comfort issue or a significant health issue, as illustrated in the following comments...

> *"I think of schools that don't have any air handling systems at all that in the winter time have to rely pretty much on just opening windows because their air handling systems are inadequate and sometimes not even present. So, the situation is not so much poor air quality as just plain lack of air to breathe where you have no air changes in the classroom and the students may be ill."*

Although all respondents acknowledged that some IAQ problems can be of serious concern and significant remedial action is warranted in some instances, there is a sense of frustration on the part of some government departments that people are overreacting based on an inadequate understanding of the problem and its effects. Conversely, there is a sense on the part of other stakeholders that those in authority at the governmental and school board levels are deliberately denying the existence of the issue or, while they may accept that a problem exists, may be "covering it up" because resources are not available to ameliorate the problem. This sense of denial or hiding from the truth was a particular affront to those who experience illness or symptoms of poor health.

There are various perceptions about government response to IAQ complaints: sometimes a particular response is said to be based on political reaction to uninformed parents, and sometimes it is based on antiquated ideas or lack of knowledge and awareness on the part of the particular public servant(s). Or there may be times where it is in the department's

interest to deny the existence of a problem so resources do not have to be spent to remedy it. Or sometimes, there may be public demand for a new school when the problem does not warrant that degree of intervention. There is a perception that people have various hidden and not-so-hidden agendas or other motivating factors for their position.

Apart from the state of the scientific knowledge and absence of agreement in the scientific and policy community about this problem, and individuals' lack of knowledge about the problem, attitudes and beliefs also shape the discourse on this problem. Attitudes and beliefs also influence how responsive authorities are to a concern that is raised.

> *"The biggest issue in relation to all of the IAQ issues and experiences mentioned is the denial that there is a problem – people tend to hide and ignore the problems associated with IAQ, when in reality they should stand up and face the problem head-on. You can have all of the money in the world but if you don't believe that there is a problem or that poor IAQ can have negative effects on health, learning, and behaviour then you are not going to put resources into IAQ."*

The point was also made that health symptoms associated with poor IAQ can have their origins at home as well as at school and it is important that stakeholders (parents, students, and teachers) address these potential sources of poor IAQ as well. The point being made here is that people have to assume responsibility for their health in other settings as well but that should not become an excuse for inaction on the part of the school system authorities.

> *"I think that people have lost sight of the realities and wisdoms that have kept us alive this long anyway and there is an over reaction. The slightest little thing can set people off and of course, the problem with indoor air quality is what are we dealing with in terms of human behaviour. What about air quality issues at home? What about contaminants that children might be just automatically or normally be living with anyway? What about the roles and responsibilities of more than just the school districts? We can only go so far."*

and

> *"Well, you can't cover all the bases. It is impossible. It would be too expensive and too time-consuming. Where do you draw the line? If you have a student or a teacher in a school and they are the only ones with the problem, it could be related to emotional or physical issues and you just don't know. It is very easy for a complaint issue to explode in the school basically on a highly subjective interpretation of something happening and it is just like bad weather. It affects everything around, the wind starts to blow and suddenly you are left with a problem that doesn't really exist but in their minds it does exist."*

Where there is room for subjective interpretation of an event or IAQ concern, people's attitudes and beliefs begin to influence the debate and the potential outcomes of it.

The absence of an objective scientific measure or standard to identify acceptable and unacceptable conditions creates a problem, not only in defining if something is a problem or not, but with enforcement as well. For example, in BC respondents talked about "grey areas" in Worker's Compensation Board regulations (which are the primary enforcement tool for workplace safety, including responses to staff complaints about IAQ). Specifically, they spoke of "grey areas" in terms of acceptable standards or limits which makes enforcement difficult. Under the BC Workers' Compensation Board's occupational health and safety regulations, there is an IAQ section (applied to schools as well as a variety of other environments) that has two exposure limits – a comfort or sufficient ventilation indicator of 1,000 parts per million and an occupational exposure limit of 5,000 parts per million – a "grey area" between 1,000 and 5,000. Respondents said it is quite arbitrary as to how a WCB investigator would use that marker in any given situation so this requires clarification.

Further, it was recognized, particularly by the IAQ consultants interviewed and departmental representatives, that there are concerns that have to be addressed even if the IAQ issues do not exceed the current regulator requirements. Some recommended that additional guideline documentation be developed to educate people about this.

> *"For example, the current occupational exposure limits, say for CO2, for other parameters, in 20 years of working, I have never seen a CO2 concentration exceed the 5,000 parts per million occupational exposure limit. But I know that there are significant issues associated with elevated CO2 levels way below that level."*

This also resulted in tension among WCB enforcement staff, the Ministry of Education and the particular school district as evidenced by the following statement from a provincial representative. This reflects a discussion about schools who, following receipt of a WCB order to repair or remedy a situation, call the Ministry to request funding to enable their compliance.

> *"Oh, Worker's Compensation or a health officer has slapped an order on us and if we don't comply immediately, blah, blah, blah. Well, if we have a dozen of these a year it is a slow year because sometimes there are some very zealous individuals in the field and our advice to them is wait a minute. If we responded to every one of these, we would be spending ten times the money that we don't have on air quality issues alone. What we have to say to these individuals is tell your health officer, your families, your parents, your teachers, your administrators that we have a plan in place to address these and we have prioritized and we have investigated. So the most important thing we can do through the guidelines is tell them to investigate. That's why we have the complaint investigation protocol. ... The first order of business is to investigate the complaint and draw a line around what you've got. That is the most important thing to do...."*

While the absence of standards can be seen to contribute to the debate about the efficacy of the issue and problem definition and response, there was also discussion among some respondents about the value of even setting standards and their utility in addressing the problem. Two points were made: 1) that passing a standard does not necessarily mean you do not have an IAQ problem and 2) that many do not understand the intent and limitations of test or standard and therefore how to interpret its results, making such a standard counter productive. This is reflected in the following discussion.

> *"I don't think there is any way you are going to set air standards for schools that would be at all meaningful or helpful. I think you can certainly get some standards for operation and maintenance, although these are probably not going to be national standards. They are more likely to be locally or regionally developed standards. I think you can look to standards for new school construction but I think the standards are going to be very much other than numerical concentrations for substances in air. I don't think that type of standard would be helpful. Indeed the one standard that is sometimes referenced now is the carbon dioxide standard and that one number has probably introduced more confusion and misunderstanding than anything else so in a sense, it is actually counter productive to have a number like carbon dioxide concentration like higher than this is bad or unacceptable but lower than this is acceptable, okay or no problem.*
>
> *[The carbon dioxide standard] creates confusion. Different people assume it to mean different things. Some people interpret it as a standard that protects against carbon dioxide toxicity. In other words, when you go above this concentration, then the carbon dioxide affects you. Of course, that's not the rationale for the standard at all. It is used as an indirect indicator of general ventilation. The problem is that general ventilation, or lack of general ventilation, is not always the reason for a problem in school air quality. There are many cases where you will exceed the carbon dioxide recommendation of at least 1000 ppm (parts per million) or it can be 1650 ppm that are used here and there has been no problem with school air quality. But boy [the thinking is] if you go above that number, then suddenly now you have a problem. Conversely in some cases, measurements may be done which meet the 1000 ppm criteria but the air stinks. Well, only 1000 ppm of carbon dioxide is no guarantee that you won't have other sources of air quality problems.*
>
> *The difficulty too is that it is a number that no one has set out protocols or any kind of guidance as to how one tests the determinant lines with that number. And of course, where people get samples, depending on where you are and what is happening in the school or classroom, those CO2 (carbon dioxide) numbers can be all over the map. And certainly the continuous recordings of carbon dioxide in classrooms can make it very clear that there are tremendous daily swings that the CO2 concentration can be. There is uncertainty among many folks as to whether*

this is a ceiling limit or an 8 hour time weighted average or a 20 minute limit. No one knows and no one thinks of where or how you should be monitoring to determine compliance so for a whole host of reasons, I don't think that number is particularly helpful.

...Is it really useful to set a number even as an indirect indicator? ...I think that is another debate that goes beyond just taking numbers and setting out protocols for determining compliance and then educating people what it means. I think that providing more information on what it means and trying to standardize it is a generally good thing but I'm not sure that even if one did all that, that setting CO2 standards in terms of CO2 concentration would be all that helpful. Indeed although there is a number in the WCB regulations in this province, I'm not sure that even the Workers Compensation Board knows how to apply that number or that their officers do so in a consistent manner and I think they recognize that it is a very tenuous surrogate at times whether air quality is satisfactory or not."

Some respondents spoke about the limitations of testing and suggested that it should rarely, if ever, be used as a first response to an IAQ complaint. Not only was it seen to contribute to the problem (because of confusion about its interpretation), but there was a suggestion that sometimes more testing is done than necessary.

"... while consultants may be quite reasonable well qualified from a technical perspective, if one has a commercial interest in selling testing, then I think there may be, at times, a tendency to recommend more testing than is perhaps helpful."

Where it was said guidelines could play a role was to emphasize that an approach to school air quality should focus on a building history, inspection, and walk through. However, it was acknowledged that testing is sometimes very useful. The following discusses the relative merits and limitations of testing and the conditions under which testing ought to be used.

"You do your building inspection and testing only if necessary or as a focus testing rather than a shotgun testing. Some testing tends to be worse than others with respect to how helpful or confusing it is and testing of bio-aerosols is one area where we've had particular difficulties because the results come back and are essentially uninterpretable with respect to the degree of human health risk that is implied by some of those airborne bacterial or fungal results. That is one type of testing that I guess is particularly abused or over ordered in the past. Other times, testing can be extremely helpful. We've had situations with malfunctioned furnaces where carbon monoxide testing has been done very quickly and that we do have a combusting gas problem that is quite significant. At least one case that I can recall warranted closure of a classroom."

The absence of communication or the existence of poor prior relationships among stakeholders compounds the difficulty of the issue. Typically, there are patterns of

relationships or communication among the parties that pre-date the identification of IAQ problem which shape and colour how the IAQ issue is handled.

Communication issues arise on several fronts. They may be a result of intentional withholding of information, but they may also be problematic because sometimes it is very difficult to explain the subtleties or complexities of the problem. Further, disagreement of opinion contributes to the confusion.

> *"I've been to meetings where you get two people with scientific backgrounds disagreeing about the impact of a potential exposure on an outcome, expressed in front of a bunch of people with kind of a lay background, and who are in the middle of the situation because they are obviously very concerned about it. And they are faced with this kind of scientific uncertainty, and that becomes a real problem for them in terms of trying to sort out should they be concerned or not."*

To influence improved and more open communications,

> *"...you have to influence organizational culture at the local level. That means school districts. My belief is that the folks who are open and upfront run into far less difficulty than the folks who try to stonewall and ignore. I think that the bunker mentality is one that just inherently leads to more confrontation and problems down the road."*

This was perspective that was shared among most respondents. More will be said about the current and recommended processes for communication in this section.

Discussion

As evidenced by the forgoing discussion, the scientific field is plagued with disagreement over what defines an IAQ problem, whether it should be characterized as primarily a health or comfort/learning impediment issue, how it ought to be measured, and whether standards are useful. What are acceptable and unacceptable standards? What tests should be employed and how should they be interpreted? How should IAQ standards be enforced, if at all?

Many participants, including medical health officers or public inspectors raised the issue of lack of scientific evidence to consider IAQ as an issue in the current school system. This goes against the mounting evidence of a link between IAQ and health, despite some clusters of resistance (Schneider et al, Indoor Air, 2003 Mar;13(1):38-48). The US EPA has done some extensive assessments of buildings through the USA and outlines some of the current exposure levels (http://www.epa.gov/indicators/roe/html/roeAirInd.htm)

They summarize their findings:

> *"The goal of the EPA's Building Assessment Survey and Evaluation (BASE) Study was to define the status of U.S. office buildings with respect to indoor air quality and occupants' perceptions of that quality. In this study, conducted between 1994 and 1998, a sample of 100 office buildings was used to characterize the central tendency—mean or median levels—of indoor air quality in commercial or public office buildings, representing the size building in which 73 percent of all office employees work. In a subset of the first 56 of those buildings, EPA measured the indoor concentrations of 48 VOCs. In a preliminary analysis, 34 VOCs were detected in 81 percent or more of the samples. All measurable VOCs were present at higher levels indoors than outdoors, suggesting the presence of indoor sources (Girman et al, 1999) In most buildings, the indoor concentration of particulate matter was lower than or nearly equal to the measured outdoor level. However, 11 of the buildings had PM_{10} (particles less than or equal to 10 mm) levels at least 50 percent higher than outdoor levels, which could be a significant factor in a person's total exposure." (Burton et al, 2000)*

In addition, the recent review from the European multidisciplinary scientific consensus meeting (EUROVEN) on ventilation and health in non-industrial indoor environments (Wargocki et al, 2002), concludes that there is enough evidence of the effects of ventilation on health to recommend minimum ventilation rates in buildings.

This does not negate the fact that in addition to physical factors, psychosocial factors need to be taken into account when assessing and responding to potential IAQ related problems in schools. Likewise, the fact that certain episodes of IAQ problems in the literature were strongly influenced by other factors than IAQ does not imply that all situations are driven by other factors than IAQ such as psychosocial factors.

Therefore, given the current status of the science of IAQ (see review of the literature section), it seems that there is a need to increase the awareness of individuals at critical levels of the system (health and policy) about the effects of IAQ on health, real or potential.

From a public policy perspective, there is a need to make decisions in this highly sensitive and emotionally charged environment that ensure school occupants have a healthy and supportive learning and teaching environment; that, as good stewards of the public purse, government must ensure good value for money; and that these decisions be made in a fair manner based on as sound a scientific basis as possible.

From a school occupant and pupil/parent point of view, it is imperative that decisions are made which support their right to work and learn in an environment that does not compromise their health and which supports learning. It is important that if problems are identified, authorities respond to those concerns immediately in an open and unbiased

manner, and that both authorities and occupants participate in shaping sound decision-making by becoming informed about the issue.

Although there was disagreement about the definition of an IAQ problem, and how best to measure it (or not), there was agreement among parties on the solutions. If there was ever a case to be made for prevention, in order to avoid unnecessary and expensive repairs later and negative political ramifications, IAQ in schools would be that case. All parties share the common objective of ensuring the maintenance of a healthy, positive, supportive learning school environment and a pragmatic approach would suggest that attention be focused on solutions.

8.2.2 Types of IAQ Problems Reported/Most Significant Issues Related to IAQ in Schools

Inadequate ventilation or the absence of ventilation and problems with mould were the primary IAQ concerns reported by respondents across the country, especially in older schools that were not well maintained. However, it was acknowledged that some well maintained older buildings have fewer problems than some of the schools built recently. The most significant issues identified, in terms of actual IAQ parameters, were inadequate ventilation, as evidenced by elevated CO2 concentrations, and moisture within buildings, particularly in portables.

Concern was expressed about elevated CO2 concentrations frequently found in classrooms because symptomatic of elevated CO2 levels, are headaches, fatigue, difficulty concentrating, and sleepiness, particularly towards the end of the day - factors not conducive to a satisfactory or acceptable learning environment.

Most school buildings were originally constructed without ventilation systems which meant windows had to be opened to promote good air circulation. This became problematic in the 1970's (when more schools were built to accommodate higher student enrolment) with the increased focus on energy conservation and the advent of air tight construction. The result was that buildings did not have sufficient air circulation such that carbon dioxide levels began to rise and occupants began to experience drowsiness, headaches, fatigue, learning difficulties and other symptoms. Many jurisdictions have had to remedy this by installing ventilation systems or, in the absence of funds to do so, implement alternative solutions that may not properly do the job. Only one jurisdiction surveyed had installed ventilation systems in all its schools – the Yukon. Of course, this was more easily done given that there are only 29 schools in the territory. Inadequate air circulation exacerbates other pre-existing conditions such as poor or insufficient cleaning practices and regular maintenance. Dust and dirt aggravates those predisposed to IAQ problems such as allergies or asthma.

Carpets also trap dirt and other materials so most jurisdictions have implemented a policy of replacing carpets with vinyl composition tile.

Mould issues are reported associated with coastal climates or climates of high humidity and with older buildings which have been allowed to deteriorate over the years and have not been well maintained. The building envelope has been compromised in some way such that leaks in walls or roofs have started and not been detected or repaired and mould has built up creating health symptoms for occupants. Portables were particularly problematic in this regard.

Problems with temperature fluctuations, humidity, and dryness were reported associated partly with inadequate air circulation and mould.

While a few mentioned the impact of personal practices of school occupants on IAQ (scents, cleaning products, chemicals in laboratories and the like), these were not mentioned by most respondents as significant issues, likely because of the cost factor (these are low cost items). Others cited a general lack of awareness by the building occupants as to what can contribute to poor IAQ.

Typical characteristics of schools with reported IAQ problems included: poor maintenance, poor cleaning practices, chronic problems with mould and moisture (leaks in the wall, roof, and around windows and the building envelope), inadequate ventilation, and poor construction.

Schools without IAQ problems were cited as having the reverse characteristics: they were well maintained - evidence of good preventive maintenance and good cleaning practices, had good ventilation, and new buildings were constructed with materials that do not harbour a lot of dirt, moisture, or parasites.

Contributing factors to these issues were identified as:

- inadequate funds available to upgrade existing facilities and existing mechanical systems
- school facilities in many areas of the country are aging and are either ventilated naturally with no mechanical ventilation at all or with "glorified residential furnaces" that bring in minimal amounts of outside air
- inadequate proactive maintenance, either as a result of inadequate funding or poor management

8.2.3 Current Policies and Practices

8.2.3.1 Current Approaches

Governments have at their disposal a range of tools to accomplish their objectives from legislation, to regulation, to standards (which can be set by either government or other associations and accreditation bodies and may or may not be incorporated into regulation or funding requirements), to policy and funding programs, to the more loosely structured protocols and practice guidelines.

In the area of indoor air quality, jurisdictions have legislation protecting public health, ensuring occupational health and safety, and governing the establishment of schools. The only regulations mentioned in these interviews as affecting IAQ in schools were Worker's Compensation Board regulations in BC as they apply to complaints about workplace health and safety, and Occupational Health and Safety regulations elsewhere. Some mentioned a legislative or regulatory requirement to have joint occupational health and safety (OH&S) committees, or an OH&S activity, established in workplaces having more than 20 employees. As well, there are occupational health and safety officers employed at various levels within the school system.

Some provincial/territorial jurisdictions have implemented their own complaint investigation protocol (BC) and some school boards or districts have developed their own such protocols for application solely to schools within their district.

Apart from these investigation protocols, jurisdictions have not developed their own guidelines for IAQ management or other standards. Some local schools use the EPA *Tools for Schools Kit* across the country but the extent of its use is not known; awareness of the *Kit* seemed particularly high in BC and some districts had a plan to implement the *Kit* in the near future.

Some provinces have specific funding programS whereby funds have been designated specifically for capital improvement, new school construction, or emergency repair in the event of a major event such as a roof collapse or something of that nature.

Other types of standards or guidelines used were: ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers)[1] standards, Health Canada documentation, Public Works documentation, the Building Air Quality Guide, and the NIOS EPA Boma publication from the US from the early 1990s. These were

A description of current policies and approaches used by the various jurisdictions is contained in subsequent sections of this report.

8.2.3.2 Are Guidelines Needed?

There was some discussion about the need for additional IAQ guidelines. The term guidelines was undefined by the interviewer and meant different things to different people. Respondents discussed guidelines in three contexts: as standards for air quality, guidelines for good IAQ management practice, and surveillance data.

[1] ASHRAE, the American Society of Heating, Refrigerating and Air-Conditioning Engineers is an international organization of 50,000 persons with chapters throughout the world. The Society is organized for the sole purpose of advancing the arts and sciences of heating, ventilation, air conditioning and refrigeration for the public's benefit through research, standards writing, continuing education and publications. Through its membership, ASHRAE writes standards that set uniform methods of testing and rating equipment and establish accepted practices for the HVAC&R industry worldwide, such as the design of energy efficient buildings.

IAQ Standards

When people refer to standards for IAQ, they suggest this primarily as a means of increasing the objectivity and precision of measurement, and improving the "science" to reduce ambiguity, thereby making decisions easier. Some felt that additional guidelines (by which they meant IAQ standards) were needed to increase objectivity when it came to determining the acceptability of an environment. Some believed there ought to be protocols or guidelines explaining how to use and interpret tests and the conditions under which they are most helpful. Others thought this would not be helpful as referenced in the earlier discussion about testing and its limitations. Barriers posed by respondents to the solution of standards are climatic diversity, funding to implement remedial steps (and therefore potential provincial opposition to their development), and that it may not be possible to get precise enough a standard that solves the problem of subjectivity or that sufficiently encapsulates or measures the problem of IAQ.

IAQ Management Practice Guidelines

When people speak of IAQ guidelines as guidelines for management practice - typically for operations and maintenance, although this encompasses other areas such as scents, new construction, and the like - this is offered as a more practical and potentially flexible solution than a testing standard. It is viewed as a common sense approach, which avoids potentially larger problems in the future. The primary barrier identified is still funding and the need for flexibility to suit jurisdictions' unique characteristics (climate), funding resources available, and implementation mechanisms is emphasized. It is interesting that most respondents thought climate would result in significant differences in the nature of problems experienced across the country but the most significant issues are common – ventilation (as a result of construction practices) and mould (as a result of poor maintenance). Climate might exacerbate IAQ but it was not the defining factor, as reflected by interview data.

Regarding the notion of developing national standards or guidelines, there were differing views among participants.

> *"Climatically we are so different. Building requirements, in spite of there being a national building code, do tend to be somewhat different around the country. I think that the problems that you are likely to encounter are going to be somewhat different in urban versus rural areas, cold versus warm climates, wet versus dry and I think that the guidelines you need are going to be more related to operation and maintenance."*

Others spoke of the need for guidelines and an overall strategy for schools that can be easily implemented and flexible enough for variations in region, as well as different target populations. These guidelines could be developed at the national level but would have to accommodate differences. They suggested that guidelines should be specific to a geographic region (coastal versus interior/urban vs. rural) and should be multi-level –

some that are general to the school population of teachers and administration and others that are more specific and technical for maintenance and building operators.

In addition to climate and funding barriers, access to resources and support from outlying areas was identified.

> *"One barrier would be the climatic diversity across Canada. It would be very difficult to establish a Canadian guideline. Also, if school districts ignore IAQ issues and don't spend money on them, then eventually they will become capital funding requests that are the Ministry's responsibility. Access is also a barrier to implementation – rural schools cannot as easily access programs and resources from head district offices, which are more often than not located in urban centers. Lack of resources is also an issue – too often there is not enough money or personnel available to address the issues as they are identified."*

Further, in terms of practical application of such guidelines, there are limitations based on resource availability and geographic location. One respondent commented...

> *"In practice you are never going to be able to provide the kind of on-site supervision in rural areas that you can in urban areas. Consider too that the urban school districts tend to have much higher budgets than rural school districts. The urban districts are far better resourced and typically the staff members that they would have dealing with these issues tend to have a much higher level of technical sophistication and expertise. I think there are some real geographic differences in how easy or difficult it would be to implement some of the recommendations and guidelines."*

One stakeholder group thought there needed to be legislation to protect children while in school. They believed standards also needed to be set with children in mind at a national level – standards on such things as chemicals, mould, construction, and renovation. It was recognized, however, that it is difficult to set a standard that applies to everyone so it is important to have standards that allow for differences among individuals as well.

Another equated IAQ with water quality and viewed it as another public health issue deserving of similar attention. As a public health issue, Health Canada was seen as having a role in setting acceptable standards and limits. This respondent suggested that a process similar to the development of national building code standards be developed whereby the federal government establishes the standards and provinces choose whether to adopt them by enshrining them within provincial legislation, making it more incumbent upon school divisions to comply.

However, guidelines were preferred by many because of their flexibility over regulations (and legislation) which, in some respondents' view, should only be provided when people are at immediate risk of danger of their lives. Good hard scientific evidence supporting the introduction of regulations was seen as a necessary precursor to ensure a regulatory

approach would be cost-effective. It was suggested that other less intrusive ways may be more effective.

One community-based group with an interest in this issue, has worked on formulating a number of guidelines over the years in such areas as the use of less toxic cleaning materials, painting and renovating during school 'off' hours, no-waxing of floors, and no roof tarring during school hours, and thought these to be good examples of the type of guidelines that should be developed and applied on a wider basis.

The idea was also raised about forming a National Working Group on IAQ mandated to develop IAQ guidelines and policies with Health Canada providing the lead.

Many respondents stated that there were lots of guidelines that existed and the more pressing need was to find ways to better implement them. Enhanced accountability measures were suggested as a means to ensure implementation. One suggestion was that schools implement an incident-based reporting system. Schools would be required to file incident reports (i.e., reports of IAQ problems) to school boards who would be better able to monitor problems, actions taken in response to the problem, funds spent to ameliorate the problem, as well as monitor if guidelines were being used and if they were useful or required amendment. More is said about the keys to successful IAQ management in the next section of the report.

Surveillance data

Other suggestions for IAQ guidelines had to do with the recommendation that baseline data be obtained on the normal rates of illness or symptoms (e.g., headaches, nose bleeds, etc.) in schools to enable detection of a problem. Schools exceeding the baseline could be more readily identified as having a problem that needed attention. This was suggested as something that Health Canada might wish to take on from a national perspective.

8.2.4 Best Practices and Keys to Successful IAQ Management

Respondents were asked to describe best practices or initiatives in this area and identify the keys to successful IAQ management.

Suggestions for best practice included:

- Increase training and education for all parties - Education should be targeted to staff of Education and Health Departments, engineering and consulting firms, health professions/medical doctors, teachers, administrators, school board/district staff and elected representatives, custodial staff, and others. While this was a recommendation that applied to all stakeholders, this was particularly emphasized for facilities and maintenance staff to avoid improper diagnosis of the facility problem and expensive repair. Many facility managers, particularly those in the

job for 20 or 30 years, were thought to be inadequately informed about air quality problems, yet were in a pivotal role to implement a change in practice.

"Government needs to engage the proper expertise to ensure that funds are being spent wisely – this could involve maintaining and upgrading the skills of staff both at the government and school board levels so that money being spent is being put into endeavours that will solve the problem the first time. You do not want to spend a lot of money and address the wrong issue, only to have to go back and spend that money all over again."

[and regarding training at the district or school board level] *"We have undertaken some training and education to educate people about the concerns for indoor air quality, to identify some actions in-house that can be undertaken in somewhat of a proactive way to improve conditions. So I think that is an excellent initiative."*

- Improve planning at the provincial and school board/district levels, based on better information. Formalize an IAQ program - introduce standardized reporting of problems by schools to the board/district and to the province.

  "So often, we build things that we shouldn't. We replace things that we need but because of public, political pressure and administrative pressure, a little twisting of the fact then something happens. And we don't follow up and audit these things once they are installed. We just assume that the professionals have put the right system in place and the problem is going to go away. And sometimes all it takes is replacing a fan belt and other times, it takes replacing an entire set of windows, all the insulation, all the carpets, all the flooring. Some school districts have been carrying on asbestos tile removal programs and all we really need to do is to put down sheet vinyl or linoleum over top of the asbestos tiles and it solves the problem. We have spent hundreds of thousands of dollars, millions of dollars on asbestos abatement in some cases where we really didn't need to. Again that goes back to the maintenance management issue where if we had good, consistent information coming out of the school districts, we think we would be able to make better and more informed decisions."

- Increase awareness about regulations and protocols – many are unaware of existing regulations and protocols for response.

  "More needs to be done because dealing with IAQ seems to be a very slow process – starting on a district-by-district level would be a step in the right direction to get everybody on the same page. There could be more done with the guidelines that are already out there – WCB regulations; Ministry of Education regulations – but they are not widely used."

- Get "Buy in" - Secure commitment and support from all stakeholders. Involve key stakeholders in the process of development as well as implementation of

guidelines so stakeholders do not see them as an imposition but an opportunity to build or re-build trust relationships among partners.

"I think you need great support from the administrators from the school district level, from the administrators from the individual school levels, so the principals, vice-principals, and also buy in from the teachers through the local Teachers Federation, Teachers Unions. It is important that it is seen in a positive light. Far too often, IAQ is a dirty word, and people would rather not have to address the issues. They would rather kind of bury their head in the sand and hope the problems are going to go away because there is somewhat of a misperception that if indoor air quality issues emerge, it is going to create huge problems, and a huge cost to rectify those problems. And in many respects, it is a tough sell but what it needs is the whole thing to be considered in a positive light. That we are all trying to work together to improve the indoor environment."

- Be strategic - Ensure Facilities Operation personnel and OH&S Committees are involved in IAQ management as both knowledge of the building envelope and how the building operates (Facilities Operations) and knowledge of industrial hygiene matters (OH&S Committees) are needed.

- Find a champion for IAQ - if there is somebody who is willing to work on the issue then the likely hood of accomplishing positive outcomes is increased.

- Implement routine monitoring and inspection of the physical plant to save money and ensure efficient operation of the school building.

"When facilities people visit a school, could they take an extra half an hour to make sure that the outside air intakes are open, to make sure that the filters are in reasonable condition, to make sure that there aren't obvious problems within the building's systems? Can't somebody commit an extra half an hour per school to do that? Because in some cases, that is all that it might take. Let me give you an example. I was in a school a month ago where there were localized indoor air quality issues – stuffiness, excessive dustiness, and what have you – that had been reported. I had a meeting with the staff, isolated the areas, had a quick walk through.... In the area where the problems had been reported, and in fact in the whole of one wing of the school, the unit ventilators weren't operating. There was no air being provided whatsoever. In a couple of the classrooms, the fans had actually physically been turned off because they felt that they were too noisy. But the ventilation systems were not operating in half of the school. I got into the computerized DVC, digital control system, to see what was going on. And one of the remote panels wasn't reporting back to the main control console. And so the computerized communication had broken down within the system, and it resulted in half of the school not being ventilated ... even at the custodial level, if there was a little bit of knowledge down to that sort of level about indoor air quality issues and kind of a simple procedure or a simple checklist that any facilities

people within the school could have undertaken, they would have recognized that problem months ago. So it is an interesting issue. Our training and education tends to focus on the people that deal with mechanical systems. Perhaps in a very simple way, there should be more indoor air quality-related information given to other people working within sort of a building service perspective. That if they are present within the school, they could at least undertake some simple inspection."

- Implement preventive, proactive maintenance and good cleaning practices

  "...there are a lot of commonsense things that we could be doing in the interim. I think it really comes down to a lot of basic building maintenance. An ongoing, not just intermittent sort of thing. It's sort of like in some schools where nothing is done for decades, and then suddenly there is this rush to clean it all up. And what they are doing is trying to resolve decades of neglected maintenance in a few weeks. And so it needs to be ongoing. You can't let it accumulate like that."

- Implement automated systems that take the decision-making, to a large extent, out of the hands of the day to day operators.

  "Idiot proof the system."

- Implement a surveillance data collection system - Establish a baseline rate of occurrence of illness types and collect surveillance data, similar to that for communicable diseases, to assist in detection of problems.

  "*When an outbreak occurs or there is a change or increase in the frequency of symptoms, it helps you detect that something unusual is going on, and it can also give you a sense of what it might be."*

- Improve the 'science" - Obtain more information; conduct research correlating exposures with outcomes, particularly with non-specific symptoms.

- Enhance education of physicians - to improve diagnosis of illness associated with IAQ.

  "The other thing that we find as well, where I think there has been a distinct lack of attention, where there is work to be done, is the area of the physicians. Because it is not unusual for ... and I have seen this myself and been involved in situations where a child will be ill. The mother will go to the doctor, and the doctor will talk about it, and the mother will say, "Well, the child is in school, and I think the school is making him ill." The doctor will make a judgement, and say yes, the school is making him ill. And so you've had an opinion from a physician. And sometimes that is correct. But ...what we are talking about is a branch of medicine which is environmental medicine where you are saying we believe there

is an exposure. To verify that an exposure is causing someone to be ill, it is a particular part of medicine done well by occupational physicians. I mean part of their training in occupational medicine is where you do that. I am not aware that it is very well taught to family physicians. And so an education for physicians is an area which may be precipitating or causing the problem to continue."

- Implement a multidisciplinary approach - Use a multidisciplinary and multi-sectoral team to respond to complaints to ensure necessary skills and perspectives are brought to the table. Adopt a three-step process of risk assessment, risk management, and risk communication.

  "In terms of risk assessment, different skills must be brought to the table – no one has the one set of skills that are necessary. In a typical situation, several individuals may have reported identifiable signs and symptoms for which the necessary expertise must be put in place to verify whether or not the signs and symptoms are attributable to the school environment. This expertise might include a physician, building operator, or mould expert. If there is a verifiable problem that is causing the illness, then the next step is risk management. At this point the necessary expertise would be called in to fix the problem – this could include cleaning crews, maintenance, or building contractors. Risk communication is the final step whereby the issue is communicated to the public, along with plans to remedy the situation.

  *"You have to have the **right expertise** at the table to discuss the issue and to assess what is going on. Because the issue of credibility is important, and communication is important, you have to have **participation** from the teacher group and ... from the parent group. And this is one of the principles of communication. But you still have to **do your science right.** You have to do your best diagnosis using the skills and tools you have to do that, and come up with a differential diagnosis. With a differential diagnosis, there may be some tests that confirm or refute your diagnosis. But to me that is important that you have a structured approach to doing that" (emphasis added).*

- Increase the focus on prevention of IAQ problems on a variety of fronts Prevention is an important part of an overall strategy and *Tools for Schools* is a good example of that.

- Enhance accountability - implement enhanced accountability measures by introducing incident-based reporting system (of IAQ complaints).

  "It seems to me that there are guidelines out there which are available and which are disseminated. The real question is "Is the problem getting better? Is it getting worse? Who is looking at the overall problem? ...I am talking about surveillance of air quality problems so that there is monitoring of what goes on a report which goes to the board level of the number of incidents. And you can

classify them in different levels. And then a report from that goes up to the Department of Education. So the Department of Education could be looking at what is going on with our boards, what is going on with our schools, and you could see some commonalities. So you would have guidelines but there would be a central monitoring of, not so much outcomes, but incidents. There is no reporting mechanism.

- Integrate adoption and compliance with IAQ guidelines into the accreditation process to enhance accountability and ensure implementation.

  "In BC, we have a school accreditation process. Once every six years, schools are examined by the school staff, by the district staff and by peers from outside the district. All aspects of the education program are examined and scrutinized and as much as indoor air quality issues impact on learning outcomes, it strikes me as highly reasonable or highly probable that we could get some sort of criteria built into that process. That would provide to the Ministry direct feedback on how well the districts are implementing the package or the program."

- Collect background baseline data - to determine what the norm is in terms of symptoms, so as to detect fluctuations from the norm to facilitate identification of problems. It is recommended that this baseline data research be funded by Health Canada.

  "It would seem reasonable to get a baseline of symptoms in schools. And you could say, "Well, this is the national percentage. "We have done surveillance among schools to look at the prevalence of asthma. The methodology is there.... Health Canada needs to fund that national or provincial type of work."

- Enhance communication processes - to minimize misinformation and ensure all stakeholders are well informed. Communication of the facts from a credible source is critical. It is also an essential part of good management of the issue.

- Tailor guidelines to children - There needs to be a continued focus that children are more vulnerable than adults and as such guidelines and policies should be tailored towards children rather than the typical industrial setting that only takes into consideration what would affect the average 40-year-old male. Children are more sensitive than adults and thus stricter guidelines need to be developed.

8.2.5 Barriers to Good IAQ Management

Barriers to the implementation of good IAQ management practices were identified as follows:

- insufficient funding – funding for infrastructure has not been put into place to adequately deal with some of the larger issues like replacement of roofs, removal

of mould or other major renovations. Funding becomes more of an issue with the introduction of policies or guidelines if the guidelines detect items or tasks that require significant funds to fix.

"You can have a guideline in place but if there is not money to make changes that are suggested by the guideline, then it becomes useless."

- absence of preventive, proactive maintenance, either due to insufficient funding, inadequate staffing, or poor management - the reduction of maintenance or custodial staff was mentioned by many respondents.

  "The school districts that I work in ....do their best but they are forever losing staff. And the maintenance staff are essentially reactive and continually putting fires out, and really have very little time to undertake any proactive maintenance on the buildings. I see that as a significant source of the problem."

- denial that there is a problem

- lack of a "champion" – someone to take on responsibility for action

  "Action on IAQ issues only seems to occur in there is somebody or some group present that can spearhead the cause – in some cases there are people within the school such as principals and teachers who have an interest in the issue because they or somebody they know has been affected by IAQ; in other cases parents have to spearhead the issue because those within the school fear losing their job, losing out on a promotion, or affecting their relationship with fellow staff members if they speak up about something like IAQ – in general, unless there is a 'champion' who is committed to doing something about IAQ nothing usually gets accomplished."

- poor communication – if there is a lack of communication, issues do not get addressed.

- lack of commitment and leadership – The personality of those in leadership roles can be both a barrier and a facilitator.

  "If you have somebody at the school or School board administrative level who does not believe that IAQ is an issue or they are not committed to doing something about it, then you will never have any success in implementing a program associated with IAQ. If on the other hand, you have a person committed to maintaining good IAQ in schools and who sees the value of addressing the issue head on, you will have an easier time implementing IAQ guidelines and policies."

- lack of education, knowledge, and awareness – as a necessary precursor to action

"There also needs to be a level of education and knowledge about IAQ before you start implementing guidelines and policies. If people do not understand the issue and you do not define it for them, then they will be reluctant to implement guidelines and practices associated with that issue."

8.2.6 Implementation of Good IAQ Management Practices/Guidelines

Respondents identified the following factors as critical in the process of implementing guidelines or practices for good IAQ management.

Education, awareness, and knowledge were identified as a necessary first step in order to ensure a common understanding of the problem and the need for action. *"You can't get somebody to buy into something unless they believe in it and that often involves education and persistence."*

Respondents suggested the Department of Education should take the lead and approach school boards to get support for the introduction of guidelines and, with the involvement of school boards, (and some said teachers as well), develop suggested guidelines for school boards to follow. There was some disagreement on whether these ought to be mandatory or simply best practice suggestions. This will be influenced by whether, and the conditions under which, funding is made available. All said funding needs to be in place by which to lead the effort and conduct any remediation work that may be associated with guideline implementation. The Department and school board trustees must establish an expectation that this will be done. Facility staff need to know that IAQ and issues related to health and safety take precedence over normal and regular maintenance (e.g., repainting a classroom).

Some emphasized the importance of the role of the facility managers and the need to work through them to implement improved practices. Where OH&S representatives may view the problem from a regulatory (exposure limits) point of view, building managers will view it as a comfort/facility operations issue with the result that changes can be made in operation and maintenance practices – a key contributor to good IAQ.

"What I have found in the schools environment is, it is a lot more difficult to get through to the Occupational Safety and Health people than it is to the buildings people. OH&S people may see indoor air quality as a very simplified issue and they don't necessarily recognize the important relationship between the design and operation of buildings and indoor air quality. They tend to see indoor air quality as an industrial hygiene issue and take some measurements, compare the standards or guidelines, and determine if it is good or it is bad.

[It is more effective to work with facility managers because] they can see the benefit. In many respects, they are dealing with the buildings on a day to day basis. They recognize the inadequacies in the building, and they see the

implications for indoor air quality. And they will tend, in many ways, to see the issue as a comfort issue, not simply as a comparing to the WCB regulation issue. Whereas some of the Occupational Safety and Health people who have to deal with Workers' Compensation regulatory issues in other areas on a day-to-day basis kind of slot it in that way. And you can't look at indoor air quality issues in schools in that way..."

The Principal and the Chief Caretaker/Maintenance were seen as critical players at the school level to ensure successful adoption of new guidelines and practices.

Some spoke of the need to work from the "grassroots" end of the spectrum as well to involve teachers, parents, and students in formulating and implementing guidelines as they will be most affected by them. Parents are important from a broad-based communications perspective to ensure the community understands the issue, is aware of initiatives being undertaken, and is supportive of these efforts. This helps to create a partnership approach to address the issue reducing the potential for conflict and crisis later on.

Another target population identified as part of an implementation strategy were family physicians from the point of view of providing them with education about the topic.

From the observation and experience of most respondents, most programs to date have been reactive in nature – they have been introduced in response to an identified IAQ problem. However, IAQ consultants report that there have been more calls recently for proactive approaches to prevent the development of problems, to get a better sense of the quality of air in their environment, and to determine what can be done to improve or maintain that quality. Other schools are using the EPA *Tools for Schools Kit* and implementing standardized reporting of complaints.

8.2.7 Mandates of Key Stakeholders

There many departments and stakeholders involved in the issue of IAQ whose roles and mandates are described below. Delegation of responsibilities among departments/ministries may vary slightly from jurisdiction to jurisdiction.

- Department of Education – provides operational and capital funding for the schools and is responsible for creation of the legislative, regulatory, and policy framework within which school boards and schools function. With respect to IAQ, it can create policies and guidelines and via these mechanisms can influence school boards to some degree but ultimately the school boards are responsible for IAQ.

- School boards/districts – have direct responsibility for the maintenance of a healthy and safe learning environment including IAQ in schools; responsible for daily upkeep, operation, maintenance, repair and renovation.

- Transportation and Public Works or Infrastructure – share responsibility for the physical structure of schools and become involved when a new school is being built.

- Department of Labour (or Labour and Environment) – responsible for the health and safety of workers in schools. The Department's role is to handle complaints from workers in buildings such as schools, although this responsibility is assumed by the Workers' Compensation Board in BC. Labour and Environment is responsible for the development and enforcement of workplace standards. The Department is also called in to do inspections from time to time on work-related issues.

- Department of Health - responsible for the protection of public health under the *Provincial Health Act* (or equivalent), including school occupants. This responsibility is executed through the office of the provincial Medical Officer of Health (MOH) or equivalent. The Medical Officer of Health provides a consultative role, that is, community health and epidemiological expertise to help address IAQ problems from the human point of view (incidence and prevalence rates, for example). The position also has a legislative function where if the MOH believes that the public or a certain group of children are at risk and that they are not being informed, the MOH has the responsibility to inform that group.

  The Medical Officer of Health may become involved in an air quality issue in three ways: the board, who typically works closely with the MOH, may inform the Officer of any test results and ask for comment; parents may call with concerns; and sometimes physicians will call about patients. The MOH may be called upon to investigate an illness at a school and work with the Department of Education and school board to remedy the problem.

  The Department has a responsibility to ensure that health care staff involved in treating individuals are provided with adequate information with respect to standards of treatment and guidelines. Improving research, knowledge and skills in the diagnosis and treatment of illness which is truly caused by poor IAQ, as well as prevention, is a role of the Department.

  Depending upon the jurisdiction, Health may also be involved by providing Occupational Hygienists (usually a physician) to Labour and Environment.

At the school level, the principal and OH&S committees, including maintenance, are responsible for IAQ in schools. All respondents unanimously agreed that all those

affected by IAQ in schools have a role to play in responding to IAQ problems and in ensuring the maintenance of good IAQ. Stakeholders mentioned include:

- Teachers and unions
- Students
- Parents
- Community-based advocacy/interest groups
- OH&S staff and Committees
- Custodians and Facility Managers
- Principals

Teachers and unions were also identified as key players in supporting the introduction of new guidelines, both in development and implementation. Their workplace has a direct impact on their health and safety and comfort level in teaching. The issue of fragrance was mentioned as a difficult one where a teachers' federation/association/union could take a lead in shaping attitudes and understanding and influencing personal practices. The union or federation was also seen as having an advocacy role with respect to IAQ and workplace health safety on an individual and collective basis.

Although little was said in this series of interviews about students, they were acknowledged to have a role both with respect to identifying concerns and with their personal practices (helping to keep their desks, lockers, etc clean; avoid scented products, and the like).

Parents have a role to play as the primary custodians of their children's health and well being, in influencing the child/youth behaviour and choice of products, and also in becoming informed and working with schools in a constructive manner to ensure a healthy learning environment. Promoting a positive working relationship with parents was often described as the most difficult but extremely critical task when addressing IAQ problems and solutions. It is an area that appears to require more effort.

> *"You can't shut parents out. Schools need to work with parents when there is a problem or when they are trying to establish guidelines or policies that address a problem. If parents aren't involved and something is implemented that is inappropriate, then there will be negative backlash and a bad relationship between school personnel and parents – parents have to be part of the solution, not part of the problem."*

Community-based advocacy groups provide consultation, education, training, and awareness about the problem of IAQ and its impact and ways to prevent and remedy problems; participate in research, development of guidelines for good management practice, and ideas for implementation.

Occupational Health and Safety Committees were identified a having a role with respect to IAQ because their presence, role, and mandate has a legislative mandate – a formal

acknowledgement of the importance of their function and a requirement that all schools must meet. These committees were identified as helping to coordinate identification and resolution of IAQ problems, as well as be a primary conduit of information to parties about the status of actions taken to respond to complaints, any testing results, and a key player in a communication plan.

Facility managers were identified as critical in terms of changing maintenance practices at the school district/board level.

Principals were identified as important in providing local leadership and support but were mentioned far less often than facility managers.

8.2.8 Communication - Current Process and Recommended Approach

Currently, complaints are typically reported by teachers, students, staff, or parents to either the Principal or custodian. Teachers also have the OH&S Committee as an avenue by which to voice their concerns so that they are not singled out when making a complaint; the OH&S committee will send the complaint to the school board without identifying who made the complaint. In Nova Scotia, there is a 21-day period within which a formal response to the complaint is required. School board staff will investigate the complaint (do a walkthrough and assess the problem) and remedy the situation. Some respondents said parents may actually have more leverage in communicating IAQ issues because there are fewer repercussions for them – they can communicate their issues to the school, the School board, and/or media if necessary to get action.

Communication is hampered by attitudinal barriers, the absence of a shared sense of concern about the priority of the issue, an absence of a common understanding of the problem, and generally inadequate knowledge and awareness of the issue in the broader society. It is exacerbated by disagreement among the scientific community, as discussed earlier, which makes it more difficult to understand from a lay person's point of view. As suggested by some respondents, it is perhaps most difficult when there appears to be no identifiable cause for the problems some school occupants are experiencing so remediation and communication about the issue is difficult. Communicating information about IAQ often takes place in a highly charged emotional environment which makes it more difficult to focus on solutions. Attitudes and the state of relationships and trust among stakeholders contribute to how effective communication is at the time.

Not having a protocol for communication can be a barrier to receiving information in an effective manner. There are many channels for communicating information, but respondents said they were used inconsistently, so a consistent approach to communication is needed.

Some respondents said that, because communication tends to be poor regarding air quality issues, this often contributes to the creation of a crisis with heated emotions and polarized positions among some of the parties that have an interest in school air quality.

> *" ...you get lack of effective communication when people are feeling they are victims. They wrap themselves in the cloak of victim. They use 'woundology' to support their cause and that takes you nowhere and what, in effect, takes place is that you wind up dealing with the symptom and not the cause. You wind up dealing with the secondary issue and not the primary issue. You wind up dealing with people who say pay attention to me, pay attention to my problem rather than what is really going on here. The problem could be potentially ignored or potentially we waste money dealing with it. ...Often the problem isn't that so much as it is a lack of willingness on the part of the 'victim' to see that the problem isn't a problem."*

Communication issues occur at various levels in the process: identification of a problem or a complaint; response to that complaint (actions taken); disclosure of information on what has been done and any testing results and what they mean; and proposed and actual solutions. Communication issues relate both to the way information is communicated, internally and externally, to key stakeholders and to the way in which the complaint is investigated and addressed. It is important that school occupants and parents have a way of communicating a concern and that this is clear and known. They need to know if and how the complaint was acted upon – what was found to be the problem or thought to be the source of the problem, and how and when it will be rectified. They need to have the opportunity to ask questions and become informed about the issue. Two-way communication mechanisms are important. It is important that these be structured to ensure that all stakeholders are informed. This is critical from an accountability perspective and from a public relations perspective, in recognition that this is shared concern. People do have a right to know if something is potentially harmful to themselves or their children.

Communication can happen in many ways – public forums, newsletters to students and parents, internal memos to staff, staff meetings, and the like. Communication happens in ad hoc or informal ways and in formally structured ways and both are needed - they are complementary processes which serve slightly different purposes and meet slightly different needs.

Some jurisdictions at the provincial or school board levels have formalized the process to ensure a complaint is acted upon and have structured the process to enable a person to make a complaint with some anonymity so as to avoid real or perceived retribution. OH&S Committees have been mandated to receive complaints in some jurisdictions and steps are outlined as to how and to whom the complaint will be reported and investigated. Some legislation requires that certain parties be informed of the results, the status of activities taken, and the like. In some cases, respondents in these interviews reported not being aware of the existence of a protocol, weak linkages among stakeholders (OH&S Committees, safety officers, WCB or regulatory agency personnel, teachers, for example) and gaps in the information sharing process.

At another level, there appeared to be gaps in reporting information to departments, and to the public and community at large. It was the position of most respondents that open communication helps to manage the issue better, helps to prevent the polarization of positions because people have the opportunity for discussion and clarification, and helps to ensure accountability. Complaint investigation protocols help to make the process more transparent. Because relationships between school boards, schools, and parents tend not to be very close, perhaps more mechanisms need to be found to encourage the development of those relationships, independent of IAQ issues so that when difficult issues do arise, there will be a better basis on which to start.

Respondents identified the need for:

- Complaint investigation protocol – which details, at minimum, how and to whom a complaint is to be made; what steps will be taken, and how individuals will be informed of the results or the outcome. As well, it identifies a process which helps to create a safe environment for a person to report a complaint without fear of retribution or jeopardizing one's job, or incurring the wrath of their colleagues.

- Communication plan – which identifies who will be informed, when, and by whom, and what information will be shared. It identifies various intended audiences and how the information will be communicated to them. Information must come from a credible source and one that is viewed as independent and objective. It is also important to ensure a consistent message is shared and that a mechanism exists which supplies accurate information from a central focal point to reduce confusion.

- Reporting of test results – Any testing done must be accompanied by clear information explaining the results. This could be achieved in public forA as well as reports.

IAQ consultants recommended the entire process of communication and investigation be open to encourage trust building to the point where the report, once completed, is not a surprise because information has been shared all along the way.

The process for communicating about issues like IAQ is relatively haphazard, therefore, there should be a protocol for communication that is part of a larger IAQ management plan. Some school boards do have protocols for communication but the standard should be province-wide in each jurisdiction so that there is consistency in dealing with the issue.

A few respondents said a preventive approach would help to convince the school body that there is genuine concern about the problem of IAQ. A team approach helps to bring the necessary skills together to solve a problem thereby enhancing the credibility of the process.

8.2.9 Comments regarding *Tools for Schools*

8.2.9.1 General

Respondents familiar with the *Tools for School Kit* supported the primary tenet of the package – that there needs to be a partnership between administration and the occupants of a building in maintaining a good indoor air quality environment. It recognizes that there are a number of ways that individuals have an impact on air quality and that they need to be part of the process.

In order to successfully implement the *Kit*, the following is needed:

- Make available technical resources to assist the coordinator.
- Ensure the necessary expertise is in place at each school (e.g., a person qualified to check the HVAC systems to make sure they are working properly and on a regular basis.
- Allow time for the coordinator to actually carry out the functions.
- Develop a communication plan.
- Discuss the *Kit* with school occupants to secure their commitment. Dealing with IAQ is not something that one person can tackle; it should be a team effort.
- Secure administrative support so that when there are activities that can be changed to improve the air quality, there is a commitment to follow through on those changes.
- Give teachers time to participate in such a program.

Others thought there were a lot of technical functions in the *Kit* that were unfair to download onto a volunteer or teacher, whose backgrounds were not in ventilation systems.

> *"I thought it was a bit much to ask of volunteers. And I guess that is where the administration needs to be involved, in terms of either providing volunteers sufficient time and resources to do what they are expected to do, or actually provide the technical expertise to work with the occupants to accomplish some of the goals that were there. But in general, it is a good idea. It is just some of the specifics might be a bit of a problem."*

and

> *"In some of the very technical things, I think there would be a requirement for the institution, building or whatever to provide those technical resources. When it comes to maintaining say an HVAC system then one of the things is the school board or building management or what have you needs to ensure that they have somebody with a good knowledge of how HVAC systems work and their maintenance and inspection to check the systems to make sure they are running properly, and do that on a regular basis. ... HVAC systems don't run themselves.*

They will for a while but then they get out of balance and a whole range of things. They need maintenance. The filters need cleaning."

Some respondents opposed the introduction of the *Kit* on the grounds that it was too time consuming.

8.2.9.2 A Case Study in Implementation of the *Tools for Schools Kit*

Background

An interview was conducted with one teacher who had prior experience with successful implementation of the *Tools for Schools Kit* in a Nova Scotia school. As a result of implementation of the *Kit*, the number of IAQ complaints went from over 1000 per year to less than 10 per year. The results are described here.

This school, located in an economically depressed area of the province, experienced IAQ problems in heating and air circulation – some rooms were too hot and others too cold and it was hard to control because the computerized thermometer system was not working properly. People also did not realize the importance of air circulation and would often pile books and the like in front of vents. In addition, the school was carpeted throughout. School occupants complained of headaches, tiredness, dry and sore eyes, and frequent asthma attacks.

Staff perception was a major issue in this instance. If staff feel that the IAQ is poor, then that concern will get out to students and parents and the whole issue "begins to snowball."

Process for Implementing Tools for Schools

At the initiative of the chemistry teacher, students became involved in a year-long project of monitoring the indoor environment for potential problems. This teacher trained her chemistry class students to monitor such things as temperature, ventilation, and other building practices. Students also made IAQ the topic of their Science Fair so as to create more awareness and understanding about the issue. *Tools for Schools* was also used – this initiative proved successful in involving everybody in the process of tackling IAQ issues at the school.

This teacher was able to get students involved in making changes to the indoor environment by making the monitoring project part of a class activity and was able to incorporate IAQ monitoring into the lesson plan. Initially, there was some resistance on the part of students to become involved because the school was in a crisis about the state of IAQ and almost came to the point of being shut down. The teacher educated the students on IAQ and talked to them honestly about the situation to convince them that their involvement would be beneficial to avoiding school closure. She arranged for representatives of the school board and maintenance staff to come and talk to the students

about ventilation and IAQ to demonstrate that there was administrative commitment to do something about the IAQ.

A training session, conducted by school board staff, was held for maintenance staff and the OH&S Committee on how to use *Tools for Schools*. The *Kit* was implemented by the teacher (also OH&S Committee member) through her Chemistry class. Instead of overwhelming staff and other students with the checklists in the *Kit*, the Chemistry class began by taking temperature readings throughout the school from which they were able to make some small changes early on and this helped to change the atmosphere at the school and receptivity to the project.

Once staff at the school were more comfortable with the idea, a presentation was held about the *Tools for Schools* approach, checklists were distributed to staff and returned to the chemistry class students who, with the help of the teacher and maintenance personnel, tabulated the results and prioritized the issues identified by staff. Constant communication during the entire process between the students, teachers, staff, and maintenance helped in the successful implementation of *Tools for Schools*.

Parents were not involved at the beginning of this process because of the sense of panic that was present in the community. However, once some successes were achieved, parents became aware of the initiative and the improvements made by attending a school Science Fair.

Barriers and Critical Success Factors

In her experience, this teacher concluded that the following factors need to be in place to ensure successful implementation of the Kit:

- Need **a champion** at the school in order for change to occur – somebody has to be in place to lead the initiative and to arrange to have experts come in to the school as necessary, either to complete work or to educate stakeholders on the issue.

- If the champion is to do his or her work effectively, there must be administrative commitment to make changes. If a needed change is identified, then the school board must act quickly to make those changes.

- Support from the school Principal is also important. Had the Principal not approved of the *Tools for Schools* project, it may not have been successful.

- Money can be a barrier to making changes but there is always an emergency budget available. One must be persuasive and provide evidence that change is important and needed at the school.

- In trying to implement *Tools for Schools,* the biggest barrier proved to be convincing the sceptics that the tool would work to change IAQ at the school. To address this,

the IAQ concerns of these individuals were dealt with first and changes were made that affected them (removal of carpet from their classrooms). This strategy helped to secure their support and these individuals became some of the biggest proponents of the *Tools for Schools* initiative.

- Time was another barrier to implementing change as using the *Kit* was time consuming. It took some time to work with school staff. Had the *Kit* not been implemented as part of class curriculum in the chemistry class, it may not have been as successful. This teacher also used part of her class preparation time to adopt the *Kit.*

Suggestions to Enhance Success

The following changes were recommended to improve the Kit: include a ready-made presentation that could be used to present the *Kit* to staff at the school; condense some of the checklists because it is almost impossible to use them all.

Although the *Kit* is still being used on a monthly basis, school wide checks are not being completed. This should be done but the support at the school board level has not continued because of change of personnel, meaning that if a problem is found there is no guarantee that it will be addressed. This support needs to be put back in place and thorough checks done more often.

The school board needs to be more proactive to change – there needs to be more emphasis on prevention and less on reaction to a problem. While the school has since become more proactive over time, this occurred only after the school was in a crisis situation. It is her view that had the school board been more proactive at the outset, the crisis never would have occurred.

At the provincial level, more funding needs to be made available for school infrastructure; if there is more money available for repair, then fewer problems will be encountered.

Problems have been minimized through use of the *Kit* but its continued use is important to preventing problems. The *Kit* is still used on a monthly basis to ensure that things are still working properly at the school.

It is also important to have resources available when implementing a new initiative – maintenance and school board staff provided expertise, while the *Tools for Schools* website provided answers to questions as the *Kit* was being used.

Open communication was important throughout the entire process, from information gathering to reporting. Meetings were held to provide feedback and answer any questions parents or school occupants might have. Because an open dialogue was created, people

felt free to express their opinions and, as a result, all complaints were addressed to the satisfaction of all school occupants.

8.3 JURISDICTIONAL OVERVIEW

This section of the report is based on data obtained from government representatives and provides an overview of their perceptions and views of IAQ issues, the most significant IAQ problems experienced in their jurisdictions, and the current mandates, policies, practices and funding programs relevant to IAQ in the federal, provincial and territorial governments. The subsequent section provides commentary provided by other stakeholders – school boards, teachers federation, and IAQ consultants.

8.3.1 Federal Role

Given that education and the delivery of health services are primarily fields residing within provincial jurisdiction, Health Canada identified itself as having a potential role in the development of guidelines and standards affecting IAQ and in acting primarily as a resource to schools, provinces, and others, providing information, tools, or guidelines as necessary. With respect to the *Tools for Schools Kit* for example, the Department can take responsibility for ensuring that the content of *Tools for Schools* is current to the Canadian context; for actual production of the *Tools for Schools* manuals themselves; and for dissemination of information to school officials.

The Government of Canada also has a role to play with respect to the administration of schools for First Nations communities on reserve. However, interviews were not conducted with either federal government or First Nations representatives in regard to IAQ in school buildings under this jurisdiction.

8.3.2 Yukon

The Yukon is unique in character, when compared with more southerly provinces, with many small communities scattered over a large geographic and remote area. The Territory has 29 schools with a total school population of 6000 and, given its small size, it assumes the roles of both the Department of Education and a school board. Some schools are literally one room school houses with 25 students, depending on the size of the community.

Perception and Significant Issues Related to IAQ

The perception in the Yukon government is that the IAQ problem in the Yukon is not as severe as in other regions of the country. IAQ issues in the Yukon tend to be related to either inadequate ventilation/high carbon dioxide content or volatile organic compounds and airborne pollutants arising from mould growth (as a result of high humidity problems or roof leakage) and from building materials. Initially, many older school buildings

experienced significant air and heat loss and, as buildings were upgraded and made air tight, air quality problems and poor health symptoms associated with high CO2 levels began to appear (headaches, tiredness, etc.). Some buildings did not have ventilation systems at all.

Over the last 15 years, ventilation systems have been installed in all schools eliminating the problems associated with high CO2 levels. Roof leaks and mould issues have been resolved with the upgrading and retrofitting of buildings as well.

While poor IAQ has a negative impact on learning, there are other significant factors that affect learning as well, such as alcoholism and poverty. There have been no problems that have required major capital spending since ventilation systems were installed; most issues have been resolved with improved cleaning practices.

Mandates

The Department of Government Services, Property Management Agency is responsible for the upkeep (building maintenance, building operation, custodians, security, and landscaping or grounds maintenance) of all buildings in the Territory, including schools, and any IAQ issues they may face. The primary role of the Department of Education Facilities Manager is to act as a 'buffer' between schools, the Department of Education, and the Department of Government Services; to collaborate with, and facilitate discussion among, all of the Departments; to provide funding for school construction and repair; and to address problems as they arise by sending out maintenance personnel to fix problems.

Current Policy or Practice

In the Yukon, there is an IAQ complaint response procedure that is followed for all publicly owned buildings, including schools. It is primarily a complaint-driven process with no proactive policies or guidelines in place. Practices employed include allowing sufficient time for the building to air out following renovations. If IAQ did become a major issue, the Yukon would like to see a rigorous analysis of existing buildings and an established list of priorities and capital projects to address those priorities. They were aware of the *Tools for Schools Kit* and have copies in their office but have not had a need to use it.

The suggested process for implementing good IAQ practices, policies, or guidelines was to first identify a problem or concern (e.g., high CO2 levels) at the local level, gather public support for the issue, present the argument to government, and, if the concern was valid, it would be implemented into the capital budget. Implementation was thought to be easier given the small size of the governing structure which facilitates decision-making.

Communication Processes

The process for responding to a problem or communicating IAQ issues was identified as follows.

If there is an IAQ problem at a school, the Government department will send out an expert in the area to assess the situation, in conjunction with the building maintenance manager. If the problem is serious enough, other branches of the government will get involved, including Environmental Health Services. Communication is very centralized with the government communicating directly with the schools, and experts if necessary, to solve a problem. A complaint originating locally will be communicated from a student or teacher to the Principal and then, if serious enough, on to government.

Barriers and Facilitators

With respect to barriers and facilitators, lack of awareness of the causes and consequences of poor IAQ can be a barrier but this was not seen as a significant challenge as the Yukon government is centralized and small. Open communication and collaboration were identified as key factors to successful implementation. Better understanding of IAQ issues on the part of the public would make communication efforts more effective.

8.3.3 British Columbia

The province has 1800 facilities in the education program and various climatic changes from a coastal or rainforest climate to a hot and dry climate in interior BC.

IAQ Perceptions

Concern was expressed that most people are not well informed about what good air quality means. While it was acknowledged that IAQ problems exist, it was felt that often people overreact to IAQ issues before they get all the facts. There is some hysteria involved, a lack of information, and a lack of real knowledge and wisdom. The need to gather all the facts before concluding there is a serious problem was emphasized. The situation is compounded by the absence of inexpensive, readily available tools and methods for determining first of all, what might be in the air in a particular classroom and secondly, what it might mean in terms of air quality. Specific guidelines or standards for good IAQ are needed. There are many standards and guidelines but there is some debate about which ones should be applied to schools. The biggest problem this respondent identified was in defining air quality with respect to what is and is not adequate.

Lack of education about IAQ is a concern because it becomes problematic to explain activities being undertaken to mitigate the problem. Parents, in particular, need to be better educated on the issue. There is also concern that the process must be fair and based

on sound findings to avoid unnecessary expenditures or an unfair allocation of scarce resources.

Most Significant IAQ Problems

In BC, the most significant problems related to IAQ are ventilation and moisture problems. Proper ventilation is not available in all schools, particularly schools with no mechanical ventilation. In addition, some schools have moisture problems because of a faulty building envelope – so-called wet wall syndrome (wet walls or leaky buildings where there are moulds present).

Contributing factors were said to include poor construction and poor design.

Current Policies or Practices

There are Worker's Compensation Board regulations that address IAQ. The Ministry of Education has a Complaint Protocol. The EPA *Tools for Schools* is used in some school districts and audit checklists are used by the public health inspectors.

An Indoor Air Quality Complaint Investigation Protocol, specifically for schools, was developed by the Ministry of Education Capital Planning Resources Division and is available to all health and safety officers via the Ministry website. The Protocol is primarily a complaint investigation guideline and not a management guideline for indoor air quality.

The Ministry is dealing with CO2 issues identified by the Protocol by implementing action plans now to upgrade, replace, or install good air handling systems in schools as part of a long term program.

The Protocol has been supplemented with professional development seminars for facilities maintenance staff in the last 12 months. Specialists and consultants in IAQ were brought in to deliver the seminars. Copies of the EPA Introduction to Indoor Air Quality Reference Manual and Self-Paced Learning Module were made available as one resource tool, along with other publications, website pointers and practical advice on identifying problems and responding to complaints and public perceptions.

As well, as a result of *Bill 14*, any workplace that has more than 20 staff members is required to have an occupational safety and health activity and a safety and health officer identified. Those individuals are required to be trained in these issues.

The Ministry was working on a guideline to assist the school districts in investigating their wet wall syndrome, also a contributor to IAQ, which was expected to be in place by the fall of 2001.

The Ministry is also encouraging schools to remove carpets and offers funding support for replacement of carpeting. The Ministry was also planning to introduce the *Tools for Schools Kit.*

Education initiatives with respect to IAQ have been undertaken by School Plant Officials Association (SPOA) as well as the BC Public School Employers Association, and the BC Teachers Association has participated in workshops and been involved with seminars. SPOA will typically include an IAQ component in their annual meeting and their annual seminars. There is also private sector involvement where firms have delivered half day training sessions as a precursor to districts setting up their own IAQ programs.

Training has been done on an individual organization basis (district to district and school to school) so the type of training that is given can be tailored to the particular needs of each organization. The IAQ training program offered by an independent IAQ consultant was developed out of years of experience in dealing with IAQ issues, in addition to information gathered from a number of resources, including: the EPA *Tools for Schools*; Health Canada regulations; Public Works guidelines; the Building Air Quality Guide; and the NIOS EPA Boma publications from the early 1990's. Training will often involve initial definition of the problem, identification of concerns, identification of causes and sources of IAQ problems, identification of mitigation actions, and helping each organization set up some frontline tools and actions that participants can take to their own schools to deal with IAQ issues in-house as much as possible. Those receiving training are most often Facilities Operation personnel who are engaged in the training process via seminars, one-on-one interviews, and by doing visual inspections of the schools.

Communication Processes

IAQ complaints normally go from the school to the school district where they are evaluated and then, if it involves significant expense, test results, renovation details, and requests for funds to mitigate the problem will be forwarded to the Ministry. There are three ways in which IAQ issues are communicated to the Ministry: telephone contact, emergent funding requests, and annual capital plan submissions. The last two typically include details of the cause and detailed estimates of the remedy. The degree of research and supporting information from investigations varies by district. Procedures are in place for responding to requests.

Roles

The role of the Ministry of Education is to develop policy and protocol that can be passed down to the School Districts for implementation. The process of policy development is usually lengthy and needs support from all levels of infrastructure in order to be successful. The Ministry is also responsible for funding allocations that could be used to implement programs or fix problems.

The Ministry has no authority for implementation of guidelines or policies as that authority is delegated to the school districts. School districts, and the Health and Safety Officers within each district, are primarily responsible for IAQ issues and implementation of guidelines. The specific designation of roles to staff is dependent upon the size of the school district whose job is to delegate those responsibilities.

The Worker's Compensation Board also has a role if a complaint is made. When a complaint is made to the WCB (regarding the health and safety of staff), the WCB is required to come to the work site, investigate the matter, and prepare a report outlining the results.

Barriers and Facilitators

Geographic distance as compared to the staffing resources available to maintain and continuously monitor buildings is a barrier. Adequate resourcing is a perennial problem. Government priorities change, which makes it difficult to ensure consistency with long term solutions. It is important to prioritize health and safety issues above all else. This may also require education of district authorities to raise their consciousness about the importance of IAQ and health and safety. Because school boards are elected and they determine funding allocations within their budget, it is also important to educate the electorate as well as those they elect.

Best practices/recommendations

The Ministry would like to implement a maintenance management system – a standard for all of the facilities in their inventory. Some of this work is conducted now with facility audits. The maintenance management system could be an automated system that would allow the department to monitor the quality of buildings on an annual basis, the amount of money put in to building repair and maintenance, and the overall condition of the asset base *"because let's face it, if there isn't enough money being put into maintenance, the buildings are continually deteriorating to the point at which they are not being maintained and we are not getting value for money."* Better planning tools would assist in identifying and justifying need based on hard evidence which, in many cases, is absent.

Communication Barriers

Communication barriers were identified in the province. This appeared to take place at multiple levels but lack of effective communication at the district level which resulted in calls to the Minister was mentioned. The prevailing attitude that government is unresponsive and uncaring and unwilling to deal with the problem was mentioned as particularly unhelpful. Attitudinal barriers harboured by some district level administrators were said to hamper the process as well.

8.3.4 Alberta

Alberta has about 1500 school sites in the province, all of which underwent a recent (2000) physical plant audit.

IAQ Perceptions and Significant Issues

Mould is the most prevalent problem, particularly mould in the ductwork, probably caused by not keeping up with the maintenance schedules. In many school districts, custodial staff have been switched from long term, permanent employees to contract staff in an effort to save money, as the latter are paid less and have less training than the former. The result is that ongoing small maintenance items (such as cleaning the mechanical system, ducts and filters) are overlooked as these duties are not in the contract for custodians and are often not assumed by others. There is not the same sense of ownership and pride in the building.

Current Policies and Practices

There are two departments with responsibility for good IAQ management as it pertains to schools in the province – Alberta Infrastructure, responsible for building and modernizing school buildings and Albert Learning (formerly known as Education) responsible for plant operations and maintenance, as well as curricula, and other matters.

There are two funding programs within the Ministry of Infrastructure that impact school facilities:

- Modernization Block Fund – under which schools are provided a block of funds to upgrade and maintain schools, consistent with the results of their facility audit
- Building Quality Restoration Program – which allows school boards to repair aging building components such as ventilation systems.

The amount of money a board or school receives from these programs is based on student enrolment numbers. In addition, Infrastructure has developed guidelines for school boards that cover a number of areas from construction through to maintenance, which has been provided as a best practices document. It suggests, as an example, that boards institute an ongoing preventive maintenance program and that custodial practices include regular maintenance of the mechanical systems, cleaning ducts annually, changing the filters once a month during the heating season, and conducting inspections to ensure all the operating parts of the system were operating properly (vents opening and closing properly, outdoor air mixing values operating properly, etc.).

A policy was implemented in 2000 to conduct a complete audit of all schools in the province as part of an ongoing movement in the province to be more proactive about IAQ issues. This process seemed to serve as an opportunity to cement positive relationships

with school board staff. The Department would like to see policies and guidelines developed that *require* a year-round program in the school of continually monitoring IAQ, checking air handling units, cleaning ductwork, and the like, as well as the development of an emergency fund to address emergencies that arise through the school year (e.g., boiler failure, roof collapse).

The Prairie Rose School Board in the province has developed a set of guidelines to handle IAQ management. The Department hopes to use these, along with the findings of the Capital Health Study on Indoor Air Quality in Schools currently underway in the Edmonton area, and the findings from this project to further develop their own guidelines in consultation with stakeholders.

The Department described its relationship with school boards in the province as positive.

Implementation of IAQ Practice Guidelines

The most effective way to handle IAQ issues would be to have a coalition in place responsible for IAQ. This coalition or committee would consist of members from the Ministries of Infrastructure, Learning, and Health, as well as representation from the school board. This implies that IAQ is a complex health, education, and funding issue that requires a joint effort from government and local school boards.

A suggested process to implement new guidelines would be to distribute an explanation of the guidelines and the policies, what constitutes "good" indoor air, and what actions are being taken to ensure the continued maintenance of good IAQ.

Open communication and the maintenance of a good relationship between the government and school boards is key to successful implementation. Any audits and studies that are being completed in the province that support more preventative guidelines and policies will help foster implementation.

Education is also an important factor for successful implementation, particularly public education. One suggestion was to inform students at each school about the program being implemented and ask that they take this information home to their parents.

Involvement of alls stakeholders in the development of guidelines will increase the likelihood of implementation.

Barriers

The availability of funding was identified as a barrier to guideline implementation. Major problems with the physical plant must be fixed first before implementation. *"If you are trying to implement policies and guidelines to improve IAQ and your physical plant at the school is not working properly, then no policy or guideline will help – especially preventative problems – you have to fix any major problems first."*

8.3.5 Saskatchewan

IAQ Perceptions and Significant Issues

Lack of ventilation and fresh air access are the primary concerns, along with mould. Many problems with air quality originate from earlier efforts to reduce energy consumption in the seventies. Insulation was added to a lot of the buildings and drafts were reduced to prevent what had previously been infiltration of fresh air, resulting in lack of ventilation and consequent high CO2 readings.

Current Guidelines or Practices

The primary role of the Department of Education with respect to school infrastructure is to provide funding for upgrades to meet standards. The Department has no specific guidelines but larger school districts have developed their own. Some divisions have developed their own long term plans to improve the mechanical systems in all of their schools as well. Generally, the province is trying to phase out ductwork under the floor in favour of placement over head or along the walls within the schools to address mould issues, as well as install ventilation systems.

The Department would like to see some baseline standards developed for other IAQ aspects beyond simply CO2 levels, as well as guidelines for IAQ testing procedures and some federal standard set out for school buildings, like a building code. Guidelines for testing are needed, as well as qualifications for the people doing the testing.

Re: Tools for Schools

The respondent was familiar with *Tools for Schools* and was supportive of implementation of such a model in schools. The Department could encourage adoption of the *Kit* and could provide educational assistance but implementation would be at the discretion of the individual school division.

> *"I think the biggest benefit to the Tools for Schools thing is education and just a matter of getting everyone to realize that they have a role to play and so I think the major thing is to get everyone conscious of what their efforts have to be and deal with it in a cooperative fashion rather than pointing fingers at other people that you have to do something. It doesn't look to me... It looks probably time consuming initially but once people get in the habit it will become practice, just like sweeping the floors or something like that. It is going to be a big help and probably not that cost prohibitive. Where the big costs are coming in is where we do have deficiencies in schools that have to be corrected."*

Barriers and Facilitators to Implementation

Financial constraints are the biggest constraint with respect to the implementation of new policies and guidelines. As well, the *Tools for Schools Action Kit* is very time consuming to use. Another barrier is unwillingness on the part of some occupants and parents to identify a problem for fear of school closure and may not say anything about deficiencies to prevent such closure. There is not a lot of awareness in regard to IAQ issues so there may be a steep learning curve when trying to implement IAQ policies and guidelines; increased awareness is a necessity.

Current process for Communication

Complaints usually go through the Occupational Health and Safety Committees at each school and then to the school board and, if it cannot be handled at that level, then a representative from the Department of Labour is called in. The Department of Education only becomes involved when money is required for remediation.

Barriers and Facilitators of Good Communication

Panic associated with IAQ issues is a barrier to effective problem solving and communication. The Department of Education encourages school boards to be as open as possible with students and staff but it is ultimately the board's decision on how they handle the problems. The fact that most problems are dealt with at the local level assists in building trust with school occupants creating a more open environment for communication.

8.3.6 Manitoba

IAQ is an issue that has gained increased importance over the years. There are many aging buildings in need of new ventilation systems in the province, as most buildings do not have mechanical ventilation systems. As well, there is a lack of resources (funding and personnel) to adequately address the IAQ issue, which results in a lack of preventative maintenance.

In general, the national building code for new construction and renovations that requires adherence to ASHRAE standards is followed; there are no specific provincial IAQ guidelines.

Two relevant initiatives were identified:

- **Environmental Assistance Program** – a cost-shared system that was originally established to help school boards deal with toxic substances in schools (i.e. asbestos) and now covers improvements such as providing air conditioning in schools, mould remediation, duct cleaning, testing and balancing of air systems,

and replacing windows. The province has a lump sum that is dispersed among the school divisions according to need.

- **Air quality program for portables** – to encourage school divisions to upgrade the older portables which is 100 percent funded by the province on a first come first served basis.

However, there is a need for some consistency in the distribution of funding between city and rural schools as urban schools have secured the bulk of funding to date.

Barriers to Communication

One barrier suggested is that perhaps there is not enough communication between the school maintenance people and the occupants – occupants need to keep the maintenance people informed of any problems and likewise maintenance have to keep occupants informed of what they are doing and what the master plan is for the facility. Another issue identified was fear – people may be afraid to voice problems to the school division or school in fear that the school will be shut down or they will lose their job.

Re: Tools for Schools

If the school divisions were to proactively implement a program like *Tools for Schools*, it would first have to be presented to the Manitoba Association of School Board Officials. From there it would be introduced to individual school divisions and then to schools themselves.

Funding is the biggest barrier – resources are scarce and school trustees may not want to spend funds on new initiatives like *Tools for Schools*, especially in rural school divisions where funding is particularly limited. Often communication is a barrier.

The Department is generally supportive of preventive approaches which increases the likelihood of implementation of IAQ guidelines such as *Tools for Schools*. It is important that programs or guidelines be user-friendly – programs like *Tools for Schools* need to be written for the lay person to help them understand the issue and need to be presented in a manner that allows people to apply it to their own situation (e.g., the use of case studies from schools that successfully utilized the *Kit* would be helpful).

8.3.7 Ontario

Perceptions and Issues

The most significant IAQ problems are mould and ventilation. There are approximately 10,000 portables in the province and they have major mould issues. Many buildings lack mechanical ventilation systems and this can become an IAQ problem.

What is needed is a team effort – custodial staff, principals, safety representatives, facility managers, and building owners all working together on a plan that involves preventative maintenance, good communication, training, and regular inspections.

Current Policies and Practices

The Ministry of Education does not have any specific policies or guidelines, although they do take recommendations for best practice and use them as needed (e.g., regular checking for mould). The school board Health and Safety Departments utilize many documents when looking at IAQ issues. Workshops will also be delivered by the Department on an as-needed basis to address issues such as mould and remediation procedures.

Any new guidelines that are created should be practical, voluntary, and provide recommendations that are low cost; and school boards should also be involved in the development of policies and guidelines.

The Ministry of Education would not be involved in implementation; they would simply endorse the idea and provide funding as needed. The way to implement a program or policy would be to go through a steering committee (e.g., Ontario Association of School Business Officials) at the provincial level and have that filter down through any other provincial associations involved with schools. At that point the school boards could become involved to look at ways of implementing the policy at the next level – schools. The Ministry's primary role is as a funding agency and, secondary to that, to encourage the use of guidelines and provide workshops for facility managers on IAQ issues.

The idea was also raised about forming a National Working Group on IAQ mandated to develop IAQ guidelines and policies in which case the Ministry could act as a liaison between the working group and school boards, providing notification of the status of the initiative and reviewing any documents that could potentially be used by boards.

In the opinion of this respondent, making guidelines like those in *Tools for Schools* mandatory would impede its success. Another barrier was the involvement of teachers in the process – having teachers involved might increase the number of issues on the table to the point where the initiative would become overwhelmed. Any guideline, policy or program has to be appealing to school boards to use – meaning it has to be user friendly and it has to be shown to produce results. A good working relationship is also important for successful implementation – the Ministry and school boards already have a good working relationship that may assist in the development and implementation of IAQ tools and guidelines. Sharing information also helps with implementation.

8.3.8 Nova Scotia

IAQ Perceptions and Most Significant Issues

The issue of IAQ has taken on increasing significance in recent years. While it is not a new issue, it did not receive much attention until the last decade. Prior to that, if people became sick, the problem was attributed to the individual rather than the building. IAQ is not a well understood issue either by the public or by school administration so sometimes a problem will get blown out of proportion and people will perceive that there is a big problem when in reality that may not be the case. Separating perception from reality can be difficult to do in an emotionally charged environment.

The Department of Education and the school boards need to work together to minimize risk as much as possible; one needs to deal with the real issues before there is a perceived crisis. From a Department of Labour and Environment point of view, the health and safety of staff in the building is the primary issue – and secondarily, students. The Department of Labour and Environment receives complaints from staff at schools, which typically concern poor ventilation, the presence of fungus or moulds, renovations occurring during peak occupancy times, and lack of routine maintenance. However, most issues are typically addressed at the local school and/or school board level. School boards have protocols in place. Should significant funds be required to mitigate an IAQ problem, the Department of Education will be consulted. As a last resort, the Department of Labour may become involved.

The most significant IAQ problems experienced by this jurisdiction include problems with mechanical ventilation systems; mould; carpet removal; limited funds to deal with issues; dirt and dust from inadequate cleaning and storage of materials; renovation during occupancy; and leaky roofs and windows. Building design; ventilation and its operation; facility maintenance; and facility occupancy load are the primary issues.

Respondents spoke of having observed changes in attitudes related to IAQ.

> *"I think attitudes have changed to a significant extent because there have been a number of issues that have promoted awareness. First of all, there has been the work within the government and within particularly the Department of Education – working on teachers, informing them and making them aware of that. The second is that there have been organizations that are involved in the promotion of a healthy environment. They have done a lot of work themselves, also identifying educational resources, papers, and help work with departments to develop a library of resources."*

One issue mentioned as a contributing factor to reduced IAQ was the change in practice regarding inspection. Health inspectors used to conduct regular inspections of schools but this practice was discontinued as government started to downsize and devolve, and as

inspectors moved over to the Department of Environment where this is no longer seen as part of their role.

> *"But we still need to have the ability to work together as a team. Government needs to have some role in protecting the public's health in, first of all, making sure that there are regulations and that they are enforced, and secondly, providing technical assistance when there are problems so that money is not mis-spent."*

Respondents also suggested the re-creation of an IAQ committee comprised of the departments involved in these issues to ensure a coordinated and more effective response. There used to be an interdepartmental committee with representation from the Departments of Education, Health, Labour and Environment, and Transportation and Public Works.

Current Policies and Practices

There are standards in place for ventilation for existing buildings (that follow ASHRAE CO2 levels) and policies for carpet removal but no specific guidelines or policies for dealing with IAQ at the provincial Department of Education level, except as it applies to new construction. The province developed a Design Requirements Manual (DRM) which contains guidelines for new school construction including building design and ventilation. The Manual incorporates many IAQ sensitive elements and was developed, not only by architects and engineers, but in consultation with the community and occupants of schools – teachers, parents, and students. Some standards in this manual exceed ASHRAE standards (e.g., the DRM calls for 100 percent fresh air in schools, which is far greater than what is recommended by ASHRAE). However, because the guidelines set out in the DRM apply only to the construction of new buildings, there needs to be a system in place for maintaining new and existing buildings as well. This means finding a way to have the financial structure in place to properly maintain schools – more funds and resources for preventative maintenance.

At the regional school board level, there are locally developed guidelines for investigations and intervention. All school boards have developed policies, programs, education, and in-servicing in IAQ, and, in many situations, have staff who spend a major portion of their time dealing with IAQ issues. Some have their own IAQ protocols. (Note: The Department of Education has since developed a complaint investigation protocol in conjunction with school boards which has been shared with boards for implementation.) Some boards in the province are also said to be using the New York protocol for mould removal but this has not been verified. ASHRAE, National Building Code Standards, and fire regulations were also mentioned as relevant. It was recognized, however, that even they are not adequate for use in non-industrialized settings like schools. As well, as mandated by law, all workplaces of 25 staff or more have a joint occupational health and safety committee.

The previously implemented policy to remove asbestos from schools helped to improve IAQ and health conditions.

The EPA *Tools for Schools Kit* was used successfully in a pilot school in Nova Scotia.

Best Practices/current practice

Tools for Schools is an excellent initiative that encourages people to work together. The program was piloted successfully in one school that had lots of complaints in the beginning but now has virtually none. With the support of the Department of Education and the school board, the school was able to tackle the problems and find solutions. While not all problems can be resolved this way, if a school is willing to help itself, then the Department and board should be there to support the school as needed. The main reason for *Tools for Schools* not being implemented province-wide is that schools are not ready yet to accept some of the responsibility for instituting the program.

The *Tools for Schools* program was implemented successfully because there was buy-in at all levels – the Department of Education and school board wanted to support it and the principal took the issue seriously. The principal supported the program and was willing to work with the board and Department to make it work. The board and Department worked with the school to make it work as well instead of mandating the program. There was also buy-in from the maintenance staff, which is critical as they are responsible for building upkeep.

Another important initiative is having a person on staff at the Department of Education whose primary responsibility is to react to any IAQ issue throughout the province by visiting the school, doing an assessment, and making recommendations for remediation. Other initiatives include changing building specifications to ensure IAQ is improved and putting more funding into capital for repairs and upgrading of buildings.

Suggested Guidelines

There is a need to find a better way to measure IAQ that includes a specific standard of IAQ for schools. Some said they would like to see ASHRAE and building standards that are specific for schools and other non-industrialized buildings. The Department of Labour is drafting standards for public places that are not industrial settings, looking at such issues as IAQ, ventilation, building maintenance, and comfort conditions for occupants. Part of the comfort factor in buildings is related to occupancy load. *"There need to be standards in place that say if a building is designed for 'X' number of people, then that will be the maximum number of people allowed in the building."*

There also needs to be guidelines in place that help clarify and identify what the problem is – whether it is physical, mechanical, or biological in nature. Other positive initiatives would be to create a regulatory standard for IAQ that includes specific criteria for constructing and operating a facility so as to avoid or minimize future problems. It is also

important to make information available to stakeholders and those responsible for IAQ so they can make informed decisions.

Barriers

The greatest obstacle to the standards for non-industrialized buildings being put forward by the Department of Labour will be their enforcement – how do you get people to comply with these new standards? Money is another obstacle; funding is often not available for ongoing maintenance and because any new regulations or guidelines would be tied to ongoing monitoring or maintenance, lack of funding becomes a problem. To overcome some of these obstacles, a willingness to act on the issue and adequate funding to support activities and programs are required.

> *"The biggest barrier to any of these changes is that people are reluctant to take on problems that they can put off on somebody else (finger pointing). To get over this reluctance, people need to be educated on the fact that they can influence their own environment if they take it upon themselves to act. You can convince people of this fact if you can show them examples of successes, such as the pilot project with Tools for Schools."*

Government must also take some responsibility to facilitate change and can accomplish this by working with boards and schools to be more proactive about IAQ issues. Government departments should also work together (Education and Health in particular) to facilitate change on an issue that is both a health and education issue.

Communication Process

From a Department of Labour and Environment point of view, most IAQ issues that affect worker's health in schools either come directly to the Minister's office or get reported to the local OH&S officer for investigation. If it is a serious health matter, then the local Occupational Hygienist gets involved. If the complaint comes to the Minister's office, it will filter down to the OH&S officer, on to the Hygienist, and then the Principal and people affected at the school. Most problems however are dealt with locally – a person makes a complaint to the Principal and the problem is dealt with internally.

Schools report their problems to the board who then contact the Department of Education if it is a serious issue. In addition, the heads of the various school boards meet with the Department to discuss common areas of interest and any problem areas that need to be addressed. The best ways of responding to the problems are discussed and the timeframe for dealing with these issues is prioritized according to seriousness and need. Also, information or reports on work undertaken at the school (including testing) is made available to the school once it is completed.

Public Works discussed the procedure for conducting repairs/renovations and for building new schools. For major renovations or repairs like replacing a roof, the school will

prepare a report and present their case to the school board's Property Committee. If this committee determines it to be a priority, they approach the Department of Education for funding.

With respect to new school construction, the Department of Education first identifies the need for a new school usually based on consultation with the school board and sometimes on public opinion. The seven boards in the province make a list of priority school replacements and then present their reasons to the Department of Education. The Minister of Education then decides which school is going to be built on the basis of the school board proposal. Education will then call upon the Department of Transportation and Public Works to design the school to meet the needs approved by the Department of Education (e.g., number of classrooms; auxiliary rooms; gymnasium; theatre etc.), as per the Design Requirements Manual. Transportation and Public Works arranges and oversees school construction through to completion. Once completed, the school is turned over to the Department of Education and it becomes their responsibility. The Department of Education then turns the school over to the school board which becomes responsible for the administration, control, and operation of the building.

Communication of Test Results

With respect to testing standards, the view is that testing does not really solve the issue because the standards that exist are inadequate and the results that are produced do not really get to the source of the problem. The guidelines for testing IAQ (taking air samples) were never intended for the school environment – the standard is often for industrial settings – so there is nothing that the Department of Education has to go by when doing testing. Testing is very inconsistent because the parameters used vary depending on who is doing the testing. *"People believe for whatever reason that there is a magic test out there that says the air is safe, when in reality there is no such test."*

The boards are not typically asked to do the testing in schools that have problems because of years of mistrust – the schools would rather the board get a private consultant because they think they will get an unbiased opinion.

Results from testing are reported back to the school because legislation requires that this be done. Results are often given to the OH&S Committees in the school or somebody designated as a safety representative who then shares the results with the rest of the school.

Current Complaint Process

Problems are usually reported to the principal who will then go to the caretaker at the school. If it is a small problem, they can fix it in-house but if it requires more to fix the problem, a work order has to be put into the school board who will either provide materials or an expert to fix the problem. Most requests are communicated electronically

through a computerized maintenance management system module. The school board will consider the request and respond, usually within 21 days.

While some thought improved testing standards were needed, with respect to guidelines for management practice, the view was that enough guidelines and policies already exist and what is more urgently needed are ways to implement them within the schools.

> *"People need to be educated on the meaning of current guidelines and policies and how they can use them effectively within their school. The guidelines and policies that exist will work if used properly – making them work properly is the biggest challenge, not developing more guidelines to solve your problems. The guidelines that are currently available may have to be refined and worded in ways so that more people can understand them but you do not need to start over from square one and develop a complete set of new guidelines."*

With regard to the process for implementing guidelines, respondents suggested there needs to be collaboration. The process for implementing guidelines needs to be discussed between administration at the board level and administration at the school level on how best to implement guidelines. This often means first providing some education on the guidelines and explaining what they mean. While the implementation process may vary from school to school, the critical ingredient in stakeholder involvement.

Comments Regarding Tools for Schools

Tools for Schools is positive if it is used within a larger IAQ management program. It provides a hands-on approach to dealing with the problem and looks at things that occupants themselves can do to help maintain good IAQ.

Schools are a bit reluctant to implement the tool, especially teachers, because they see it as a time-consuming exercise. Time factor aside, there also needs to be support and commitment from the school board and operations people to implement such a tool. Without this support, problems identified by the school in using the *Kit* may not be addressed. There also has to be commitment from the school staff. Someone or a group of people needs to be willing to spearhead the effort in order to be successful and they need to communicate effectively with the school body to get overall support for the program.

There are a lot of materials in the *Kit* that are not used because they are not appropriate for a specific school, so the amount of materials should either be pared down or made more flexible so that they are appropriate for most situations.

Roles

The principal sets the tone for the whole building. The principal at the school has the responsibility of being informed about IAQ and taking it upon themselves to manage their

school environment – they must ensure that problems are dealt with immediately and that nothing is being done in the school that could contribute to poor IAQ. This does not always happen because a principal's primary role is to run educational programs, so they do not always have the time to deal with other matters, which becomes problematic in trying to control IAQ problems. If the principal takes control and take some pride in having a productive learning environment, then this attitude will filter down to teachers, staff, and the students with the result that the building will be better maintained and there will be more awareness about how to make the school the best that it can be.

Communication was identified as critical to implementation of good IAQ management practice.

8.3.9 Newfoundland

The main issue in Newfoundland regarding IAQ is misinformation about appropriate levels of CO2 and spore counts in the school environment. On a larger scale, funding is always an issue in that funds are not always available to complete work within a given fiscal year.

Department of Education does not have a policy specifically with respect to IAQ. The province has a program in place to replace all rural school roofs and, a few years ago, conducted testing in all the schools in the province. There is a protocol for handling requests for funding which come to the Department for air quality testing, school improvements, mould issues, or to increase ventilation. The protocol requires completion of a survey to determine the scope of the problem. The school principal is asked to distribute questionnaires to students and staff to enable the Department to quantify the number of complaints and the type of IAQ issues. An expert interprets the results and the results are communicated back to the school boards. The boards are then encouraged to share the results with the schools. If there is a need for funding and the funding is available, the necessary work will be completed. The respondent also indicated that *Tools for Schools* would be a useful program to help identify basic IAQ issues.

Implementation of Guidelines

The school board is responsible for implementing initiatives regarding IAQ and for the day-to-day operations of schools, in collaboration with local school staff.

The respondent suggested that placing a requirement in legislation that school boards demonstrate acceptable IAQ in school buildings would help ensure accountability.

The Department's role in implementation of guidelines would be to act as a resource. If, for example, *Tools for Schools* were to be implemented provincially, then the Department's role would be to evaluate the program and determine if there was a demand for its use. There would have to be a legitimate use for such programs, such as their use to meet any new standards.

An education component is required in the beginning before implementing any guidelines or policies and there have to be resources available (both personnel and financially) to implement programs aimed at fixing or preventing problems.

8.4 OTHER STAKEHOLDER VIEWS

8.4.1 School Boards

8.4.1.1 British Columbia School District Authority

IAQ Perceptions and Primary Issues

Lack of education and awareness about IAQ was the primary concern identified.

Current Policies, Practices and Guidelines

There is an inspection protocol for HVAC systems that was developed to address the WCB regulations in the province but not all districts are using this protocol. Some people use the EPA *Tools for Schools Action Kit* but something more is needed that instructs people exactly what to do to address an issue, rather than just having checklists that identify the issue (although the checklists are a start).

Roles

School districts have the responsibility to endorse initiatives that deal with IAQ and raise that as an expectation of performance. Trustees should also be involved in supporting IAQ initiatives. Within the school, the administrative officer/principal, the teachers, and support staff are also responsible for supporting IAQ initiatives. Beyond that, the involvement of others would vary from district to district. The Ministry of Education could become involved by evaluating any IAQ programs through the school accreditation process that is already in place. This would give the Ministry a better understanding of how well schools are managing their IAQ.

The Public School Employers Association's role is to advise, encourage, motivate, assist, train, and coordinate on a provincial level with the Ministry of Education and school boards. It also works closely with facility managers as the latter are going to be asked to fund any changes that arise at the school level.

Barriers

The trustees will have to give clear direction to facilities groups that IAQ issues and health and safety issues take precedence over normal and regular maintenance – that clarity is not present at this time. Other barriers include funding and personnel resources.

Apathy of the involved parties and lack of communication of information are seen as the two biggest barriers to implementation.

Implementation of Good IAQ Practice Guidelines

A number of key elements are required in order to successfully implement new guidelines. Using *Tools for Schools* as an example, a coordinated training package on the introduction of *Tools for Schools* is required at the district level. This district is planning to introduce *Tools for Schools* into the school system this coming year. There also needs to be some awareness and endorsement by the Ministry of Education for the program. In addition, unions must be brought on board to ensure support "from the ground up as well as from the top down". Also needed is in-depth hands-on training within the districts in order to develop expertise to deal with IAQ issues once they have been identified.

The Ministry needs to establish expectations, as do the Trustees, that *Tools for Schools* is going to be implemented and that IAQ issues will take precedence over regular maintenance issues such as repainting a classroom. The Ministry could establish a reserve fund to deal with emergencies that would allow the Ministry to intervene before a school goes into crisis and respond to items identified in the protocol. The recently introduced *Bill 14* will also help with implementation – this Bill requires that an organized health and safety activity be conducted at every school so IAQ could be part of this process.

Experience with implementation of the BC Complaint Investigation Protocol suggests that, not only is training needed to accompany the introduction of any new policy, protocol or guideline, but there has to be some source documentation or standard established. As well, access to expertise is needed at the board or District level. For example,

> *"We talk in terms of doing, let's say, an initial indoor air quality investigation and we don't describe what that involves. The result is that we've got sixty school districts all applying their own criteria. Some will do it well and some won't do it well. The second problem that you hit of course is that the more expert level you start getting into the in-depth investigations and school districts won't have any expertise."*

Summary of Implementation Strategies

- coordinated training package on the introduction of *Tools for Schools*. That will provide skills at the district level on how to implement that package.
- motivation - direction from the trustee level to convince the school district that they should get on board.

- endorsement by the Ministry of Education - the Minister of Education has to buy into IAQ management and make some public announcement that this is going to be done.
- Unions - to ensure support from the ground up as well as from the top down.
- Training - at both the school and district level to provide school districts with the expertise that is going to be needed to support what is going to be taking place at the school site. *"There is no point in asking members of the school to get together to deal with indoor air quality issues, turn in a report and then it is done and we have district staff who are unable to deal with it."* The District plans to offer two days of hands-on training to address this need.

The need for support of other stakeholders was also mentioned such as the School Plant Officials Association, the School Safety Association, the Teachers Federation, school district administrators, school principals, and Parent Advisory Committees.

Communication was universally identified as both an issue and a recommended solution to correct misinformation, promote trust among stakeholders, and a critical component of good IAQ management practice. Management of public relations is as important as implementation itself.

8.4.1.2 Alberta School District Facilities Manager

At the school District level, one district facilities manager identified ventilation in older schools and carpets as the biggest problem in the district. Asthma was seen as a major issue resulting from poor IAQ. They have a school district policy where they are replacing all carpets with Vinyl Composition Tile (VCT).

They also have a maintenance policy for filter changes, duct cleaning and for minimum fresh air exchange. The Facilities manager has an individual hired specifically to go from school to school on a six-week rotation changing filters.

The following comments illustrate the value of having facility managers supportive of IAQ efforts.

> *"If we have a problem with IAQ, we hire an independent firm to do some testing for us too, if need be, just to see where we are at and what the levels are, and go from there. We don't treat these concerns by teachers as frivolous. You have to get into it and give an honest answer for what the problem may be or may not be. And some people have very low tolerance to some of these issues. They have a low threshold to stuffiness or air-borne stuff in the air or whatever. Somebody else could teach in that room and think it is perfectly fine, but Mrs. Smith has allergies and it causes her a problem."*
>
> *"The changing of the air filters I funded out of my maintenance budget. I just allocated an appropriate amount of money to make sure that we could do the*

filter rotations on a six week turnaround. Now, the other one with cleaning the ducts, I had to go to the school board and ask for an extra $50,000 a year on my budget to have these ducts cleaned. When we started out, we thought it would take us a five year period to do all the schools. But the way it is working out now, it is four years, and it might even be less because we could do it every three years. Because once the fellow has gone through everything and done what he needs to do, it will be a lot quicker the second time around."

This proactive position was also influenced by school board support and resource availability. The respondent also recommended more education. The facility manager used one-on-one consultations to provide education to those who were opposed to the carpet removal or any other actions his department was taking.

8.4.1.3 Manitoba Schools

Issues and Perceptions

In Manitoba, the main complaints revolve around ventilation. Overcrowding is a related issue – many of the schools have too many students for the design of the building and this causes more problems in that the ventilation system cannot handle the capacity load. As well, many older schools are being used for things they were not designed for, like computer rooms, and the smell from computers can cause a problem. Heat is also another problem, especially towards summer as most schools do not have air conditioning.

Current Policies and Practices

Standard for all buildings in the province are the ASHRAE guidelines. There are also guidelines specific for schools that are produced by Manitoba Workplace Health and Safety – including policies for IAQ. The school division also has a policy to utilize a risk management person (outside person) to that assist school divisions in assessing certain air quality problems. Since most current guidelines and policies are reactive in nature, in January they will be implementing a preventative maintenance program (specific to their school board) that is proactive in dealing with issues like IAQ. The new policy will involve taking an inventory and assessing what needs to be done right away and what needs to be done on a regular basis. Then budgets and scheduling of work will be completed.

Roles

The OH&S Division of the school board is primarily responsible for IAQ – they have made IAQ a top priority within their division. The Department of Education is also responsible, primarily for providing the funding to complete projects that deal with IAQ. The OH&S role in implementation is to ensure that workplace policies are enforced and that work is being completed to address those concerns.

Implementation Process

All policies are implemented through a central School Division committee which works with schools locally to address IAQ concerns. The process is somewhat complaint driven in that health and safety policies are enforced after a complaint is lodged – representatives from the central committee (OH&S Officers) will go to the schools and work with the local maintenance person to identify and solve the problem. Situations are dealt with immediately using the school division guidelines. The division will be responsible for implementing the new preventative maintenance program in conjunction with the school board – the new policy will be implemented by going to each school, completing an assessment, and then developing a business plan to take back to the board to ensure that work is completed.

Barriers

Money is the biggest barrier to implementation. The budget provided by the Department of Education is inadequate to complete the work. The rationale for completing the assessment and creating a business plan is to demonstrate to the Department of Education that more funding is required. Secondary to funding barriers is the downsizing of the workforce – without sufficient staff to complete the work, guidelines will not help.

Facilitators of Good IAQ Practice

Money, personnel, and a clear plan of action are required for successful implementation. A plan of action is particularly important as an accountability tool for government; it outlines the IAQ problems, demonstrates how they can be prevented, and informs the Department of Education of the needs. Support and understanding from the school division and the Department of Education will also help with successful implementation. You also need to educate people at the school level about what you are doing so that there will be more acceptance of new policies and practices.

8.4.1.4 Ontario School Board Trustee

Perceptions and Significant IAQ Issues

Ventilation, water damage, and improperly stored materials are the typical IAQ problems arising in this area. The investigation protocol is thorough in its exploration of the issues and identification of the problem. Another important issue seems to be a lack of awareness at the school level – often people within the schools are unaware that their own personal actions have an impact on IAQ.

Internal School Division Policies

Guidelines from the Ministry of Labour, professional standards, and ASHRAE standards were mentioned as those followed in the division. Other than actual guidelines, Facility

Services creates a regime for their custodians on materials to be used in cleaning as well as the timetables for cleaning.

Communication Process

The 'internal responsibility system' was referenced as the primary mechanism for identification and response to problems. Complaints originate from staff to the principal to the Industrial Hygienist and on to an investigation process. Once a concern and its cause are identified, then the solution is directed to the appropriate department within the school board. This department will strive to reach a cost effective solution to the IAQ issue which may mean coming to a compromise or a "mutually satisfactory" agreement. If an agreement cannot be reached, then the issue goes to the superintendent or the director of education for a final decision.

8.4.1.5 Newfoundland School Board

Perceptions and IAQ Issues

Ventilation problems are the most significant issue facing schools within this school board. Funding is also a factor as resources are needed to ensure proper ventilation and maintenance of the building envelope.

There are no provincial policies in place regarding IAQ, although the province has a program in place to replace all rural school roofs. The school board has a carpet removal program as well as an investigation protocol. When a complaint is made, a representative from the maintenance department performs follow-up. Checklists are used to investigate, ask questions, and provide information on such things as the presence of mould and moisture, proper storage of cleaning chemicals and chemicals used in chemistry labs, and any problems with pests. This school board also has a preventative maintenance program in place for ventilation systems – they are routinely checked by the maintenance manager and his staff. On the development of future policies, the comment was made that policies should be developed that are proactive and that have prevention in mind.

Barriers

Lack of government funding and time constraints are the biggest implementation barriers. In terms of money, if government does not provide the school board with funding and resources necessary to do the job, then implementation of new policies and guidelines is greatly inhibited. In terms of time, the mandatory two-month summer vacation limits the amount of time available to address all the identified issues.

Tools for Schools

The respondent was familiar with *Tools for Schools* and felt that it would best be implemented through the Department of Education first, then filtered down to the school

boards and locally to the schools. In terms of sponsorship by an outside organization of such a package, the respondent thought that an outside organization might hinder the implementation and usefulness of a program like *Tools for Schools*. This is something that should be implemented internally through the Department of Education.

8.4.1.6 Nova Scotia School Board

Perceptions and Issues

Lack of funds, not acting promptly on IAQ issues, and false complaints are the three biggest barriers to IAQ management.

Comments regarding Tools for Schools

Tools for Schools was not seen by this respondent as an effective tool for dealing with IAQ issues because of the following barriers: it is too much for teachers to do/too time consuming; only good for schools with problems; requires money to implement and to act upon some of the recommendations; requires a motivated coordinator at each school and support from the school board; needs to show immediate results but the checklists just create a list of work that may or may not need to be done; if work is not done, the results are not immediate; it is not easily sustainable because of changing staff and loss of interest from one year to the next; it is not region specific; and it does not direct people with health symptoms to doctors.

In order for *Tools for Schools* to be effective it has to be specific for every region and show immediate results. Funding and commitment need to be in place and implementation has to be the responsibility of someone other than teachers. A paid school IAQ coordinator or an additional maintenance/custodial staff person whose only responsibility is IAQ is required. Training and support for the IAQ coordinator would need to be provided.

Successful Implementation of any IAQ Guideline

An IAQ Complaint Response Protocol which reflects the importance of acting promptly on complaints that are received is essential because *"the longer you wait, the bigger the problem will become."* This board recommended incorporating IAQ into already existing vehicles and procedures - in this case, the mandate of the OH&S Committee - to expedite implementation and increase its success. The funds for necessary capital expenditures also need to be in place. Perhaps federal infrastructure funding for school repairs could be made available. It is also important not to waste money on false complaints but address only those problems that are 'real'.

Best IAQ practices

The IAQ Complaint/Response Protocol was offered as a best practice model for dealing with IAQ. Regular maintenance and cleaning are also best practices in schools for managing IAQ.

8.4.2 Provincial Teachers Federation/Association

Perceptions and IAQ Issues

Two IAQ problems were mentioned:

- issues related to dust, moulds and ventilation that are directly linked to lack of maintenance staff and funding, poor building design, or lack of preventative maintenance

- lack of maintenance and lack of custodial staff are major issues as most elementary schools in at least one province have no daytime custodians so no one is there to keep the school clean and to respond appropriately when water pipes burst or there are other spills, including bodily fluids

Current Policies and Practices

Most people are not aware of the complaint investigation protocol.

> *"It was not developed cooperatively, nor was it distributed with a lot of fanfare and most people are unaware that it even exists and I think that is unfortunate. It is not a bad document. For example, the Health and Safety Officer for the Teachers Federation representing 47,000 teachers - all the teachers in the K-12 system - didn't even know it existed until [she] was attending a zone meeting of teachers."*

It is also protocol to have health and safety officers at each school district, but this is often not the case. There are also WCB regulations on IAQ, which again are largely not enforced at this point, nor are they well understood by school districts. There should be additional protocols in place that inform people about the types of products that can be used in schools for teaching as well as cleaning.

With respect to training, the Federation offers an IAQ workshop to both their staff representatives and to their health and safety committees.

The Federation thought guidelines and policies should first be implemented through the District Health and Safety Committees (comprised of representatives of the teachers union, support staff union, and management at a district level) because they would be responsible for the development of an implementation process. From there, the district

should involve groups like Parent Advisory Committees and student councils in the development of policy. Once the policy is created, it could then be disseminated down from the District Health and Safety Committees to the local Health and Safety Committees at each school and then to the people who actually use the school – the key is collaboration of all stakeholders during the development and implementation process.

> *"If it comes from above and it is simply put in a booklet and handed out then there is no ownership and no involvement and there is no understanding of it. There is going to have to be time devoted to it as well. There are way too many things coming down the pipe for teachers to do this, do that, here is another book to read, another binder. There is going to have to be some time built into this for education and awareness and review of these things - real health and safety training wherever necessary."*

Roles

The primary role of the Teacher's Federation is building policies and protocols into current training programs, announcing and communicating the status of current activities to teachers, and supporting any initiative with which the Federation agrees.

Barriers and Facilitators of IAQ

Lack of time is a significant barrier. If time is not provided to introduce new IAQ initiatives, this will undermine success because time is a barrier to all health and safety initiatives. The respondent reported that Health and Safety Committee members have been denied time off to do the work of the Committee, despite inclusion of this requirement in legislation. Without time, teachers would not choose IAQ work because other priorities have to be done as part of their job.

Management barriers were also identified along with attitudinal barriers. *"There are attitudes out there that health and safety is not an important issue and that indoor air quality is not a big issue in our schools and we have had some resistance to doing anything about it."* Money is another concern *"because, of course, the more people know about indoor air quality, the more they start making demands about improving it and some of those demands cost money."*

One proposed solution was to have a non-instructional day called a "safe school day" that could be devoted to health and safety training and awareness, including IAQ. The day could be an annual non-instructional day so it would not result in additional costs. A student council representative could attend and participate in the health and safety aspects. In a non-instructional day, teachers, support staff and management would be able to spend the necessary time and get the education that they need about the guidelines and about the issue of IAQ. The respondent felt strongly that this is the only time that can be provided to teachers - they must be released from instructional time. Interestingly, IAQ was cited as one of the top two issues among teachers in this province.

"We pay lip service to safe schools right now. The government likes to do a lot of advertising about safe schools and they focus on one issue and they focus on bullying and they don't talk about the other things in schools. Safe schools really mean a lot more than an anti-bullying program. It means good indoor air quality for example, and it means emergency preparedness."

"I've come to the conclusion that several things have to happen [to overcome management attitudes at the district level]. One is just the ongoing education awareness of management themselves. They are very much in many of our districts at a reactionary state right now where health and safety is a new issue to them and they react to it as a union plot and something that we are trying to make them do that is going to cost a lot of money and not save a lot of money and I think that they truly don't believe that the savings are there. They don't even believe that there is necessarily a problem, but the ones that have accepted it have very good financial plans where they have shown that, by addressing health and safety issues, they have actually saved a lot of money for the school district and that has made a difference to the health and safety of students and staff. So I think it is a matter of getting those good managers who are out there who have this increased awareness to spread that word around.

I also think Workers Compensation has something to do with this and should be working actively with management and explaining to them in great detail what their role and responsibility is. Because they will get orders written and they are liable to fines and other kinds of penalties if they don't do what the law requires. And in fact, the regulations on indoor air quality are pretty clear so there is the carrot and the stick kind of stuff.

I also think the Ministry of Education has a big role to play here too by putting it on the agenda and indicating in very clear terms that they expect senior management to take these issues seriously".

Working together on IAQ issues would be a major contributor to facilitating implementation of protocols and guidelines. In addition, there is going to have to be some time built into this for education and awareness and there really is none that exists. There is a need to change attitudes that exist around this topic and there is also a need for finances to repair larger issues.

Clear, simple management guidelines would be very useful for everyone.

Communication

Communication seems to be poor. People (teachers in particular) do not know, but definitely need to know, safe procedures and understand a little bit about the building

they work in. Too often they are unaware of work that is being done and do not receive any feedback on this work or any testing that is being completed.

> *"Sometimes it is left to the principal to tell somebody; sometimes it is the district person who talks to the teacher directly. Sometimes it is the health and safety committee and it is never very clear and it is never done very well, in most cases. Thus, there is no clear protocol for communication and this proves to be the most problematic issue to effectively communicating about IAQ."*

There should be very clear channels of communication in the district. Communications should go through the Health and Safety Committee and to the individuals concerned. Schools need a designated communications contact. If testing is done, the results should go back to the district Health and Safety Committee. An indoor air quality problem should be addressed at a staff meeting *"so everybody knows about it and how it is being dealt with because that is how rumours start when people get the impression that nothing is happening even sometimes when it is."*

> *"There doesn't seem to be a very clear information sharing process around indoor air quality complaints, investigations and testing. And I don't think there is a very clear understanding of what testing is to be done. The most common thing that happens in school districts right now is that someone will say "I've got really bad nasal problems." I get itchy eyes and I've got a rash and they will come in and do a CO2 test and that's it. And they'll say, the CO2 is fine, you don't have a problem here and they'll go away so there is no matching of the health complaints to the testing and almost inevitably what the school districts are equipped to do is only do a CO2 test and nothing else. And then they go away and say everything is fine and everybody else is left behind saying everything else isn't fine and what do I do now. So there is a really poor response at the front end and then relationships start falling apart and information isn't clear and it goes on and on and on. That is the biggest complaint about IAQ problems. They go on for two or three years sometimes and still people are complaining and nothing has been done or they can't find the problem and they say that they can't anyway and I can't tell you how many workshops I've given where someone puts their hand up and describes that kind of story."*

Regarding the Tools for Schools Kit

Corporate sponsorship of the *Kit* had been discussed as a potential way to afford production. However, this would be a barrier for the Teachers Federation as they are very concerned about the increased corporate sponsorship in schools and of educational material and would likely boycott the *Kit* in that event.

It was recommended that the *Kit* be simple and straightforward.

"People are very afraid of the topic of indoor air quality. They think it is a science topic. I keep saying to them, look, I'm an English teacher and I get this stuff and anybody can get this stuff. It is pretty simple but even our trainers are quite afraid to go out and give a workshop. It is a topic that puts people off because they think it is scientific. And yes, maybe there are some scientific underpinnings to it, but so the more that we can de-mystify it and have it simple and straightforward for people, the better off it is going to be. Where they don't have to read a whole pile of stuff about science or chemicals or whatever and the more that it is about everyday simple things that they can do, the better it is going to be implemented because a lot of it is about behaviour. You can deal with school facilities, the committee needs to worry about that and other people can worry about that but when you are a teacher in a school you really need to worry about your own behaviour and the behaviour of those around you. There is not a whole lot that you can do about the facilities but you can at least report a malfunction or something that you see to the health and safety committee so you know exactly who to report things to and what the process is."

Implementation Ideas/best practices

A checklist is needed by teachers and staff who work in classrooms to detect student health concerns and the symptomology associated with IAQ problems. There should also be some communication between the schools and parents. Parents may see something at home that they do not communicate to the school and vice versa. For example, a student may experience a constant runny nose and sore throat at school but is fine at home. This should be communicated to the school or teacher. This is often seen by teachers as simply common childhood illnesses when it may be reflective of some larger IAQ problem and they are unable to make that distinction. One practice recommended by the Teachers Federation is to conduct a health survey of students and staff of the entire school when a health complaint is made to determine how widespread a problem is and its location.

Fragrance is a difficult subject requiring more education and awareness for students and teachers about the potential impact it has on others who are sensitive.

"Sometimes when you've got an air quality problem that is about fragrances, that is a huge problem. How do you get high school kids not to wear the latest things in hair gel or whatever? It is a real problem. We have a teacher right now who just passes out. He was exposed to photography chemicals for 22 years in a non-ventilated photo lab in a school and now he is really environmentally sensitive and there is this one particular hair gel that just knocks him off his feet. ... How do you allow him to come to work safely and protect him? Are you going to control 1800 kids? I don't think so. ....

We also have real education awareness of our own members (teachers). We have members who really resent being told that they can't wear perfume. It is like they

think they have a right to wear perfume and they actually get quite hostile and this is in the face of someone who gets crippling two week long migraines from being exposed to perfumes. Other people - her own colleagues, educated adults - refuse to not wear their perfume so those are problems too."

Hostile attitudes are a problem. *"They don't see indoor air quality as the same thing as peanut allergies. They don't see it the same way even though it is. .... We are still at the non-acceptance/acceptance stage, I think."*

8.4.3 IAQ CONSULTANTS

Perceptions and Significant Issues

IAQ is a very important issue because of the serious impact it can have on the learning environment. It is critical that the issue be examined from a multidisciplinary perspective.

High CO2 levels in classrooms resulting from inadequate ventilation is a serious problem because it can cause headaches, fatigue, difficulty in concentrating, and sleepiness, all of which are not conducive to learning. A second issue is moisture within the building envelope that results in mould problems.

The source of these problems is often inadequate funds for such things as regular maintenance and repairs; preventative maintenance; and upgrading of facilities and ventilation systems.

There needs to be more understanding of how a school operates. Schools need experts in the fields of ventilation and building management. Often consultants will be called in to look solely at ventilation but the building envelope also requires examination. Staff are not trained on IAQ in schools and this becomes a problem when trying to identify issues – that expertise should be on-site.

Poor maintenance is a significant IAQ issue. If schools are not well maintained it becomes hard to have good quality indoor air. Often the ventilation system is poorly maintained. This can be attributed to budget cuts to facility maintenance. However, if you have good leadership and a willingness to do something about the problem, a lot can be done with a minimum budget (cleaning and regular system checkups). Poor maintenance is often not the fault of maintenance personnel but rather they lack the resources to adequately address issues resulting in a build up of problems causing most IAQ issues today.

Their Role and IAQ Problems Encountered

IAQ consultants are often called in as part of the investigation process in response to a complaint(s) received by the school board/district. However, they are usually called in as a last resort when all else has failed – often too late, in their view, to solve the problem. They perform comprehensive investigations that examine the school envelope, ventilation, maintenance practices, and occupant behaviours. Types of activities include IAQ testing and interviews with school occupants. A report is prepared and submitted to the board. They are sometimes asked to do follow-up testing after recommendations have been implemented.

Guidelines or Standards Used

A variety of standards and guidelines are followed during an assessment, they include: Health Canada's 1995 Fungal Contamination in Public Buildings; Health Canada Exposure Guidelines for Residential IAQ, 1989; IAQ Comprehensive Reference Book; New York IAQ guidelines; IAQ in Office Buildings manual; ASHRAE; 1983 Ontario Ministry of Labour guidelines; and a reference paper by Yan, Hung, and Vampiello, 1993 for fungal contamination levels. The American Conference of Industrial Government Hygienists guidelines for chemicals was also mentioned.

These guidelines are used as a reference along with personal experience and consultation with experts in the field. Most said a visual inspection is far better for solving a problem than air testing. They would also rather use guidelines that are specific for residential housing as opposed to those for office buildings as those guidelines are more specific.

There is a need for better guidelines for air particle measurements that are specific for schools.

IAQ consultants suggested that the experiences of consultants and those in the field be brought together to create guidelines; it is important that guidelines be developed from an experiential base.

They recommended that additional guidelines and policies be developed around the areas of planning and operational procedures; education; communications; maintenance; and commitment to handle IAQ issues. The latter policy on commitment could be something as simple as a mission statement saying the school is committed to good IAQ.

In discussing *Tools for Schools*, the *Kit* was seen as one component of a comprehensive IAQ management plan that could empower schools to do something for themselves. Schools could tackle the small problems with the *Kit* as added value to an overall IAQ management plan.

Best Practices or Current Initiatives

Increased training and education for facilities personnel is an important and positive initiative. In this way, schools can identify and rectify concerns 'in-house' in a more proactive way.

Some districts are standardizing procedures for reporting and identification of problems; and some schools are beginning to buy into seeing IAQ activities as a proactive as opposed to reactive process.

Recommended Implementation Process for Guidelines/Keys to successful IAQ management

The consultants agreed with most other respondents that the most successful approach to implementing guidelines and standards is one that involves all stakeholders in the process. Guidelines cannot be imposed upon schools or they will not adopt them.

The support from administrators at both the school district and individual school levels is critical, as well as from teachers through the local Teacher's Federation and Teacher's Union. *"Unfortunately there is great distrust between teachers and administrators who view IAQ as a dirty word – if these groups can work together and look at IAQ in a more positive light then they will be able to better manage IAQ."*

You also need to go through the proper channels when managing IAQ – usually Facilities Operation personnel and the OH&S Committees.

Having a champion for IAQ is also important – if there is somebody who is willing to work on the issue then the likelihood of accomplishing positive outcomes is increased.

Implementation could be improved with more education and training; conferences could be held to educate people about proper procedures or any new program that is being introduced. One respondent suggested that a test be administered to building managers and facility operators in particular that they would pass to demonstrate the adequacy of their knowledge and ensure that a new program or procedure is being implemented properly.

Students could become involved in the implementation by having them do projects around IAQ. This would help to create more awareness and willingness to do something about IAQ.

Barriers/Facilitators to implementation of Good IAQ Management Practices

The same barriers identified by others were also identified by the consultants: funding, lack of support, withholding information, and lack of leadership or time to implement a strategy.

In addition, they mentioned that some consultants who test IAQ are 'hired guns' by the school board who often *"only test or find what the school board wants and will say anything you want them to say"*. This means that issues are not being addressed properly, the correct information is not being communicated, and any interventions have a diminished chance of being implemented.

Conversely, sometimes consultants are used as leverage to provide a persuasive argument to government in order to free up more funds for IAQ work.

Getting buy-in from all levels is often difficult because of the distrust that exists in some jurisdictions between administration and teachers. This needs to be overcome in order to be successful.

There is the view expressed in the colloquialism 'If it ain't broke, don't fix it'. People are reluctant to look at the issue proactively because there tends not to be funds for preventative maintenance.

In order to get something done, parents often need to get involved in the form of protest – the media usually becomes involved and the government has no choice but to react and implement a strategy that will remedy the situation.

Good leadership and support is instrumental in addressing IAQ issues in schools. *"If you have a person at the school that is willing to take up the cause, you are going to be more successful in addressing IAQ issues"*.

One suggestion, in order to make implementation "fun" and more successful, was to set up a point or rewards system whereby schools reaching a specified standard for IAQ would be rewarded for doing so. Administration, teachers, and students may be more likely to get involved if they know there will be recognition of their efforts.

A management plan is also important, as is a review of IAQ status specific to each school that shows what steps need to be taken and the resources/funding required to do so.

Additional facilitators include: building awareness through education and open communication; putting IAQ at the top of the priority list; and a presence by scientists in the field – knowing there are experts that can be relied upon as resources for IAQ issues.

They recommended that each school and school district have a team of people (both those with and without expertise) who can work together in an effective manner. If you can show success early on in your intervention there is a greater chance that implementation of that intervention will continue in the future.

Education for the school Superintendent and the school board is important so they know how to address IAQ issues properly.

Engaging all stakeholders - school board personnel, Department of Education, principal, teachers, students, custodial staff, Health and Safety Committee, and parents - in the process is important to increase their comfort level and ensure their support.

IAQ Consultants also recommended there be someone at the school who understands building construction and the function of the building envelope in order to effectively implement guidelines and standards.

Communication

All stressed the importance of communication throughout the process. When a consultant goes into a school, it is important to explain to all school occupants the objectives of the investigation, the activities being undertaken, and the rationale for the particular approach. A consultant should have a group meeting pre and post investigation to ensure school occupants are comfortable with the proposed process. Ideally, there is constant communication throughout the entire consultation process. By the time the report of the findings is released, most of the information should have already been communicated through phone calls, letters or meetings. The report is often used as a reference only in the communication process.

Experience suggests that open communication is important - letting people know what you have found and answering questions as honestly as possible - because if you withhold information people will think that you are hiding something. *"You have to be somewhat of a 'social worker' when it comes to IAQ."*

8.5 SUMMARY ANALYSIS

Perceptions and Issues

The most significant IAQ problems experienced by schools across the country are ventilation and mould. The primary contributor to ventilation problems is that many schools across the country do not have ventilation systems. This is particularly pronounced in buildings which have been constructed to be airtight. Mould issues arise mostly from aging buildings that have not been well maintained; the building envelope has been compromised and remedial steps, where taken, have not been adequate to address the problem. Portables also have significant mould issues.

Jurisdictions are grappling with the same issues associated with IAQ across the country - at the provincial and school board levels. The most significant issues identified in the interviews were:

- the perceived uncertainty and inexact nature of the science supporting IAQ, and therefore the resultant difficulty with problem definition, measurement, and response
- the degree of fairness and objectivity of the process to address IAQ problems
- the nature of the relationships among stakeholders and the degree of trust among those partners

The degree of cooperation, or conversely hostility, among stakeholders varies from province to province. In some provinces, relationships appear to be positive between the provincial Departments of Education and school board/divisions (administration and board members) where in others they appear to be quite strained. Relationships between school boards (administration and trustees) and teachers are also poor in some areas.

Further, the relationship of school boards with parents is extremely sensitive. The nature of this pre-existing relationship - its patterns of communication and decision-making and past behaviour - influences how contentious issues such as IAQ are addressed. The absence of a common understanding of the problem contributes to the difficulty of the working relationship. Because all stakeholders do not share the same level of awareness, knowledge, and understanding of the problem, even defining the existence of problem is difficult, let alone reaching agreement on a solution. This is further complicated by the perceived inadequacy of science to determine by some objective measurement or standard the presence of a problem. While there are *indicators* and tests which help with this task, the diagnosis of a problem must be based on a broad investigatory approach which acknowledges school occupants' health symptoms as legitimate, and examines, from a practical point of view, the school building itself and it's the functioning of its operational systems. As with so many other health issues, because one cannot identify what the source of the problem is, this does not mean a problem does not exist.

Relationships

The depth of trust or mistrust that exists, or not, among parties colours their ability to work together and their confidence in the identification of the IAQ problem, including interpretation of test results, and the proposed solutions to mitigate the problem. Where problems have been identified and acted upon quickly and satisfactorily, relationships tend to be generally positive. Where the response to a problem is characterized by denial or an inability to respond because of resource constraints, relationships are not positive. However, in some cases, the cause is not known and ill will on anyone's part does not help the situation. It is imperative that ways be found to work together in a constructive manner and that time be spent on relationship building. Building partnerships and collaborative relationships are time consuming, but no less so than the time it takes to do "damage control" - usually in the press - later, and to deal with the resultant created that permeates the various other issues of concern. However, it is also just as important to respond with action that is appropriate and sufficient to address the problem itself, rather than with a politically expedient solution. Resources do need to be spent wisely and the

process of decision-making with respect to allocation of resources should be fair and based on the area of greatest need.

Communication

Communication is a critical component of any positive working relationship. It takes time to build trust and credibility among stakeholders and open communication is a basic cornerstone of trust. Attempts to hide IAQ problems or test results will be interpreted, as denial of the problem and malevolent motives will be attributed to those in authority. This will undermine any ability to achieve a satisfactory solution to the problem. A communication plan is needed as part of a broader IAQ management plan that involves key stakeholders. Complaint investigation procedures and communication protocols (which specify the steps for identifying and responding to a problem, for sharing and interpreting test results, and for informing wider community) can help clarify expectations in this regard and improve communication, and hence relationships among parties.

Some attitudinal and knowledge barriers can be addressed by education and awareness efforts, which will improve relationships.

Policies, Practices, and Funding Approaches

Some governments have set aside designated funds for remedial repair and emergencies. The amount of funding available for this purpose, however, differs among jurisdictions. As well, some provinces have developed complaint investigation procedures and protocols. School boards/districts have developed their own such protocols, and some have also developed IAQ management guidelines as a set of best practices, which, among other things, encourage preventive maintenance, outline regular inspection and cleaning regimens, and other practices. The presence or absence of such protocols or policies and guidelines and their scope differs among jurisdictions as well. There is much more emphasis in BC, for example, on WCB regulations and their impact in ensuring good IAQ.

School boards/districts/divisions, as they are variously known, have direct responsibility for the maintenance of good IAQ in schools but the responsibility to provide adequate funds to do so resides with the provincial government (Department of Education or equivalent). School boards have suffered from budget reductions in maintenance personnel with an increase in contracting out (which was said to compromise preventive maintenance and cleaning practices) and in capital funding for repair. Most, in the last decade of budget reductions, have chosen to protect the allocation of funding to "the classroom" and reduce capital and maintenance budgets in the difficult juggling exercise of balancing their budgets. However, the result has had an impact on the level of IAQ in schools. Of late, the thinking appears to be to place priority on budget items, which have an impact on health and safety, as compared to other repairs

Best Practices/Keys to Successful IAQ Management

The degree of success in achieving change in IAQ management practice at the school board level appears to hinge on leadership within and external to the district leadership of the provincial government in encouraging the adoption of such practices (and perhaps providing a model set) and providing the funds to so; leadership at the board level to approve funds for such activities; leadership of the district facility managers in supporting such practices and ensuring the work gets done; and leadership at the school level (principal) to support IAQ initiatives. Efforts to increase the current state of knowledge of research in this field, which challenges the notion that poor IAQ is not harmful, are necessary to ensure informed decision-making and the exercise of good leadership. Changes in preventive maintenance - a key contributor to good IAQ - can largely be influenced by facility managers and their understanding of the value of these activities so training and sufficient funds to carry out the work at this level appear to be critical success factors. A shift in thinking needs to take place at the school board level - indeed at all levels which places value on good IAQ and good IAQ management practices.

Governments need to be prepared to invest in both infrastructure (to repair and remediate structural problems, and ensure preventive maintenance) and staff (for preventive maintenance) to prevent IAQ problems. In order to implement good IAQ management practices, the necessary will, education/awareness about IAQ, training in how to identify and respond to IAQ problems as appropriate to individual roles, development of an IAQ management plan, involvement of all key stakeholders, preventive maintenance and structural remediation, and funding to support these efforts is required.

There are many players in this arena, emphasizing the need for a coordinated effort. This section of the report outlines the sheer difficulties of this task. It also supports the introduction of policies and management guidelines or practices to promote good IAQ and healthy learning environments, particularly for children who have greater sensitivity to poor IAQ; the input of stakeholders into the development and implementation of such practice guidelines; the delivery of IAQ training based on the roles of the various players/target audiences; the provision of access to resources and to expert consultation and advice both in IAQ and in the health profession; the adoption of a team approach to identification and resolution of IAQ problems; the adoption of explicit complaint investigation procedures and communication protocols; the promotion of relationship building efforts; the use of conferences to share learnings, update findings, and promote cross fertilization of perspectives; the provision of funding to fix the problems; and the development of long-term IAQ management plans. There is some interest in the development of improved IAQ standards in the interests of objectivity but this is not universal; nor is this approach without its shortcomings.

The difference one individual can make - positively or negatively - is striking. A champion willing to take action on the matter can influence the outcome in significant ways. Attitudes and beliefs also shape problem resolution: a response of denial changes

the tone of the conversation and relationship immediately, and this is difficult to overcome making it difficult to work in a positive, pragmatic way toward solutions.

Implementation Strategies

The suggestions for implementation are similar - and could apply to any set of guidelines, including *Tools for Schools*. The routes of influence and leadership may differ among provinces/jurisdictions but the players who need to be involved are essentially representative of the same stakeholders. A flexible application of guidelines is necessary among jurisdictions. The time it takes to implement such guidelines (for IAQ management practice, for complaint investigation and response, and for communication) and the level of effort required, will be influenced by the nature of the relationship already existing among parties and by the type of policies, practices employed, and guidelines already in place.

9. TOOLS FOR SCHOOLS PILOT TEST

9.1 Pre-pilot Results

As described earlier in the methodology section of this report, the pilot test of the USA EPA *Tools for Schools Kit* was implemented from the spring of 2002 (April/May) to October/November 2002. Although the project would have preferred a September start, schools originally approached in both BC and Nova Scotia did not wish to participate, and time securing alternate study sites made a later start necessary. Project time limits did not permit a longer evaluation period.

This *Kit* was chosen as the best available to potentially meet school needs given the preliminary results of the focus groups and individual interviews. There was some suggestion that what was most needed was a means of implementing existing guidelines for management practice rather than development of new guidelines. Conscious of the barriers identified, it was seen as a cost effective, "low-tech" solution to common school complaints, and one, which could empower schools to diagnose and solve *some* problems on their own. It was also seen as a way of addressing IAQ problems in a collaborative way. A decision was made to test application of the *Kit* in eight schools to determine its effectiveness in achieving its objectives, which are described below.

Objectives of the Tools for Schools Kit/Pilot Project

The objectives of the US EPA *Tools for Schools Kit* were:

- to promote a proactive, preventive management approach to IAQ in schools
- to offer practical strategies to encourage good IAQ management practice
- to promote a sense of shared responsibility for the maintenance of healthy IAQ
- to promote recognition of the importance of good IAQ and the impact of poor IAQ on school occupants and society

Prior to commencing the pilot test, pre-interviews were conducted with 40 participants (5 IAQ team members from 8 pilot sites), the purpose of which was to get a baseline of knowledge and practices concerning IAQ at the school.

Participants were asked about the following:

- their perceptions of IAQ in their school and whether they thought their perception was unique or shared by others
- any IAQ experience they might have had in the past
- what was being done to maintain good IAQ in their school and their role
- how IAQ issues were communicated in their school
- whether they thought the pilot project might help manage IAQ in their school and how, and
- their knowledge of the *Tools for Schools Action Kit.*

Perceptions about IAQ at Their Schools

Participant responses about the air quality in their school varied by school site but were mostly internally consistent within the school. It was either good or bad depending upon their current personal experience. Their views were usually shared by others interviewed at their school, and they thought the broader school community would share their views. However, there were concerns expressed that students may not be coming forward with concerns and it was acknowledged that the level to which people were concerned varied.

Representatives from four schools characterized their school's IAQ as generally good, three thought IAQ at their school was poor, and one was split equally between good and poor (only four participants were able to be interviewed at this site). There were occasions in three schools where one respondent felt the opposite of the others interviewed.

Reasons or explanations respondents gave for poor IAQ included:

- poor ventilation – in a number of buildings even in new buildings where the air handling system was not working properly or inadequate; inside classrooms with no windows were especially affected
- some areas of the school seemed worse than others
- seasonal fluctuations (wintertime was worse) or after school had been closed for some time (Christmas, March break holiday, summer)
- air seemed "dead" a lot of the time
- insufficient cleaning of ventilation system (proper equipment not available to do it)
- belief that IAQ issues are "brushed under the carpet" because it has taken so long to get action on the complaints
- more aware of IAQ issues as a result of participation on the OH&S Committee
- never noticed how poor the IAQ was until affected personally
- complaints are not addressed promptly

In the school where the IAQ team was split on the quality of the air, it appeared one person was sensitive due to allergies. Comments like "notices IAQ because of a personal problem with allergies," IAQ is "especially poor in spring in and fall" or "*between November and April when the heat exchanger is on*" appeared. Yet, others thought that few health problems had been reported.

Comments supporting the view that IAQ was good were:

- the school building is new
- the ventilation system is working well
- staff, particularly those with asthma, find it easier to cope and work in the new building compared to an older school they were in

- few or no complaints or health problems reported
- worked in some older schools and the air in this school is a lot better

In some buildings where the air quality was characterized as generally good, there were some issues reported with respect to dryness and temperature/heat as it neared the summer months; four classrooms had temperature issues; and windows that open were needed to cope with high occupancy levels in some classes some were unsure the ventilation system was adequate for the occupancy level in the building.

General comments on perceptions about IAQ and reasons offered for good IAQ included:

- IAQ has improved over the years because of anti-smoking policies.
- People are more aware and have greater sensitivity toward the issue than in the past.
- More focus on prevention has resulted in better IAQ.
- New schools are easier to keep clean and cleaning is superior compared to the past.
- Since a principal is personally affected by IAQ, there is greater persistence in addressing the issue.
- There is a reasonable degree of awareness and cooperation about IAQ at the school.
- IAQ is something that is (and needs to be) continuously monitored to ensure good IAQ is maintained.
- IAQ is good because the school board is proactive in dealing with the issue.
- Time was permitted for "off gassing" from furniture and materials used in construction (gym floor) before the school was occupied.
- Policy of carpet removal has improved IAQ.

Types of IAQ Experiences

The types of concerns people reported tended to relate to included:

- temperature fluctuations (too hot, too cold)
- inadequate ventilation/air circulation problems
- inadequate cleaning practices
- scents - some incidents with the wearing of personal scented products
- smells (from cafeteria), smells of varnish (from Industrial Arts room) and chlorine (from swimming pool) spread throughout the school; outdoor pollution from surrounding industry being brought into school through the ventilation system

Health symptoms reported included headaches; respiratory difficulties/difficulty breathing (especially those with asthma); increase in allergy-like symptoms (including resulting in needles to control it); nosebleeds; dry mouth, eyes, and skin; and lethargy/tiredness were reported.

One school was a P3 (public-private partnership) school built and owned by a private contractor and leased back to the province. This school, although new, was reported to have a ventilation system that was not working properly. School occupants reported strong smells, gases, chemical fumes, exhaust from idling vehicles and cigarette smoke being drawn in from outside, sewer system gases, and the like. Poor water quality problems were also present which affected air quality because the humidifiers had to be shut off. Testing had been done to analyze the chemical content of the air. Health symptoms such as headaches; difficulty breathing (especially those with asthma); nosebleeds; dry mouth, eyes, and skin; and feelings of tiredness were reported. Because communication was poor and there was no feedback to staff and students on what, if anything was being done about the complaints received, respondents assumed nothing had been done. All respondents, including the principal, agreed that feedback was lacking and that, as a result, people assumed nothing had been done to respond to complaints. It was also said that people in the building do not understand how the ventilation system works and need to keep windows closed for it to function properly. Interestingly, the principal thought complaints were addressed more quickly as a result of it being a privately owned P3 school but others thought that was not the case.

Another school reported a very positive IAQ environment as a result of recent occupancy at a new school. They talked about problems such as mould and poor ventilation at their former school building which was originally an open concept design but, as teachers could not teach in that environment, walls were erected blocking air flow. Some classrooms had no windows at all. There were complaints of headaches and respiratory difficulties in the old school as well. In the old school, students were asked before admission if they had asthma or health concerns so that they could be placed in an area of the school that would give then the least problems. There was also a committee in place to address IAQ concerns, which ultimately resulted in the building of a new school. In contrast, there are no problems at the new school and pro-active efforts are being made to ensure it stays that way. The Principal encourages occupants to take pride in their school and keep it clean, not deface or damage property, keep it running well and well maintained and cleaned, and the like. Good communication and prompt reaction to complaints were features of this school, particularly with the building operator, as was working together as a team.

One school reported that, while the school board was addressing the complaints with respect to cleaning of ducts, it was not the thorough job that should be done. One school mentioned that the board only addressed complaints of an extreme nature at the insistence of parents and the fire department and cited an example of smoke in the ventilation system. A leaky roof has resulted in the air exchange system being left on all the time to counter any mould growth.

Another school reported good IAQ since the ventilation system was overhauled. One school mentioned a leaky roof and windows were replaced as they were causing problems with mould, carpets were removed as they proved difficult for some people, asbestos tiles were removed, toxic materials had been used in some (art and chemistry) classes in the

past, and there was no working air system prior to renovations including a ventilation system. Prior to renovations, some occupants experienced headache and fatigue and there seemed to be more colds and flus as well as skin rashes.

Most schools seem to have a scent policy in place. Their views about how it should be enforced or encouraged vary. Usually, if there are complaints about scents, it originates with a student who is sensitive to the products. Some mentioned that the custodian regularly checks all of the air handling equipment to ensure it is working order.

IAQ Practices at the Schools

Participants were asked "What is being done to maintain good IAQ at your school?"

Some identified both reactive - testing - and proactive measures - adoption of scent reduction policies, routine cleaning, documentation of the types of chemicals used in the lab so if a problem occurs it can be traced to the lab and a possible source identified more readily; air handling units tested regularly - as practices. Others are mentioned below.

- Monitored for potential problems during degassing when school first opened – did not allow students in the building until it was clear throughout.
- Posted procedures on school bulletin board to explain what to do if you find something peculiar. This creates a shared sense of responsibility for such issues as IAQ.
- Review employer/employee expectations with Technical Education class and school staff as necessary
- Monitor the air handling system regularly, including changing filters and regulating temperature
- No scent policy introduced – people encouraged not to wear scents New air system was installed when addition was built onto school
- Regular cleaning by custodians and regular removal of garbage by custodians and students
- Separate room and ventilation system for photocopier after renovation
- Special ventilation/exhaust in Chemistry labs to prevent the spread of odours throughout the school
- Routine maintenance of the air handling system, including changing filters regularly
- Less toxic materials/supplies used in Art and Chemistry classes
- New section built and old part renovated with windows that open
- Better vacuum with Hepa filter
- Try not to introduce products into the school that will off-gas
- Choose less toxic cleaning products
- Maintenance completed during off hours
- No pesticide use on grounds
- Maintain awareness through close relationships with staff and students

- Routine tours by OH&S Committee to look for possible signs of IAQ problems – dirt, bad ceiling tiles, etc.
- Windows are kept open to allow for natural ventilation
- Fan installed in classroom to circulate air
- Some IAQ testing done
- Chalk boards replaced with white boards to decrease dust build up
- Collaborative effort is important

Barriers mentioned to good IAQ practice were funding for the necessary repairs, lack of understanding about IAQ or how systems functioned, communication, and lack of time.

Some recommended:

- standardized IAQ guidelines and procedures for reporting/investigation of complaints; include complaint form at the office to facilitate student reporting
- a protocol for school board reporting of test results
- regular communications from the OH&S Committee with staff so as to alleviate any fears and create a better working environment
- an independent group to look at the problem
- funding for upgrading and acting on problems as they arise
- regular maintenance and cleaning to prevent future problems
- letting students know they have a voice and that the school is genuinely concerned about IAQ

Roles in IAQ Management

Those who identified themselves as a participant in maintaining IAQ at the school were primarily custodial/maintenance staff and principals.

All were in agreement on their own and others' roles in maintaining good IAQ as outlined below. This was largely consistent with roles identified in other sections of this report.

Staff/Teacher role: report problems, sit on the OH&S Committee, and handle complaints from students

Students: report problems to teachers, help to increase awareness among peers of IAQ issues and encourage observation of reduced scent and other IAQ policies

OH&S Committee/Safety Officer: receive complaints, write letter board requesting resolution if it cannot be resolved in-house; discuss complaints at monthly meetings and keep records of meetings; encourage people to contribute to improved IAQ; initiate testing where necessary

Principal/Vice Principal: handle complaints, arrange for the problem to be fixed if it can be done internally; if not, forward to the board for a response; sit on OH&S

Committee and communicate with remainder of staff; ensure solutions are implemented; act as a liaison between the school and the board

Maintenance/custodial staff/building Manager: handle complaints and fix problems that are brought to their attention or arrange for the requisite expertise to do so; keep the school clean

School Board: act on complaints and remediate/fix the problem, including initiating testing

School Private (P3) Owner: involved when a repair or other mitigating step needs to be undertaken at the school

Parent: volunteer to help with IAQ activities; act as a liaison among various groups (SAC, OH&S, etc.)

Other: various Committees such as School Advisory Committees, Home and School Associations have a responsibility to learn more about IAQ and advocate for healthy IAQ in schools

Having a supportive community can help people gain a better understanding about IAQ and help to move things forward – with community support a new school was able to be built to replace the old one.

How IAQ issues are communicated

With regard to communication processes, most schools said staff (and occasionally students) report a problem to the principal and/or chief caretaker/maintenance who would investigate the problem and take remedial action if it could be handled locally. If not, a complaint would be made to the Occupational Health and Safety Committee, and forwarded to the school board. The principal also forwards request for work to be completed to the board.

Other methods of communication about IAQ involve:

- Scent policy is communicated via notice boards, posters, signs, PA announcements, and a memo sent to students.
- School newsletter is used to communicate IAQ issues.
- Notices about the scent policy and scent awareness are sent home to increase compliance rates.
- Minutes from OH&S meetings and SAC (School Advisory Council) and other committee meetings are shared with staff and with the greater community.
- Staff discuss the issues among themselves - this is how the issue first became identified in some sites, or at staff meetings.

- Literature is sent home to parents at the beginning of each year explaining school policies such as no smoking.

Where people in schools felt positive about their school and IAQ, they also said complaints were addressed promptly and communication mechanisms were good. Similarly, poor IAQ is positively correlated with poor communication and a slow or inadequate response to problems. There was one school where communication was described as good, largely it appeared because the school principal was supportive and listened, but IAQ was poor.

Issues regarding communication were prevalent at sites where IAQ was identified as poor. Poor communication among the school, the school board, the P3 school owner meant that actions were not always taken as needed. Communication between administration/the principal and staff was often an issue as staff felt uninformed as to the status of a complaint once made.

In other sites, students and staff are usually debriefed if there is a problem and what is being done about it to reassure them. Feedback is received from the school board on IAQ issues and is passed on through the Principal, in some sites, to those who need to know at the school.

Perspectives on Participation in the Pilot Project

Participants felt that participation in this pilot project might result in greater awareness of IAQ issues and ideas about how good IAQ might be maintained in the future. In particular, it was felt that the project would help to educate people about the little things they can do to maintain good IAQ and provide a standard process for assessing IAQ – a tool that people can use to help identify any concerns that may be present.

Some participants also hoped it would raise the profile of the issue with the school board and some hoped specific actions would be taken to address their particular IAQ concerns. One respondent was sceptical of the value of the project because it was not conducted during the winter months when more of the problems appear. Respondents were not expecting immediate improvements to IAQ as a result of this project. A few saw it as primarily an information gathering exercise.

Those familiar with the *Tools For Schools Kit* believed that the checklists would help people to identify issues and provide a means for bringing them forward.

Knowledge of Tools for Schools Action Kit

Most respondents were not familiar with the *Tools for Schools Kit* and had not had an opportunity to review its contents thoroughly prior to the pre-pilot interview.

9.2 POST-PILOT INTERVIEW RESULTS

Interviews were conducted following the pilot test with the same respondents as in the pre-pilot interviews, with the exception of three who were no longer with the project. The intent of the interview process was to determine whether or not:

- the objectives of the *Kit* were met and what components were most useful
- the ideas offered in the Supplement regarding implementation were helpful
- training was a critical success factor in the implementation of the pilot and good IAQ management practice
- the sites developed a plan of action encompassing improved IAQ management practices and actually implemented it
- the pilot produced successful outcomes and what the critical success factors were
- the initiative is sustainable on its own (i.e. whether they will continue to maintain the IAQ team and implement their plan).

As well, comparisons were made between pre and post-interview data to explore any changes occurring as a result of the pilot, as well as between "hands-off" (who were simply supplied with the *Kit*) and "hands-on" schools (who were offered training and support) to explore success factors in implementation and the type of supports needed. This would determine the degree to which distributing *Kits* to schools without additional supports would be likely to result in implementation.

9.2.2 Schools Not Implementing the Project

All schools did develop their IAQ team, which may have been a result of pressure from the project to identify team members for pre-interviews. Of the eight pilot schools, two did not implement the project at all. These, perhaps not surprisingly, were hands off schools. Their efforts were limited to either a cursory review of the *Kit* and video by the principal and two school staff in one school and a meeting of principal, vice principal and maintenance staff in another with no review of the materials. Their IAQ Team never met so other team members (usually parents, students, and teachers) were left without information and had no idea what developed, if anything. They never saw the *Kit* or *Guide* so were unable to comment on its use or utility.

The *Kit* was not used, nor was the *Supplemental Guide*, in either of these cases and no plan was developed or tasks identified. Both felt IAQ was not a priority because the school was considered to have good IAQ. One said that the pilot project helped to highlight or bring to the forefront for presentation to the board tasks or problems identified prior to the pilot. Increased awareness was still seen in one school as positive outcome. There was increased awareness about individual roles and responsibilities for maintaining good IAQ. It also reaffirmed for one school that the school had good IAQ enhancing the comfort level of occupants.

A negative outcome was the frustration experienced at not having sufficient time to get the team together to work on the initiative. The biggest barrier for these schools (as well for those who did take action) was time. People felt it was just another committee to which they had to devote time. While attempts were made to schedule meetings, these ended up being cancelled. Again, it was not a priority because IAQ was considered to be good at the school. One person said the timing of the project was problematic; starting the project in September may have improved outcomes.

> *"The project was a great idea but people did not have the time to get together and discuss any of the issues... So the project did not help to get over the time barrier and allow everybody to meet."*

The approach of the two schools was slightly different; it was clear the level of familiarity with the *Kit* differed and their view of its potential differed as well. One school (i.e. the collective view of all respondents interviewed from that school) said the *Tools for Schools* project was still seen to be a positive approach empowering schools to support good IAQ internally without the requirement of seeking outside assistance. The *Kit* was seen to provide the basic knowledge base to enable schools to take responsibility for their own IAQ. It was viewed as a useful and practical tool for addressing issues in a collaborative manner and encourages a team approach to problem solving. The team approach, although not implemented, was seen to be essential, encouraging people to take ownership of a problem and develop a sense of pride in their school. The team approach avoids putting the responsibility on one person, encourages the sharing of differing thoughts and opinions on problems and their solutions, enhances trust (there are fewer "secrets" and more openness in a team approach), and has the potential to encourage the involvement of others in the process, and heightens credibility. Open lines of communication were also identified as important. "Hiding things" was seen to simply exacerbate a problem, making it far worse in the end by contributing to a potential crisis.

Training was the necessary "jump start" to the project that these schools said they needed. They felt it would have given them a solid foundation upon which to start, enabled the team to become more familiar with the *Kit* and their respective roles, clarify expectations, and helped to develop a plan with the expertise and guidance of Project staff. One school said it may have been helpful for project staff to have "dropped in" periodically to review and provide more hands on guidance (but this was contrary to the design being tested as they were a "hands off" school). Sending the *Kit* to the school with the expectation they would use it without an overview and some guidance as to how to use it was unrealistic. Time and motivation are lacking, as is accountability or monitoring process to ensure it is being used and plans are developed and acted upon. It was also felt that if the school does not have an IAQ problem, there are far greater priorities that demand attention and the *Kit* will not be used.

At this point, the plan for one school is to make IAQ part of the OH&S committee mandate; there could be an IAQ subcommittee of the OH&S Committee or an individual tasked with the lead role for IAQ on the OH&S Committee. Their recommendation is to

implement the initiative into existing structures to enhance likelihood of implementation and sustainability. Involvement of students was also suggested. Future and ongoing in-service sessions would help to invigorate and breathe new life into this project. The other school said if the board made it a priority, they would implement it. It should involve maintenance staff at board school levels but local leadership is also needed.

9.2.3 Changes to IAQ or IAQ Management Practices

All schools said actual IAQ in the school had not changed as a result of participation in the pilot, except for three, one of which had the curtains and ventilation system/air ducts (which had not been cleaned for 15 years) cleaned over the summer months, a second which partially completed cleaning of the ventilation system, and another which had extensive renovations done which were planned prior to the pilot.

> *"The indoor air quality in our school has changed since the beginning of this pilot. It has changed somewhat because we have done some work in our air handling units. Some of them have some extra cleaning done and then there has been, of course, new filters in on a quarterly basis but the ventilation system and some of the dampers have been readjusted and calibrated. It seems to be better right at this present time.....What basically happened was that we looked at a number of things in our school and in our building that were contributing to poor air quality and we were able to get, for example, the vents all cleaned over the summer months and the air quality has definitely been better, for myself, I find. For myself, the air quality is much improved. Things that in other years I was bothered by, like sinuses, I have not been bothered by yet. I've not had a problem and mostly we are getting fresh air and things like that into the building, so its definitely better."*

> *"Yes, air quality has changed because we did have meetings about it, the students, and one problem that we did have was the curtains, the really old curtains that collect a lot of dust and we got all new curtains in every classroom. What else did we do? We opened windows more often now, too. Kids that have a lot of allergies and it never occurred to us how many had been complaining. .....We've a janitor on our committee and he met with all employees, staff and he takes more concern to make sure everything is cleaner."*

> *"No, the IAQ in the school hasn't changed..... because I don't think it could get any better."*

> *"Well, I guess I have perhaps been made more aware of how fortunate I am to be in a school that doesn't have indoor air quality problems, in this day and age where so many public institutions seem to have problems with indoor air quality. I guess perhaps it has been an eye-opener for me that way. But because of the very nature of that we don't have the indoor air quality problems. I wasn't able to take a whole lot from the kit. I guess it did make me a little more aware of some*

of the ways certain things are done in terms of the intake fans and the school and the exhaust fans and not to have them positioned here. I never really thought of that stuff before."

However, all reported an increase in awareness about IAQ (although the two that did not implement the project said this was confined to the IAQ Team or fewer people only). Most respondents said that people were more aware, became more vigilant, more people became involved in maintaining good IAQ, and there were more open discussions and greater communication about the issue. A few reported changes in management practices, mostly with regard to the exercise of greater vigilance over cleaning practices and monitoring of the ventilation system. However, most reported no significant change in management practices, largely because they said they were already following many of the recommended practices, although this was not possible to determine.

However, respondents went on to identify changes in management practice or other areas which occurred as a result of participation in this project. The project resulted in:

- an assumption of roles as a result of greater awareness of people's responsibilities within the school
- a way to bring parties together to solve a problem internally without seeking outside help
- greater focus on cleaning practices; greater vigilance on the part of the head custodian
- greater focus on the proper functioning and cleaning of the ventilation system ductwork, on cleaning and changing filters, and on readjusting and calibrating some of the dampers
- development of a process to record the number of sick days lost because of IAQ issues before and after the cleaning of the ventilation system (data has not been tabulated due to sick leave of person collecting data).
- a procedure to allow furniture to "off gas" prior to placement in the school
- subsequent development of a number of policies and practices regarding IAQ

In one area, the school board hired a person to manage custodial services locally in a more direct way to ensure regular inspections of schools.

Although most schools reported no change in IAQ or IAQ management practices, many did go on to cite changes that had occurred as a result of participation in the pilot as follows:

"I would say that the air conditioning in the computer lab, it was pointed out that the lab was over hot, overheated and under ventilated and the air conditioner got changed so that it was much more reasonable in the warmer months.... This was something that was rectified as a result of being involved in this project."

"I think probably the biggest outcome was awareness within the staff. When we passed around the initial backgrounder there were a lot of groans, a lot of negativism, but once we went around and actually started looking and realizing and sort of sharing our information rather than being in an elite group sitting in a corner pretending to do things, they saw what we were actually looking at and they realized that there were things they could actually do in their own room to improve their situations. As far as activities that have happened it is very difficult to, in all honesty, it is very difficult for me to sit and say this is a direct result of what we're doing (participation in the pilot) because so many other things are going on as well. For example, in our library there has been a big problem with air quality for a long time. Our librarian had been complaining about chest problems and this kind of thing. They removed the carpet. Now that is not a direct result of what we did but it is definitely a positive outcome. Right now, we have, I mentioned the circulator. The teacher who is in that room is out with respiratory problems. I don't know what is going to happen there but I'd like to think that we, as a group, would have some role to play there but I'm not sure that we will. And I'm not sure that that would be anything that would happen there would be a result of what we were doing or if it would be a result of a teacher's medical condition."

Some cited examples of IAQ problems they found as a result of their inspections, although the problem may not yet have been corrected at the conclusion of the pilot project. For example,

"In one of our classrooms we have a circulator room which is basically an adjoining room where the mechanism for the fire sprinkler system is. Now in that room it is very, very damp. It is very musty. We found clear evidence of mould buildup and that kind of thing when we went through. And the teacher who teaches in the room, like this is sort of a, it isn't sort of an adjoining room it is more of an adjoining closet... This teacher is now out with respiratory problems."

9.2.4 Use of the *Tools for Schools Kit* and Suggestions for Change

As mentioned, two (hands off) schools did not use the *Kit* and the remainder used it in different ways. Most did not use it in its entirety. Some used it primarily as a reference document, some used or adapted its contents - specifically the checklists, one created a survey for distribution to staff, and one distributed the backgrounder to students, staff, and parents on the Home and School Association. The backgrounder was seen to be too lengthy and cumbersome to read. The *Kit* was introduced by the IAQ team to staff at a staff meeting where the IAQ Coordinator gave a presentation and described how it should be used.

The *Kit* was used in the following ways:

- as a reference to create a survey circulated to school personnel (staff, teachers, and custodians) to identify IAQ concerns, compile data, and identify tasks to be completed. There was good response to the survey but items identified were basically already known.
- to develop a condensed questionnaire distributed to staff and teachers about temperature and garbage removal. It received a poor response so staff and teachers identified issues verbally to the IAQ coordinator who documented the concerns. This process resulted in identification of a faulty thermostat that was subsequently corrected.
- used some of the checklists that applied to the site – food services, teacher, caretaker/maintenance checklists
- modified the checklists for local applicability
- mostly relied on the walkthrough checklist while conducting the school inspection; found additions had to be made to it for things found but not on the list
- guidance during meetings to determine steps to take
- to develop a system to keep a record of the number of sick days lost prior to and after cleaning of the ventilation system (due to IAQ related illness) so as to have a comparative measure of success. A count of children with asthma was also completed. Data remains to be tabulated due to staff long term illness.
- as a basis for discussion at a staff meeting
- launching the IAQ Team and Activating the IAQ Management Plan sections were mentioned by one site
- some information was sent to the OH&S Committee

The IAQ coordinator usually used the *Kit* (who was often the Principal or science teacher or head custodian in one case) as did the custodian and sometimes the Science or Industrial Arts teacher on the IAQ Team. Usually, the IAQ Coordinator had the most knowledge of the *Kit*. The knowledge of the active IAQ team members varied, depending on the school. Usually, their knowledge was not extensive indicating there had not been a thorough review by all members; many members did not review it at all and were unaware which sections and checklists had been used.

In one site, the IAQ team and teachers assigned to several classrooms used the walkthrough checklist to identify problem areas in the school. Teachers assigned to one classroom used the teacher checklist. The IAQ team also read the backgrounder to provide them with a little more information and decided that this would be something that is useful to send out to staff, students, and parents. All staff received the backgrounder, as did some students and parents who attended Home and School and PTA meetings (the distribution was not more widespread because of photocopying costs). Some people thought that the backgrounder was a bit 'bulky'; and that people wouldn't take the time to read it.

In four sites, teachers and staff (i.e. the stakeholders as identified in the *Kit* checklists) were asked to complete the checklists as prescribed in the *Kit*. The response to completion of the checklists by staff varied by school - sometimes it was welcomed as a means of identifying concerns and/or supporting prior IAQ complaints and sometimes it was seen as unnecessary either because staff had no faith in the outcome (i.e. that any action would be taken), or because it was seen as time consuming and "better left to the experts", or there was not an IAQ problem. For example, the following comments shows the varying responses to the checklists.

> *"Their feeling was not that it (the pilot) wasn't relevant. We have several concerns here with indoor air quality within the school coming from teachers and the Occupational Health and Safety Committee. But the feeling was that, ok we'll do it but we know that nothing is going to come of it. There are never going to be any changes because of it. ...I think some of them would have seen it as an opportunity to vent some frustration. Some of them would have seen it as, like I said, just another paper exercise that will never amount to anything."*

and

> *"Tools for Schools was introduced to staff at a staff meeting and checklists were distributed. The response to the checklists was positive because over the last few years there have been comments by staff members with respect to IAQ – cleanliness (dust) has been seen as a problem that is negatively affecting IAQ. There was a also a walkthrough of the school that was completed using the checklists."*

In another site, while staff members were willing to complete the checklists, they did not really see the value of it since the building manager handled most of the IAQ issues adequately. Teachers in one site noted that their checklist was longer than the others. A lot of the information was seen to not apply at one school site. Other criticisms were that teachers do not have the expertise to carry out some of the checks and that most would have to be referred to experts (e.g. biology lab checklists).

In about half the sites, staff and teachers contributed to identification of problems by completing a checklist or abbreviated survey. In others, the "core team" comprised typically of the principal, teacher, and custodian/chief caretaker/building manager, did a walk though of the school and used the checklists to denote problem areas for follow-up.

In operational terms, who *completed* the checklists differed by site. Some sites had the IAQ team complete the various checklists as part of the walk through denoting items to be followed up on and, in others, the relevant checklists were distributed to staff and teachers in the school for them to complete while the Team used the walk through checklist. It was felt that rather than burden teachers and staff, the team would do the checklists. Sometimes abbreviated checklists or surveys were distributed to staff and teachers to identify IAQ problems, making it a simpler and less time consuming exercise for staff.

One school that did distribute checklists felt later that it may have been more effective to have distributed a one page outline to staff and then discussed the issue at a staff meeting to identify common concerns rather than have them complete it on their own. Some sections of the *Kit* were found to be not applicable to the school site in question - mention was made of classrooms not having sink drains for example - so the material was adapted for local use. The least useful part of the kit was the American references.

Generally, all participants found the *Kit* to be helpful. It was useful in making people aware of the many factors contributing to good IAQ (regular cleaning of garbage bins; the regularity of dusting shelves and desks). Use of the *Kit* needs to be ongoing as part of routine monitoring of the school.

One participant said the full version of *Tools for Schools* might be useful for a school with a lot of problems – they may actually want to sit down and use all of the checklists in order to identify the issues that they have. For a school with few or no problems, it was felt that the *Kit* did not need to be quite as detailed – a simplified version that is user friendly would have worked better. *"When you see how much is contained in the Kit it can be intimidating and you think ...oh my goodness, I have to read through that!"*

One respondent said the *Kit* should contain a 'bulletin' that summarizes the backgrounder which could be sent out to staff, students, and parents so that they become aware of what is going on in the school. It was also thought that there should be some flexibility with respect to checklists so that they are more applicable to specific classrooms.
Additional changes suggested include: present the information in point form, a lot of it is needlessly wordy and time consuming to read; the way the material is presented in a box is cumbersome (a three-ring binder would make it easier to use and organize). The *Kit* needs to be less generic, but that may be difficult as every school is unique. Most said there was nothing specifically wrong with the *Kit* but found it a bit lengthy to get through. A suggestion was made to create a version of the *Kit* to be Canadian or region-specific.

> *"It was hard to use every part of the kit because some of it did not apply (e.g. this school does not have problems with mould etc.). The tool as a whole was helpful in creating change in the building site, in terms of monitoring new equipment and furniture that was brought into the building."*

> *"A lot of the materials in the kit are not appropriate for a new school. A lot of issues in the kit like mould and fungus just are not present in a new school and the kit should be adapted to address this fact."*

> *"There should be something specific in the kit that says you can modify parts of the kit to your own school needs – this is what we ended up doing but weren't sure if we should be doing it this way."*

"We went through all of the kit materials and found them all very helpful but just used those parts that were appropriate – tended to stray a bit from the kit and incorporated some of our own ideas as well with respect to the types of policies that need to be developed."

"A lot of the information in the kit is very useful for creating awareness, especially with respect to the off gassing of new furniture – with a new school there is a lot of new furniture (still coming in) and the information provided in the kit created more awareness of what to do with these materials before use."

"Unfortunately, the walk through checklist and the teacher's classroom checklist were not that useful within our school. Part of the difficulty is that each room is unique in its own way and the checklist and the walkthrough list were really done on a sort of generic sort of, typical classroom sort of thing. And so there were things there like checking for sink traps and stuff like that that 90% of our classrooms don't have. And then the other thing is that most of our classrooms have I don't know if it is the age of the building or if it's the design or what it is but there are things in our school that just weren't on the sheet and there was just no room for them on the checklist ...The teacher who teaches in that room is very frustrated because there was nowhere on her list to report that. What we did was we adapted it. There were several situations like that were we found that the sheet wasn't very good. What we did end up doing was we ended up going through an entire walkthrough of the school on our own and just made notes using that as a reference for the types of things to look for."

9.2.5 Use of the Project *Supplemental Guide* and Suggestions for Change

The *Supplemental Guide* was used a reference document only and briefly at that; the *Guide* had limited use for the project. One school used it as means of coordinating stakeholders for another purpose - a testament to its general applicability in terms of methods for garnering stakeholder support, regardless of the issue. While the concepts were helpful, generally little use was made of the document. However, this may be more a function of time available to execute the pilot. As well, it is possible that the document might find greater use for a school seeking to implement the *Kit* on its own as some support was already obtained from the school boards by the project prior to school involvement. One school mentioned they used the *Guide* as a reference but still found it did not help with implementation in that the OH&S Committee felt *"their toes were being stepped on"* with the introduction of the project. Otherwise, there were no negative comments on the contents or suggestions for revision.

9.2.6 Development of an IAQ Management Plan and Pilot Project Outcomes

Most schools in the project did not develop an IAQ management plan per se (with activities to be undertaken and timelines for completion), and, although this was

mentioned in the *Kit*, this was not introduced or focused on until the second round of training delivered to the pilot schools, at which time a planning tool to do so was provided. However, some identified activities they wished to do as a result of the visual inspection of the school.

> *The project and the kit enabled a group of people to get together, identify a problem, and find a solution from within, without having to go to the School Board – in this way identifying tasks was very helpful.*
>
> *"Development of a plan was helpful at the time of the workshop to decide what needed to be done but there seemed to be no follow through."*
>
> *"Use of Tools for Schools created a heightened sense of awareness about IAQ issues – even though this is a new school, involvement in the project helped to create awareness of everyday issues and activities that could potentially contribute to IAQ. One major issue was IA classroom contaminants – the outcome was removal of this classroom out of the school to an adjacent building. There were also policies created with respect to smoking, painting, personal scented products, the laminating machine, and off gassing of new furniture products as a result of participation in the project. Project forced people to become a little more proactive and take action – even though this is a new school people need to realize things can wrong even in a new school and therefore you need to find ways to prevent problems."*
>
> *"Increased awareness about IAQ issues was a significant positive outcome – through both poster campaigns and the activities of the IAQ Committee. (A poster campaign was carried out by one class)."*
>
> *"With respect to positive outcomes? I think awareness. Keep people aware of the various things that are being done. And that is not the biggest change. The very positive things are the things that have been done.*
>
> *"Just change in practice, basically a little bit about management of certain areas and keeping our classrooms clean."*
>
> *"Well, first of all, I guess for me I would say to be able to measure success you'd have to be able to see if you accomplished anything and I guess because we didn't really, I don't consider us to have any indoor air quality problems I don't really see that I guess I succeeded in solving the problems, but then again there were never any real problems to solve. Now I think I perhaps did heighten my own awareness and some of the awareness of some of the individuals on staff that there are ways to address there are a chain of command and all the rest of if for addressing indoor air quality problems. That one I would guess could be considered a success, but in terms of developing a plan and solving a problem, we didn't really, that didn't happen."*

"Definitely the idea of looking at it (IAQ) has helped. Making people aware of certain situations in our building that has helped."

"We distributed the survey we looked at the survey thoroughly - what was being said by teachers and staff members. From there we basically initiated a plan, put the plan into action, and approached the school board about getting certain things done. Some of them have been done. I would venture to say most of them have been done. There's probably only one or two other things that need to be done that haven't been done yet."

All six schools that implemented the project conducted a walk through of the school building. Sometimes this included the "core" members of the IAQ team and sometimes just the custodian/maintenance person and IAQ coordinator/principal. In most cases, the *Kit*'s walkthrough checklist was used.

One school made a short term plan that extended into the summer and the primary outcome was cleaning of the ventilation system and ductwork through the summer months with the financial support of the school board. During the training in one school board region, time was devoted to development of their IAQ plan. At the time, it was agreed these would be shared among participants once plans were completed back at the school site. Copies were to be forwarded to the project staff for redistribution but none were received by the project. It appeared that plans were partially completed and partially implemented.

Tasks completed and positive outcomes achieved during the process varied from increased awareness, to the conduct of a visual inspection to identify problems, to the introduction of IAQ sensitive policies, to the redesign of a building to relocate the industrial arts shop to an exterior building to reduce dust and airborne contaminants. Some schools only got to the point of distributing checklists and did not tabulate the results to identify concerns. Some reached the stage of documenting the results of the visual inspection.

Some schools achieved significant results, some of which were mentioned in the earlier section on changes to management practice, IAQ itself, or awareness. Where outcomes were achieved, they were as follows:

- cleaning of the ventilation system and ductwork which had not been done since the school was built 15 years ago
- changes in cleaning practices and more rigorous cleaning (tiles, carpets, vents in classrooms cleaned on a regular basis)
- painting of the walls
- increased awareness of IAQ issues
- replacing of gyprock damaged by water which caused mould to form
- one teacher - an IAQ Team member- had his class develop posters promoting good IAQ

- introduction or revisiting of policies regarding new construction, off gassing, scents

One school implemented new policies requiring new furniture to be aired prior to placement in the school and sufficient time for scents arising from materials used in construction to dissipate prior to occupation (e.g. gym); construction and repair activities were required to take place after school hours; a zero tolerance policy for scents was introduced/revisited; cleaning supplies were examined and replaced with environmentally friendly and less chemically sensitive materials. As a result of use of the *Kit*, the school was redesigned to locate the Industrial Arts (Technical Education) room to an external on-site building eliminating odour, sawdust and other particles from circulating in the main building of the school. As a result of discussions with staff during a walkthrough, a laminating policy was implemented to minimize odour and IAQ issues. More emphasis was placed on the no-smoking (near the school) policy. Because this school was completing construction at the time of the pilot, the school had the opportunity to introduce new policies concerning IAQ that they might otherwise not have introduced. There was a focus on tasks related to the building warranty to ensure everything was fully operational and opportunities presented whereby the school was able to consider the purchase of IAQ testing equipment. This school also used an existing "Greening of the School" Committee to support IAQ efforts. This was a community-based committee comprised of parents and school staff whose mandate was to plan for and enhance the school grounds by planting trees and shrubs, promoting green space, and the like.

> *"Our most positive outcomes were increased awareness about IAQ issues; cleaning of the ventilation system which had never been done since the school was built; and some changes in the practice of keeping things like vents and classrooms cleaned on a regular basis."*

When asked what would improve outcomes, responses were:

- more money for prevention and clean up activities
- publishing the checklist results or list of complaints by number received (the number of complaints by type)
- more team meetings

9.2.7 Barriers and Success Factors

While school board support was important, the real driver in the pilot schools was the Principal. In cases, where outcomes were achieved, it was largely due to the Principal or Vice Principal. The role of the IAQ coordinator was usually assumed by the Principal/Vice Principal as well and this leadership role was a critical success factor.

Critical Success factors supporting efforts in the schools were identified as:

- training
- leadership of the Principal/Vice Principal and secondarily the IAQ Coordinator, although these roles were often assumed by the same person
- school board support
- active core group on the team

Secondary factors identified were:

- funds from the school board (in one case)
- janitorial/custodian/maintenance support
- knowledge and expertise provided by the building operator
- changes did not cost a lot of money

It was suggested that what was needed were the following:

- a "champion" with the time and interest to take charge of the initiative
- a group of two or three others to work with the person to share responsibilities
- the principal and custodian need to work closely together
- designated time to implement the program
- orientation and training on the *Kit* and the management plan

Being provided with a tool to help school identify IAQ issues was very helpful, without which the school would not have had the means to conduct their own assessments. It provided guidance from a self-help perspective. To be successful, school boards have to assume a leadership role with IAQ efforts providing tangible and intangible support. There also has to be a supportive environment within the school from staff about IAQ initiatives. The project provided a vehicle for staff to voice concerns; the presence of the initiative increased their comfort level that IAQ was important in their school.

Those success factors were in place, at least in part, at all schools implementing the project. The overall management approach to IAQ shifted in the sense that there was greater awareness of the issue and the need for ongoing attention. However, how long this can be sustained remains to be seen.

One site mentioned the importance of demonstrating early success to achieve buy-in, particularly of staff and teachers. Ductwork cleaning was seen to produce a positive change in IAQ and hence created support for the project.

Although funds were provided by the project and the Department of Education for minor remediation efforts and for substitute teachers where required to support IAQ initiatives (e.g. staff attendance at training), most project participants were unaware of this and did not access these funds. Both the existence of these funds and the process for accessing these funds from the school board was not clear to most of the IAQ teams, or was

reported to be too cumbersome, although principals were advised of its existence by the project.

Only one school accessed funds from the school board for cleaning of the ventilation system but only a partial job could be done due to insufficient funds. It was not clear if this money was drawn from resources identified for the project or from some other source. This suggests that money was not a significant barrier or that the level of funding available was not sufficient to have an effect. In reality, most schools did not get very far in their assessment of needs and their assessments did not result in the identification of problems, which required funds to fix. With more time, it is likely that more action would have been taken. As well, IAQ teams appeared to not be aware of the availability of funds and/or the process by which they could be accessed.

Barriers cited to implementation of the *Kit* were:

- time - some IAQ teams were unable to devote the time necessary to completing the tasks

- funds - where money was insufficient to complete a task to remediate a problem; more funding was needed to complete ductwork cleaning, replacing the drapes could not be done because of funding constraints; funds were not used, with the exception of the training session, to free up time for staff to work on the project

- timing of the project – the pilot began at the end of the school year and while motivation may have been initially high following training, this was lost over the summer months and teams had difficulty starting up again in the fall. The project did initiate contact with all schools in the new school year as a reminder to start their teams again but with the demands of the new school year the process was sluggish and some never did begin again. It is important to capitalize on initial momentum offered by training and to use the training session to begin development of plans. As well, from an IAQ perspective, some IAQ problems appear only in the winter months.

- Staffing - The fact that custodial and maintenance staff are off work over the summer means that very little work gets done with respect to IAQ.

"There was not a lot of time to do this project. Everybody is really busy and the time frame for completing this project was very short so not a lot was accomplished. Things were going well initially but then summer came and this basically 'fell off the radar' in September. Time is however a major issue for most anything – it is difficult to get together to discuss one more thing when there are already so many other things to do."

"There has to be time freed up for people who wish to participate in an initiative like this – you need time for meetings and inspections and there just isn't a lot of time to

do this during the day when you are teaching. People who are part of the OH&S Committee have time set aside from their workday to participate in that group's activities – perhaps something similar to that could be done for an IAQ Committee. Otherwise, the only time to do something like this is in your own free (non-paid) time and a lot of people would be reluctant to do this (this group did, however, end up working on this in personal free time)."

"The principal is supportive to doing something about IAQ and that is an important success factor – without administrative approval it would be very difficult to move forward with something like this."

"You also have to be able to identify an actual problem, not just symptoms – you have to find what is causing those symptoms and get rid of that source. If you know what the cause-effect relationship is you can implement a procedure or program to eliminate that source and reduce the symptoms but this is very difficult to do."

"People have to be convinced that there is a problem and that is has to be changed – often it is the personality of the people that is important – people have to want to work together in a cooperative effort in order to be successful."

Pilot sites implementing the project did say that involvement in the project itself proved beneficial in getting action on problems that been "on the agenda" for years.

A few cited bureaucratic difficulties independent of the pilot which exacerbated these issues:

"An example of some of the problems we ran into. If there was something as simple as a latch on a window that needs to be changed, in order for us to get this latch that costs maybe $2.50 down at the hardware store we have to send a work order into (head office) which is about 250-kilometers from here. They have to receive the work order, it goes into a pile of prioritized work order, they then will send a purchase order at some point to our school for us to go over to the hardware store to go over and pick up this latch. So you are talking about a two-week lapse. And these are things that we deal with that are, you know very frustrating, it is very difficult to get things done. And it is not so much the materials that are provided, I shouldn't say not so much, in every case it is not the materials it is the bureaucracy that we have to go through."

Some mentioned they would like to have seen more community and parent involvement; had there been a community-wide effort to increase awareness, more would have been accomplished. An awareness campaign could have stimulated the development and implementation of IAQ supportive policies, procedures, and practices. There was only the involvement of one parent on the IAQ team and a small mention (others mentioned getting students involved would have helped the process of implementation) about the project went out in the school newsletter, to which there was little response.

"The only negative outcome, and this is nothing to do with pilot per se, was that the parent and student volunteer on the IAQ Committee were not brought into the process as much as they could have been."

"In order to increase student and parent involvement you need to find people that are anxious to participate and you need to find the appropriate medium in which they can participate."

Suggestions to enhance implementation of the *Tools for Schools Kit* and improve outcomes were:

- increase involvement of parents and wider community
- increase communication between parents and the school about initiatives like IAQ and what is being done to enhance success
- increase involvement of students (especially regarding the observance of scent policies, storage of food in lockers, etc.); poster campaigns would increase awareness and change behaviour; involve student council; stage a student-sponsored IAQ Awareness Week
- incorporate the above activities into the curriculum
- provide teaching opportunities in the classroom to address IAQ issues (classroom project in science for example)
- develop an IAQ management plan as a tool to track IAQ Team progress and create a sense of shared accomplishment as tasks are completed
- ensure identified issues receive a quick response to ensure credibility of the initiative
- conduct school walk throughs with someone knowledgeable about the building operating systems

9.2.8 Prevention Approach

Some schools acknowledged to grasp the *Kit*'s emphasis as a preventive tool more than others, usually the hands on schools understood this concept better than the hands off schools and this may be a function of the training. Some thought that the *Kit* was effective in promoting the adoption of a preventive approach to IAQ management but worried it would lapse once the pilot project was over to one, which was simply reactive to problems. Factors that would increase the likelihood of the school adopting a proactive preventive approach were identified as school board support and guidance, and leadership and willingness of school occupants. Unions were also identified as a potential untapped resource, which could distribute information to its members. Other ideas involved the development of a protocol so school staff and principals are aware of who to contact at the school board level to address a problem. Maintenance and janitorial staff were seen as key players in this effort.

While *Tools for Schools* was generally seen as a good instrument, it needs to be implemented over a longer period of time to be effective (at least one school year). There

also needs to be more involvement and more communication when the *Kit* is being used. There needs to be both a school and a community effort with two way communication between those on the IAQ team and the people that are filling out the checklists. A proactive approach requires the establishment of an ongoing group or committee mandated with the responsibility to address IAQ issues. Some felt that there was too little time to execute the pilot; therefore it did not get implemented the way it should have.

9.2.9 Team Approach

The team approach was universally acknowledged as essential to IAQ efforts. Promoting and maintaining good IAQ was seen as a shared responsibility; everyone had a role to play and resolution of problems did not weigh heavily on the shoulders of one person.

> *"The project was helpful in adopting a team approach; with more time, however, increased effort could have been put towards furthering this approach. The project was helpful in adopting a team approach because it enabled people to get together and talk about issues and to share ideas and opinions. It's not just one person's problem with a team approach, as the responsibility is shared amongst the team members."*

> *"The team approach was good at getting different people together who have different ideas and views about the situation. It is very helpful and valuable to have people come together and share ideas because then you can identify what needs to be addressed in a collaborative effort."*

> *"The team approach really helped efforts because it allowed people to bounce ideas off of each other, especially when trying to solve the odour problem in the lobby."*

> *"The team approach would be helpful because you are not putting the entire responsibility on one individual, as well, people have different opinions and ideas and it is good to bring all of those thoughts together. The more people that are involved the more trust that can be created – there will be fewer secrets and more openness in a team approach. If other people in the school see that there is a team addressing this issue then they themselves may want to become involved."*

> *"The team approach is helpful because it allows people to get together and discuss the issues – people have different opinions and work in different areas of the school, so with everybody together a more complete picture of the school can be obtained."*

> *"This team approach can be useful because you can gather ideas from many different people and when you do that people take ownership of the program and to some degree develop a sense of pride in their school."*

> *"This approach was helpful to get other people involved such as teachers and students from the CS class. The team approach also brings together people with different expertise, which is helpful in looking at the problem from different perspectives – the building operator knows how the ventilation system works, teachers know about their individual classroom environment, administration knows the ins and outs of operating the school etc... The overall team approach was helpful because people could rely on each other if there was a gap in knowledge."*

Participants appreciated the opportunity to talk with each other. For those who retained the full team complement, the team approach helped to break down barriers among members, particularly with custodians/building managers who initially felt defensive about the project thinking it was simply a critique of maintenance practices and their personal performance, with parents who may have been suspicious of school efforts, and with principals who were wary of external criticism. For others on the team, the project presented a chance to learn how the building and its systems function and to understand the difficulties facing building mangers. In many cases, the custodial and maintenance staff became recognized and respected as the "resident authority" on the building by the end of the project. It became clear that this person played a key role in good IAQ and was an integral part of the success of the project. The pilot project became as much a relationship building exercise as a chance to take corrective procedures. There was a real sense of support for the airing of different opinions. Some said parents provided a useful and different perspective. One participant mentioned the team approach was useful in swaying negative attitudes and opinions of IAQ issues.

The project brought together stakeholders who do not usually work together. The team met four times in one location. The team approach also brought together people with different expertise which proved helpful in looking at the problem from different perspectives – the building operator knows how the ventilation system works, teachers know about their individual classroom environment, administration knows the ins and outs of operating the school, and this collective knowledge contributed to problem identification and resolution.

Overall, there was little parent and student involvement, although these stakeholders were represented on the IAQ team. It seemed that most schools/IAQ coordinators found it simply more expedient to meet without these stakeholders. This seemed to be both a function of expediency/pragmatism (it was easier to get staff at the school together, both formally and informally, to conduct walkthroughs and discuss action) and of wariness of parental involvement (potentially complicating the process and exposing the school to external criticism). Parents often had jobs and could not meet during the day and this was a barrier. The process of involving other stakeholders and partnership building takes time but has the potential to achieve broader and possibly more sustainable outcomes as a result.

Students were not seen as particularly relevant by most teams, except one, which actively involved students in a classroom activity to increase awareness. However, it seemed this was also a function of the stage of the effort; raising awareness and securing buy-in from students was not seen as a first step, rather, emphasis was placed (as it is in the *Kit*) on initial assessment of the physical plant and its operating systems done through a walk through and use of checklists. Student involvement may be something that teams could have moved on given more time.

In some cases, the members of the IAQ Team were also members of the OH&S Committee, which helped to facilitate information and knowledge exchange. It operated independently but with links to the larger OH&S Committee, which seemed to work well and enhanced possibilities for sustainability. One detracting factor was the absence of parent and student involvement as it went about its work.

9.2.10 Training Workshop

With the exception of two respondents from one site, training was universally identified as beneficial to both recipients and non-recipients of training. A one day training session, as described in the methods section of this report, was provided to IAQ team members in the "hands on" school sites. It provided an orientation to the project and to the *Kit* as well as an opportunity for the team to begin development of their IAQ action plan. Training served as a catalyst to get the project going and provided an opportunity for participants to ask questions and learn from each other's experiences. They learned from the perspectives of other stakeholders within their own school and from other schools, reviewed the contents of the *Kit*, clarified expectations of schools for the project, and began the process of development of an IAQ management plan. Schools which received training identified it as a critical success factor and those who did not, said the lack of training was a major stumbling block. Participants in the schools where progress on IAQ was made during the project said that without the training workshop, and the project for that matter, none of the outcomes would have been achieved.

From respondents who did receive the training,

> *"The workshop was a great motivator at the time but it would have been more effective had it been held in September."*

> *"The workshop was helpful to talk about the issue and to gain a better understanding of what to do. Because the emphasis was not on blaming people for IAQ problems it produced an atmosphere that was conducive to finding solutions."*

> *"The workshop was helpful because you had people from other schools there who you could relate to and gain knowledge from their experiences – it was interesting to hear how other people handled IAQ issues."*

"Without the training session there probably would not have been the focus and desire to get going on a project like this."

"The workshop helped to focus on the issue and discuss things that need to be done. It also provided an opportunity to sit down and discuss IAQ issues with the building operator – this was key to a lot of the successes had by the project – the building operator was already doing a lot of the things mentioned in Tools for Schools but up until the workshop there wasn't an opportunity to sit down and talk about it."

"The workshop was important because it went through the kit and gave the group and idea of what to do – really had no idea what to do with the kit when it was sent to the school, so without the workshop it probably would have sat on the shelf and nothing would have been accomplished. The workshop was very empowering in that it got everybody together and provided them with tools to do something about IAQ in their school."

These views are expressed in the following comments from respondents who did not receive the training:

"A training workshop would have been helpful to discuss project materials and develop a course of action... the training workshop acts as sort of a springboard to getting the process started. Having the workshop probably would help in selling the project to schools because any questions that schools have could immediately be answered."

"A workshop would have helped to get our group focused and perhaps enabled us to design a plan so we could find more time to implement this program."

"Training would have helped because it would have given the IAQ team a jump start and perhaps provide encouragement for finding the time to follow through with activities related to IAQ. Training would also have helped to give a foundation from which to start and would have enabled people to become more familiar with TFS and to ask any questions about the overall process."

The training provided:

- the necessary focus to get started and acted as a catalyst for change
- an opportunity to sit down and discuss IAQ issues with the building operator whose knowledge and support was intrinsic to the success of the initiative subsequently undertaken. The building operator was doing many of the things suggested in the *Kit* but there had never been an opportunity to discuss these activities
- a chance to raise concerns and ask questions that could be immediately answered
- the benefit of outside leadership as a resource through the process

- a cross section of staff and stakeholder viewpoints which led to development of a more inclusive plan
- an opportunity to develop an IAQ management plan with guidance from project staff

Based on the post pilot interviews, training workshops must consider the multiple audiences to be addressed. It is important to be cognizant of the great power differential that exists among stakeholders in the school hierarchy. Students, for example, can be easily intimidated in such a forum, as can maintenance or custodial staff. Principals may feel the need to be circumspect in their comments so as not to draw criticism. Parents are not as familiar with the school system and infrastructure and therefore may feel at a disadvantage. Creating a comfort level for all participants is important, particularly as this lays the groundwork for the IAQ committee and its future work together. The opportunity to talk in the training workshops began the process of developing relationships among team members. This format was supported by participants as well.

The workshop evaluation ranked participant opinion on a number of elements regarding the effectiveness of the training offered to the four "hands on" schools. The project received high marks (i.e. average scores of 3-4), on a scale of 1-4 (with 1 being not effective at all, 2 - somewhat effective, 3 – mostly effective and 4 - very effective), in the following areas:

- providing an overview of the purpose of the project and the pilot
- helping to clarify what was expected in the pilot and the role of the IAQ Team
- introducing participants to the *Tools for Schools Kit*
- providing an opportunity to discuss ideas and pose questions about IAQ issues
- identifying potential barriers and solutions to IAQ issues facing the school
- helping to provide the impetus and focus to get started
- promoting a cooperative and collaborative process or team approach

A weaker area was that of helping participants get started on development of a plan of action for their school. This may be because there was less emphasis placed on the plan in the first training session. Recognizing that more time was needed to formulate a plan of action subsequent sessions offered to three sites devoted two hours to development of the plan by school IAQ teams, and provided a planning tool by which to do this. However, no site had sufficient time at the session to complete their plan, and although completion was not expected by the project staff, it may have been the goal of the participants. Plans, for the most part, were not completed once participants returned to their home site.

One participant mentioned that there should be scientific expertise available at the workshop to answer more specific queries pertaining to mould counts and the science of the air quality. Comments at the workshop suggested that an overview of the elements that contribute to good, or conversely poor, IAQ would have helped as well.

One suggestion made was that perhaps there should be a two or three day workshop that thoroughly reviews the *Kit* in detail and how to use it while doing an IAQ assessment. This could involve bringing several schools together (as was the model used for training) and actually using the *Kit* in the building to do a 'mock' assessment. Extensive training would be beneficial because then when people come back to their own schools they will know exactly what to do. Ideally, there should be a workshop at each individual school with people there to help in doing the assessment. However, it was recognized, given time and budgetary constraints, that the ideal is not always possible.

The workshop, along with general involvement in the project, was cited as critical in achieving outcomes. Other suggestions for training included:

- Provide ongoing, annual in-services for initial orientation to IAQ management and follow-up sessions to discuss common concerns.
- More follow-up from the project team might have helped.
- Host a follow-up workshop to detect problems, review progress, learn from other schools' experiences.
- Meet each year in September to review the IAQ plan and assess the current state of IAQ in the school and what tasks to take on during the school year.
- Ensure more frequent communication among all team members.

9.2.11 Follow-Up / Accountability

The project provided, in and of itself, some measure of follow-up/accountability in that participants knew here would be a post-pilot interview to document their experiences but this had limited impact. One site suggested it should have been the role of the Project to continue to check up on their progress and to impose deadlines for completion of tasks. However, each plan is site-specific and it was not the intention of the project to micro-manage the schools. While project staff were free for consultation upon request from hands on schools during the project, no calls were ever received requesting support. As well, contact was initiated via email to all sites upon return in September to encourage the IAQ teams to meet again early in the fall and reminding them of the pilot conclusion date. Schools need to see the benefit of this project for themselves and need to be intrinsically motivated, as well as held accountable by the school board.

A follow-up workshop at which pilot sites could report on progress would have helped encourage further action as well. The timelines in the project made this difficult but this may be a good idea to institute on an ongoing basis to enable schools to support each other.

For schools without a perceived IAQ problem, it will be more difficult to implement the *Kit*, unless required to do so by their school boards.

> *"Just sending the kit to the school and expecting the school to use it is unrealistic because everybody is so busy and the kit just tends to be put to the side. If IAQ is*

not an issue at the school, getting schools to use the kit voluntarily is difficult. You'd need to have a person check up on the school to ensure that it is being used."

9.2.12 Sustainability

Some sites planned to incorporate the responsibilities of the IAQ committee into the OH&S Committee. The IAQ team whose members have joint membership with the OH&S Committee intend to also continue active involvement.

Participants made a number of suggestions to enhance the possibility for sustainability of the initiative:

- Link the IAQ initiative and the implementation of *Tools for Schools* with existing structures and mandates, specifically OH&S Committees. IAQ teams could operate functionally as subcommittees or separate committees with close links the OH&S Committee. OH&S Committees are mandated by law in Nova Scotia and therefore have a sustainability that does not exist with the IAQ teams.
- Provide ongoing in-service orientation and training workshops.
- Incorporate the project into new schools at the outset to enhance the notion of a prevention approach and involve school representatives in design and construction phases.
- Implement *Tools for Schools* through the OH&S Officers at the school board level who can then support schools with implementation on an individual basis.
- Conduct walkthroughs on a semi-annual basis.
- Incorporate IAQ related tasks into the daily activities of the custodian.
- Involve both OH&S Officers and building operators in the implementation process. These two groups meet regularly with their provincial counterparts to discuss issues of mutual concern. This presents a great opportunity to secure their support of the initiative, standardize good IAQ management practices (preventive maintenance, cleaning) around the province, and share concerns and solutions on a peer-based level.
- Institute mandatory regular inspections of schools conducted by government.
- Free up time for IAQ team members to participate in such an endeavour (time for meetings and inspections and other activities), similar to the OH&S Committee.
- Make the IAQ committee a more recognizable group within the school so occupants know about the initiative.

"General awareness of staff is also important – if staff is aware that something is in place through which they can voice their concerns, then dealing with the issue and implementing programs becomes much easier."

One respondent did caution about the potential loss of broad support by having OH&S Committees solely assume responsibility for IAQ.

> *"If you're expecting schools to follow through you would have to make the committee a mandatory committee. ... I see that as a very positive step. The problem with that or the difficulty with that would be if you did, my fear would be that it would become the same people. And I think this is an opportunity to expand the number of people who have taken responsibility for the building or for at least the care of the building... And I think that my fear would be that if you linked it too closely with the occupational health and safety it would become a subcommittee of that group. ...You lose the idea the whole idea of the program in my mind was to have a shared responsibility amongst the staff and what happens with the occupational health and safety is you end up a small group of four or five people who suddenly in the eyes or the perception at least of others are suddenly responsible for the safety of the building or the safe conditions the building. And so when another person walks by and sees that there is a broken latch they simply report to their occupational health and safety and assume that it would be taken care of. And I think with the whole idea of the indoor air quality was everybody assumes part of the responsibility not just in reporting but also in action."*

One successful example was the school where some of the IAQ Committee members were also OH&S Committee members. Although this approach proved beneficial for accomplishing tasks, it meant that members of the original IAQ team were not involved (parent and student participants) and this was seen as a loss by respondents.

There was an interesting debate in the interview data about the relative value of the *Kit* for new or older schools. Some thought that the *Kit* would be more helpful in older schools assuming them to have more problems than newer schools, while others thought it might be seen as "too little, too late" to be effective, that is, that the problems are too large to be prevented or addressed by small steps.

> *You don't have to have problems to keep working at IAQ – just keep at it instead of letting a problem happen and then calling somebody to fix it. This will create a more positive attitude and increase the likelihood of implementing a program.*

> *"You folks chose the wrong school. This school just got renovated - top to bottom - and the air quality was a big concern when they renovated it. Since they've renovated it, there have not been a lot of problems. And of course, I was one of the people that if anybody had a problem they would come to and I've not had a complaint. No one has ever come to me, so when you don't get any complaints you don't set up meetings. ... If you had it in the school that hadn't just been renovated, you could use it as a proactive tool to avoid having problems."*

The following captures many respondents' thoughts in regard to sustainability.

> *"The IAQ management approach will continue to be sustained through active involvement of the IAQ subcommittee of the OH&S Committee. Walkthroughs and checklists should be completed on a semi-annual basis (twice-a-year) so as to*

encourage participation and to keep the topic on the minds of school occupants. Older schools may require more frequent inspections to sustain the project but for a new school twice-a-year inspections would be sufficient. Overall, unless you use the approach continually you will lose sight of it and push it aside. The information in Tools for Schools and the checklists are a good resource and will be something that this group will refer to on a regular basis. ....Having three people devoted to IAQ on the OH&S Committee is important because OH&S Committees are mandatory in schools – if the OH&S Committee takes on the task of IAQ then the chances of the effort being continued will be greater."

"I think once people realize the need, then all you really need to do is free up some time and people will do it. I think there is enough people who have their own either personal interest, or wherever their interest is coming from, I think there are enough people who have the interest to do the work and I think, if the time was available, they would probably do it."

"This approach to IAQ has to continue because there have been too many complaints about IAQ in the past. The current team will probably continue because all of the people on the team have been at the school for a while and know that something needs to be done about IAQ – we just need to find more time to do something about it."

Some emphasized the need for leadership and support on the part of the school board.

"Well, first of all, the board itself has to initiate it and they have to say 'ok we want this done and we want this done on a daily basis, all the time' much like how health and safety is done. And money has to be put towards doing things, looking at things, so things don't pile up. Right now, basically, you are looking at neglect for the last 12,13,14 years or however long this building has been here. And if we have a return to that, then problems will come back so the board has to make that commitment that they want this project to continue. The commitment has to be in the form of direction that they want the schools to take but is has to come in the form of funding. It is fine and dandy to say that we want this to occur, but if they are not willing to put in dollars to get things done, you know, the thing is if there are no dollars behind the project getting and keeping things clean are not going to get done. So the board has to make that commitment."

9.2.13 Pre- and Post-Pilot Comparison

Comparing pre and post-pilot data, the perceptions of respondents about the quality of air in their schools did not change and, in most cases, actual air quality did not change either. Some experienced a change in management practices, although most believed they were engaging in the appropriate practices already. This was not independently verified. However, significant outcomes were noted in some sites, depending upon the effort expended. Increased awareness was a positive outcome of the project, even for those

unable to fully implement the pilot, which was an expectation held at the pre-pilot stage. Enhanced and more vigilant cleaning practices were mentioned, as were ventilation and ductwork cleaning. Additional policies and procedures and greater attention to the quality of air in the school were outcomes, as was greater vigilance overall. Because parents and students were underutilized as team members, the results were unknown to them. Poor communication, not surprisingly, was cited as a significant concern for these respondents.

Participants also felt at the pre-pilot stage that the project might help to educate people about the little things they could do to maintain good IAQ and provide a standard process for assessing IAQ – a tool that people could use to help identify any concerns that may be present This objective was met in the project, for those who implemented it. Some also hoped it would raise the profile of the issue with the school board and some hoped specific actions would be taken to address their particular IAQ concerns. The project did seem to serve as a catalyst for action on some longstanding items for some schools. In many cases, IAQ concerns were already known and this simply presented an opportunity to move them forward for resolution.

While specific knowledge about the *Kit* improved, this was not shared by all team members; indeed, in most cases, the *Kit* was used by the IAQ Coordinator who knew most about its contents.

For those who were involved in the teams, ventilation and temperature remained concerns identified in the visual inspection of the school. In some cases, it was not clear what policies and practices pre-dated the pilot and which were solely outcomes of the project as similar items are cited in both the pre and post pilot stages. It seems they may simply be more educated in identifying good IAQ management practices - heightened awareness and knowledge of practices was an outcome of the project.

9.2.14 Comparison between "Hands on" and "Hands off" Schools

The primary differences between "hands on" and "hands off" schools were:

- Schools which received training identified it as a critical success factor and those who did not said this was a major stumbling block. Schools which did not receive training were unclear of expectations, unsure how to proceed, lacked motivation, and had a more difficult time creating opportunities to even meet, let alone develop a plan of action. This was clearly reflected in their relative progress: those with training achieved more outcomes than those, which did not.

- Outcomes in "hands on" and "hands off" were significantly different. Those without the orientation session achieved little more than increased awareness about IAQ while those with training reported other outcomes in addition to increased awareness. Two hands off schools did not implement the project at all

while the other two reached the visual inspection stage. Their IAQ teams did not meet, problems were not identified, and no corrective actions were taken.

9.2.15 Researcher Observations

In introducing the *Tools for Schools Kit* to schools, it is suggested that a brief outline of it's contents, its purpose, general instructions for its use (complete a visual inspection, develop an IAQ management plan, determine a means of identifying problems and communicating information) and considerations for establishment of the IAQ Team (either as a Subcommittee of the OH&S or separately), be outlined, as well as its relationship to other policies and complaint protocols that may exist. *Tools for Schools* may well supplement other components already developed or trigger a need for such policies, complaint protocols, and communication plans. There needs to be an ongoing mechanism of surveillance of problems/complaints identified, monitoring of ventilation and temperature and other operating systems, routine maintenance practices, and a clear mechanism for identifying and reporting back on complaints. Mechanisms for increasing parental and student involvement need to be implemented, and many good suggestions for doing so can be found within this section.

Length of the checklists and their appropriateness for teaching staff was a concern. They were seen as potentially laborious and, in some cases, too technical for teaching staff to complete (e.g., checking air vents and air flow). Pilot sites found ways to get around this by creating abbreviated lists or surveys and essentially shifted the burden for the physical building inspection from teachers to maintenance and administrative staff/IAQ team members themselves. In this way, staff could still have input into identifying concerns (too stuffy, hot, etc.), but diagnosis and checking of the air vents and operating systems were left to maintenance staff who had knowledge of the systems.

It seems unrealistic to expect, from this experience, that the *Kit* be implemented in its entirety as laid out. It is a useful resource but a simplified means of execution is needed. Schools must be able to implement the *Kit* with flexibility, adapting it to their needs. The danger in this approach is, of course, that something may be overlooked but from a pragmatic point of view, in order to ensure implementation, a flexible approach is necessary. This approach must be supported with initial orientation/training, followed by regular in-service opportunities to share updated information, knowledge in the field, and experiences. Building operations staff may need more technical training to supplement the general overview provided to other IAQ team members. The format of bringing different stakeholders from different schools together was a positive and useful experience where they both work in their own school-based teams to develop their IAQ plan and in a large group forum to have the opportunity for discussion of common concerns.

A few schools were clearly not that interested in participation - usually because IAQ was not seen to be an issue or because of time constraints. There were sites in which morale appeared to be low; there was a sense of frustration and no interest, support, or leadership

locally in devoting the time to the project. In others, time was a barrier and the priorities of the day took precedence. This was particularly true in schools that did not have a perceived IAQ problem or did not have the opportunity, as with new construction for instance, to implement new policies or practices. As indicated earlier, while school board support was important, the real driver was local leadership, usually by the principal and IAQ Coordinator.

The timing of the project was not ideal: the break in the summer served to reduce initial motivation gained from the training session and the duration of the pilot was too short. A school year would have been preferable. However, while the project sites may have made more progress, it is unlikely that the issues of concern would be any different. The barriers identified herein would still be a concern: time constraints, interest, local leadership, the length of the *Kit* and mode of use of checklists, for example. The critical success factors are also likely to be similar, (e.g., training, local leadership).

Some attention should be devoted to an accountability framework and motivators to encourage schools to continue with IAQ efforts. A follow-up workshop to report on progress and discuss challenges may help in this regard, as well as some encouragement from the school board. Surprisingly, funding was not sufficient to do so. Building a network of IAQ friendly schools might be helpful.

Although all schools were encouraged to continue with the initiative after expiration of the pilot, the degree to which they did so is not known. Some have indicated they would continue with the work, in some cases placing responsibility for IAQ with the OH&S Committee. Some mentioned they would continue with the effort until June on their own. However, IAQ efforts in the fall may have been more driven by the fact that post-pilot interviews were going to be conducted and a report on progress made, than by any motivation internal to the school. Training also served as motivator.

9.2.16 Post-Pilot Interviews with School Board Staff

Four interviews were conducted with representatives of the two school boards in the pilot to determine their views about the relative success of the pilot project.

Familiarity with the Pilot

All four school board representatives had no contact with the pilot school sites since the beginning of the project, although one had contacted the project to inquire about status. As a result, they were unsure about the experience of the schools with the pilot and their degree of success with implementation. They were also unaware that all but one site had not accessed funding available to implement changes. Funds had been made available by the project and the Nova Scotia Department of Education to the school boards to enable pilot schools to address minor repairs or other changes schools wished to make (drapery cleaning or replacement for example) as a result of their participation in the project, as well as to provide staff to fill positions while teachers were at training sessions or the

like. However, these were largely not accessed. (It appears the process for doing so was not clear to all school sites, although the availability of funding was mentioned at the training session and in correspondence with the principals. One site complained that the normal processes for requesting repair or funds were slow and cumbersome. However, most sites simply did not get to the point of identifying items requiring funding.) Respondents from the school board were unaware of these factors as no communication had occurred between them and the school sites.

Potential Benefits of IAQ Management

All respondents thought the *Kit* could work to improve IAQ and had potential to:

- reduce the number of IAQ complaints received by a school
- empower schools to address the situation themselves locally
- prevent small problems from becoming larger more expensive problems later
- promote communication and identify ways of doing things in a more efficient manner to provide greater satisfaction at the school level
- encourage positive, proactive response to IAQ issues rather than a negative crisis oriented approach.

Respondents thought the *Kit* could promote healthy IAQ in schools because it involves people at the school in looking at IAQ in a positive way and encourages people to make helpful suggestions for improving IAQ. This was seen as much more effective than through the OH&S Committees via the 21-day notice provision.

> *"TFS is a great idea because in some of the pilots conducted by the School Board, it helped to identify what is needed in order to have good IAQ in schools. It promotes communication and identifies ways of doing things in a more efficient manner so that it provides more satisfaction at the school level."*

> *"It can promote healthy IAQ in schools because it involves people at the school in looking at IAQ in a positive way – it encourages people to make positive suggestions for improving IAQ. The other way that schools look at IAQ is through the OH&S Committees via the 21-day notice, which is a negative way of getting things done because it is more reactive, whereas TFS seems to be more proactive in addressing IAQ issues."*

> *"TFS does help to promote healthy IAQ in schools through education and awareness. Plus if there is a problem with IAQ in schools then TFS may help in identifying a problem before it gets out of control."*

Tools for Schools was also seen to be effective for identifying "little things" that could make a difference to school occupants but they emphasized the importance of a prompt response to address these. One spoke of a prior experience where maintenance was not particularly responsive or quick to correct complaints and the use of the *Tool* stopped as a

result. IAQ issues need to be given a high priority when using *Tools for Schools* so the problem does not linger.

> *"TFS is good at identifying 'little things'. When these things are identified they need to be worked on right away or people will stop using the tool. In some cases with non-pilot schools the maintenance staff did not address these issues quickly enough so the school stopped using Tools for Schools."*

> *"IAQ issues need to be given a high priority when using Tools for Schools so the problem does not linger and portray Tools for Schools as being ineffective."*

They also stressed the need for open communication between the schools and the school board in order to get *Tools for Schools* on the agenda so that schools will use it across the board. There also needs to be support from the school board in order for schools to participate. Education within the schools is important as people need to be made aware about IAQ and be educated on ideas and tools that can be used to address the problem.

If the pilot proved helpful, they all would recommend its introduction in schools in their regions. However, this would require the initiative and interest of schools and while they would support and encourage implementation, they did not suggest a mandated approach. If people in schools that have tried *Tools for Schools* did not have any success with the tool *Kit* would be difficult to sell the product to other schools. If schools feel that the *Tool* will open up communication and that using it will help them in addressing IAQ issues, then schools will embrace it without much difficulty. This response suggests that those experiencing IAQ problems might be more apt to look at the *Kit* as a means of addressing those problems, rather than assume a preventive approach so there may need to be some promotion of its value for schools without perceived IAQ problems. Indeed, the school which appeared to use the *Kit* most and employed the most IAQ sensitive policy and procedural approaches was the new school just completing construction and assuming occupancy. Of course, this was partly an issue of opportunity but illustrates the value of its use in schools where problems have not yet appeared and where an active role was taken to prevent IAQ complaints (as a result of off gassing for example).

> *"Time and commitment are the biggest issues - you need to have the time to implement a new program and somebody that is committed to spearheading the operation. The kit probably won't solve every problem and people need to realize this fact."*

> *"The main difficulty is getting the program started - people need to be motivated to doing something about IAQ. Then once it is started you need to make sure that problems are addressed as they are identified."*

Critical Success Factors

When asked what type of support was necessary for long-term sustainability and expansion of the *Tools for Schools Kit* into other schools, they identified the following critical factors to ensure successful implementation:

- Cost effectiveness - costs must be feasible.
- Involvement of teachers - a core staff willing to work on such an initiative is necessary.
- Training followed by periodic in-servicing to address any problems that may arise.
- The tool has to achieve some success.
- A resource person tasked with assisting schools to implement the *Kit* and providing support as needed in order to quickly address problems.
- Effective marketing of the *kit* is necessary - it cannot be imposed by the school board; one must demonstrate benefit of using the *Kit* to schools.
- Support from the Department of Education - both to promote the *Kit* and provide funds to assist with implementation.
- School boards (administration and operations staff) must endorse the product.

Respondents were not sure about the extent to which the provision of additional funding and the support of project staff or specifically designated person were essential ingredients to implementation, given that funds had not been accessed for the pilot. However, it was thought that some funds would be necessary.

> *The cost associated with implementing the program is a factor – if it is cost feasible it will work. Also, the involvement of teachers is important – some schools are very good and have a staff that is very enthusiastic about new initiatives, while other teachers only do what they are paid to do and nothing more. You need to have core of the staff that are willing to work on such an initiative in order for it to work. Training schools on the proper use of the tool is also important – including periodic in servicing throughout the process of implementing the tool.*

Prospects for Sustainability

The practices proposed by the *Tools for Schools Kit* were seen as consistent with the practices of the OH&S Committees and with complaint reporting at the schools. Therefore, they could dovetail nicely. School board respondents felt it could be readily integrated into existing practices and structures. It was felt that working through the OH&S Committees and the Facilities operations managers would be the most effective route of implementation and would enhance the likelihood of sustainability of the initiative. Links with maintenance are critical to ensure immediate action is taken in response to identified problems.

The importance of how this *Tool* is "marketed" to schools, how the potential benefits of its use are described, how concerns about time constraints and budgets can be addressed, and the supports that the school board and others are willing to provide cannot be understated. Supports must be made available from the school board (in the form of funding for repairs, prompt response to complaints, expertise to discuss concerns, support for investigation and corrective action, and open communication) when required, or there will be little effort made at the school level. A high degree of skeptism related to IAQ exists already and a perceived lack of support will undermine its effectiveness from the outset. Leadership is required to support this effort and to ensure the above mentioned critical success factors are in place. The Department of Education must also provide leadership, endorse the idea, and provide some measure of support including funding.

The following comments illustrate these points.

> *"When used, the tool has to show some success in order for its implementation to continue. If you were going to implement the tool in all schools within a Board then you may need a person in charge of getting the tool out there – the person would have to be dedicated to doing this and be there for schools as a resource person in case they needed something – if a problem is identified it should be reported to this person so it can be addressed quickly. Training or in servicing would be important to educate people about Tools for Schools and to address any problems that may arise."*
>
> *"The key to any program at the implementation stage is how the program is sold – if the Board just dictates to the schools that this needs to be done then it will not work – you need to communicate with the schools and work at selling the product to them before it can be used. The schools have to see the benefit to themselves of using Tools for Schools; otherwise it will just sit on the shelf. It also helps if the Department of Education is promoting the tool as they are the funding body and any new programs will require funding."*
>
> *"The approach can be sustainable with the support of the Board."*
>
> *"There is a definite link with OH&S and this link is important for future sustainability. There also needs to be some link with maintenance personnel when problems are identified – if issues are not addressed when they are identified then people will stop using the tool."*
>
> *"I believe that the kit will continue to be used because in the beginning there was a great response to the program. The schools did most of the work themselves and may have felt that the School Board did not help as much as it could have (because of our small staff) but their self-initiative is a good indication that they want to continue using Tools for Schools."*

"Once it is found out what happened in the pilot schools, people can identify what worked and what didn't and why and move on from there to find ways to better implement Tools for Schools."

10. SUMMARY AND RECOMMENDATIONS

10.1 Summary

The findings from the four primary data sets are remarkably similar, although each provides a different lens on IAQ issues. The project has resulted in a full and wide-ranging discourse about the issue of IAQ.

People across Canada concerned with IAQ in schools responded to the web site survey. The data demonstrate both the depth of their concern and their sense that little is being done to either acknowledge or correct the problem, which has resulted in a great deal of frustration.

These sentiments were also apparent in the focus groups and, to a lesser degree, in the individual interviews and pilot test results. The focus groups, in particular, provided multiple perspectives within specific school sites. The individual interviews illuminated the positions of the various government departments and school boards as decision-making authorities in IAQ issues and the difficulties and complexities of dealing with this matter as a public policy issue. Associations and community-based groups were also able to identify unique concerns from their perspectives.

The report provides a discussion of perceptions, significant issues, views, and experiences of a variety of stakeholders including students, parents, school occupants, staff and elected representatives of school boards/districts, Teachers Federation, IAQ consultants, governments, and a community-based advocacy group. An overview of current funding programs, policies and practices by federal, provincial, and territorial government jurisdiction as it relates to IAQ is offered. Typical problems experienced with IAQ across the country are identified, as are suggestions for best practices and keys to successful IAQ management. Respondents identified barriers and contributing factors to good IAQ management. They also recommended processes to implement good IAQ management practice and/or guidelines, based on their environments and the respective roles and mandates of stakeholders. Current and proposed communication practices were discussed and recommendations offered for improving IAQ in schools. Those familiar with the *Tools for Schools Kit* also offered their comments on the *Kit*.

All agreed on the value of prevention and identified preventive maintenance and good cleaning practices, as well as ensuring major structural repairs to ensure a secure building envelope, as key actions required to ensure the maintenance of good IAQ. Most IAQ problems across the country are reportedly related to inadequate ventilation and mould. Health issues perceived to be associated or attributable to poor IAQ are: headaches, lethargy, confusion, respiratory difficulties, exacerbation of asthma and allergy-like conditions, and in some cases, more severe reactions. The use of scented products was also mentioned to a lesser extent, primarily by students and some teachers, with respect to the degree of understanding and acceptance of limits on behaviour concerning personal choice, as well as the degree or limits of the policy (no scents, reduced scents), and the

means of ensuring observance of these policies. While enforcement was mentioned, most preferred an education and awareness approach with constant reminders rather a punitive response to enforce compliance.

There appears to be greater awareness of this issue - the importance of IAQ and its impact on individuals which has grown over the last decade and this awareness continues to grow. All project participants share the goal that schools should be healthy learning and working environments for children/youth and staff.

Although there is some concern about the difficulties of science in measuring and diagnosing IAQ problems, and discussions around the concept of the cause and effect relationship between poor IAQ and poor health, by and large, IAQ is a genuine concern among government policy-makers. There is agreement as well, at least in principle, on the value of a preventive approach, and support for an emphasis on preventive maintenance and good cleaning practices. Some jurisdictions in Canada have earmarked funds for capital (renovation, repair, and new construction) and operations (maintenance) to support this approach and some have introduced compliant investigation protocols. While other provincial/territorial jurisdictions have these protocols and procedures, they have been developed at the school board level and contents vary within a jurisdiction. The most significant issues identified in the interviews were the perceived uncertainty and inexact nature of the science supporting IAQ, and therefore the resultant difficulty with problem definition, measurement, and response; the degree of fairness and objectivity of the process to address IAQ problems; the nature of the relationships among stakeholders and the degree of trust among those partners; and the (in) adequacy of communication mechanisms among stakeholders.

As mentioned in an earlier section of this report, the challenge for governments is to ensure value for money to deliver cost-effective solutions for IAQ problems, fairness in the identification and response to needs, and balancing IAQ issues among the other priorities of the day. Given the general state of knowledge and awareness about IAQ among all stakeholders, managing public expectations and communicating knowledge about IAQ issues is also a challenge. While awareness is growing, the issue of IAQ - what constitutes good IAQ, the importance of good IAQ and ways to maintain it, and the impact of poor IAQ is not generally well understood by all. This report demonstrates the value of open communication and, further, the importance of acknowledging a problem where one exists. Enhancing communication between school boards, schools, and the Department of Education on the one hand and their constituents on the other is necessary, as are mechanisms by which to build public trust in these institutions. While school boards have responsibility for maintaining school buildings and therefore good IAQ within these structures, they are essentially entities created by provincial statue and delegated authority for management of schools. They also exercise their functions within the parameters of the budgets provided to them by the province, making IAQ essentially a shared responsibility.

The degree of success in achieving change in IAQ management practice at the school and school board levels is heavily dependent upon leadership at various levels of decision-making. Provincial/territorial governments need to encourage the adoption of such practices, perhaps providing a model set of IAQ practice guidelines, and provide the funds to enable implementation. Policy-makers must keep abreast of the latest research findings in this area in order to make informed decisions and good public policy. School boards/districts also need to demonstrate their support of such an initiative, approve funds for such activities, and ensure the appropriate people are trained and able to provide advice and prompt assistance in response to complaints or requests. Leadership of the board/district facility managers in supporting such practices and ensuring the work gets done is an important and proactive response, as is leadership by the principal at the school level to support IAQ initiatives. Changes in preventive maintenance -a key contributor to good IAQ can largely be influenced by facility managers and their understanding of the value of these activities, so training and sufficient funds to carry out the work at this level appear to be critical success factors. A shift in thinking needs to take place at the school board level - indeed at all levels which places value on IAQ and good IAQ management practices. This report emphasizes the need for a coordinated response to maximize the effectiveness of efforts.

Based on the response of stakeholders, this report also supports:

- the introduction of policies and management guidelines or practices to promote good IAQ and healthy learning environments, particularly for children who have greater sensitivity to poor IAQ
- the input of stakeholders into the development and implementation of such practice guidelines
- the delivery of IAQ training based on the roles of the various players/target audiences
- the provision of access to resources and to expert consultation and advice both in IAQ and in the health profession
- the adoption of a team approach to identification and resolution of IAQ problems
- the adoption of explicit complaint investigation procedures and communication protocols
- the promotion of relationship building efforts
- the use of conferences to share learnings, update findings, and promote cross fertilization of perspectives
- the provision of funding to fix the problems
- and the development of long term IAQ management plans.

There is some interest in the development of improved IAQ standards in the interests of objectivity but this is not universal; nor is this approach without its shortcomings. While there may be merit in exploring this area, it should not be the only effort undertaken nor should it be viewed as a "cure all" approach. While there is disagreement on the need for and value of improved testing and standards for IAQ, there is a greater, although not unanimous, agreement about guidelines for management practice, and compliant

investigation protocols, and communication strategies that inform the community about IAQ efforts.

The suggestions for implementation are similar in the various data sets – and could apply to any set of guidelines including *Tools for Schools*. The routes of influence and leadership may differ among provinces/jurisdictions but the players who need to be involved are essentially representative of the same stakeholders. A flexible application of guidelines is necessary among jurisdictions. The time it takes to implement such guidelines (for IAQ management practice, for complaint investigation and response, and for communication) and the level of effort required, will be influenced by the nature of the relationship already existing among parties and by the type of policies, practices employed, and guidelines already in place.

Low cost strategies that empower schools at the local level to act on their own initiative to solve their IAQ problems, provided the necessary supports are in place, are welcomed by all stakeholders.

There must be a supportive climate at the school board level for this type of initiative and the Departments of Education can be influential in that regard. However, if *Tools for Schools* or IAQ management practices are to be changed/enhanced to support good IAQ, then the building maintenance staff need to be on side and the school-based administration must exercise leadership. As demonstrated by the *Tools for Schools* pilot project, the principal or some such "champion" was the real driver of the process. It also demonstrated the need for a range of supports to be in place to sustain the effort.

Tools for Schools was tested as a model for diagnosing and solving problems, within the limits of their own knowledge and resources, as well preventing IAQ problems. The tool is designed to:

- encourage local ownership of the issue
- empower schools to take action to promote healthy IAQ in their environment
- involve all stakeholders (potentially)
- encourage collective action and the adoption of a team approach to IAQ problem identification and resolution which both increases the sense of shared responsibility and communication
- offer practical, low cost strategies to address IAQ problems
- encourages routine visual inspection as means of initial problem diagnosis and prevention
- give the school some capacity for problem diagnosis; avoids having to call a specialist at the outset, potentially saving costs
- provide a focal point of responsibility for acknowledging and acting on IAQ issues.

More effort appears to be required at the beginning to launch the program, coordinate a team, identify a an IAQ Coordinator, conduct a walkthrough, complete checklists,

develop an IAQ management plan, and undertake identified activities. Once this work has been done, routine inspection at key intervals and observance of new practices may be all that is required, along with awareness activities.

The primary difficulty is the time required to invest in such an approach. However, pilot school sites found unique ways to lessen the burden, on teaching staff in particular, and more fully utilize the expertise of the building manager/custodian to implement this *Kit* – key factors contributing to success. This also counters some concerns expressed about the use of the tool by study respondents. Other strategies, such as freeing up time to enable staff (particularly the IAQ Team) to devote attention to this issue, can be explored.

If *Tools for Schools* is offered, then a flexible approach to implementation will be necessary. The *Kit* was generally seen as a useful and practical tool. Checklists may require amendment to remove the technical aspects of ventilation workings and the like from the teachers list and place them on the maintenance or walkthrough list as this is how they were implemented in many school sites. There was less emphasis placed on changes to the *Kit* as there was on the need for accompanying supports. This report identifies the elements of an effective response and the supports that need to be in place to ensure success of such an effort.

The pilot test of *Tools for Schools* found some early successes and identified barriers to moving forward as well. While there was limited time in the pilot test to produce positive outcomes, all experienced a change in their levels of awareness and understanding of IAQ and the factors which contrite to good IAQ. Some also reported positive change in the following ways: improved IAQ (in 3 sites); improved IAQ practices (usually in the form greater vigilance in cleaning practices and routine maintenance); cleaning of ductwork and replacement of filters; development of new policies or greater attention to implementation of existing policies (such as those pertaining to the use of scented products, smoking, new construction, occupancy of buildings following renovation or repair or acquisition of new furniture; the timing of repair and maintenance activities to reduce exposure for school occupants; and other such activities. All mentioned the benefit of a team approach in addressing this issue which served to break down barriers among stakeholders. While there were signs of early success (only two schools did not implement the program), time was limited in which to test outcomes of the project. However, time was sufficient to identify both the barriers to implementation of the *Kit* and the elements of an effective response. These findings appear to generally be consistent with the experience of others in testing the *Kit* as it pertains to barriers and success factors.

The *Kit* also should be accompanied by a short overview - in essence a briefing note - describing the purpose of the *Kit*, its contents, the process by which it encourages action on IAQ issues, the role of the school board and school in providing leadership in implementation, and the supports that should accompany the *Kit* (funds and a process for assessing funding for mitigation efforts, if required; training and on-going in-service opportunities; technical assistance at the board staff level; etc.), the need for a

communication strategy and the involvement of other stakeholders. Part of the great difficulty in addressing this issue stems from lack of a common understanding and the lack of mechanisms to work together for solutions in a positive and supportive climate. While schools are highly reluctant to involve external players in initiatives, this division contributes to a lack of public understanding and the potential for poor relations with the community. Work needs to be undertaken in this regard and *Tools for Schools* is one method for doing so. It should also be placed in the context of an IAQ management plan; this *Tool* might assist in that development. Complaint investigation protocols are also a part of the range of tools needed to address the issue; *Tools for Schools* is but one component piece an integrated management strategy required to properly address this issue.

Because the management of many issues, including IAQ, flounder on the nature of the relationships among stakeholders, the degree of trust or mistrust, and the quality of communication, time was spent developing a *Supplemental Guide* for use as a supplement to the *Tools* for School *Kit*. The *Guide* was intended as a means of garnering stakeholder support, enhancing communication and understanding about IAQ, and encouraging a collaborative approach. It was intended to assist in breaking down some of the barriers identified in earlier phases of the project by study respondents.

Time was limited in which to implement the pilot project and therefore opportunity to test the *Guide* was limited. Little time was devoted to the tool in the training session as well. While it was not used extensively in the pilot test, this may have been an unfair assessment of its value, particularly since it was used as a means of securing stakeholder support on another issue and the Project had already secured Department of Education and school board support prior to the execution of the pilot test. Although designed around IAQ issues, it does have general applicability to other school and non-school based issues where enlisting stakeholder support is important to the success of the endeavour. It should be offered as an additional resource to both accompany *Tools for Schools* or any other IAQ management guidelines that may be implemented, as well as a general resource for building stakeholder support for initiatives and collaborative relationships.

The basic ingredients for successful implementation of this policy approach are the same as for any other and are identified in the following set of recommendations, supported by the suggestions of study participants.

10.2 Recommendations

This report supports the introduction of policies and management guidelines or practices to promote good IAQ and healthy learning environments, particularly for children who have greater sensitivity to poor IAQ; the input of stakeholders into the development and implementation of such practice guidelines; the delivery of IAQ training based on the roles of the various players/target audiences; the provision of access to resources and to expert consultation and advice both in IAQ and in the health professions; the adoption of

a team approach to identification and resolution of IAQ problems; the adoption of explicit complaint investigation procedures and communication protocols; the promotion of relationship building efforts; the use of conferences and other opportunities to share learnings, update findings, and promote cross fertilization of perspectives; the provision of funding to remediate IAQ problems and coordinate implementation of IAQ guidelines/base practices, including *Tools for Schools*; and the development of long term IAQ management plans. There is some interest in the development of improved IAQ standards in the interests of objectivity but this is not universal; nor is this approach without its shortcomings.

Many ideas have been suggested to facilitate implementation of good IAQ in school environments within each section of the foregoing report. The following set of recommendations does not list each idea offered, but attempts to summarize, in a global way, the key recommendations made. Readers are directed to the suggestions and recommendations contained within the report for more detailed examples. The following are recommendations based on the study results.

10.3 Summary of Recommendations

INDOOR AIR QUALITY (IAQ) IN CANADIAN SCHOOLS PROJECT SUMMARY OF RECOMMENDATIONS
1. **Coordinated IAQ Management Strategy**: It is recommended that each provincial/territorial jurisdiction implement a coordinated and integrated IAQ management strategy at multiple levels of governance.
2. **Education and Awareness**: It is recommended that all stakeholders enhance opportunities to increase awareness and knowledge about the importance of healthy IAQ.
3. **Develop IAQ Management Guidelines**: It is recommended that Departments of Education develop a set of policies and best practices for IAQ management which apply to both the design and new construction of school buildings and the maintenance of existing buildings.
4. **Training**: It is recommended that training accompany any guidelines, practices, policies, or tools.
5. **IAQ Standards**: It is recommended that governments explore development, at the national level, of IAQ standards for school settings, recognizing the increased sensitivity levels of children compared to adults.
6. **Build Collaborative Relationships:** It is recommended that all stakeholders develop and/or enhance mechanisms to build positive working relationships with respect to IAQ.
7. **Leadership, Coordination, and Responsibility**: It is recommended that there be a focal point of responsibility for IAQ issues at various levels of influence and authority.
8. **Complaint investigation protocol**: It is recommended that for jurisdictions or school boards/districts which have not already done so, that a complaint investigation protocol be developed and implemented.
9. ***Tools for Schools Kit***: It is recommended that school jurisdictions offer the *Tools for Schools Kit* as a resource to schools as a practical, low cost strategy for implementing

IAQ sensitive practices, along with the *Supplemental Guide* produced by the IAQ in Canadian Schools project, and adopt a flexible approach to implementation.
10. Planning, Monitoring, and Accountability Framework: It is recommended that all stakeholders be involved in the development of IAQ management plans (as per recommendation #1) and that implementation, monitoring and accountability mechanisms be put in place to ensure adequate identification, reporting, and follow-up of IAQ problems.
11. Communication and Participation: It is recommended that broad-based communication take place on the issue of IAQ, and that discussions and actions include all stakeholders.
12. Funding and Support: It is recommended that Departments of Education and school boards ensure the necessary funding and support is in place to prevent and respond to IAQ problems in schools.

10.4 Details of Recommendations

1. **Coordinated IAQ Management Strategy** - It is recommended that each provincial/territorial jurisdiction implement a coordinated and integrated IAQ management strategy at multiple levels of governance. A range of efforts need to be undertaken as part of an integrated and coordinated management strategy required to properly address IAQ in Canadian schools, the components of which should include, at minimum:

   - policies and practice guidelines
   - complaint investigation protocols and procedures
   - communication plans and protocols
   - methods to involve and build positive working relationships among all stakeholders to share ownership of the problem and responsibility for solutions
   - planning, management, monitoring and accountability measures
   - training and education
   - funding
   - leadership and coordination

   This includes development and implementation of IAQ management practice guidelines, development of IAQ management plans at the school level, and an approach to monitoring to ensure implementation. Each school should be required to develop an IAQ management plan that incorporates good IAQ management practices and guidelines and ensures observance of same. Each

school should be required to demonstrate how they will ensure the maintenance of good IAQ on their property.

Provincial/territorial governments should identify a model set of guidelines and practices (see recommendation #3) that they strongly encourage school boards to follow and supply funding in support of implementation. School boards and schools should work with their regional/local stakeholders to refine these guidelines with respect to implementation, ensure they have the necessary expertise to diagnose and address IAQ problems as much as possible, implement an IAQ program and ensure training is delivered. Preventive approaches such as *Tools for Schools* should be considered as part of an overall IAQ management strategy or program. It is one program which school boards may wish to examine to determine if it is an approach they wish to use to implement good IAQ in schools. Reporting, monitoring and accountability measures need to be put in place to ensure implementation. An accountability framework should be developed describing how implementation of IAQ management practices and plans will be monitored and to gauge progress in implementing the elements of the IAQ management strategy. This may involve various mechanisms such as audit; regular reporting to the school occupants, IAQ teams/OH&S Committees, the public, and the school board; reporting by the school board to the Department of Education; and others.

2. **Education and Awareness** – Enhance opportunities to increase awareness and knowledge about the importance of healthy indoor air quality, the potential effects of poor IAQ, the possible sources of poor IAQ, the types of steps (policies, practices, complaint protocols, and tools) that can be taken to ensure the maintenance of healthy IAQ in schools, the roles of stakeholders in supporting good IAQ, the value of open communication and shared understanding about the problem, and vehicles to support communication about this issue.

Education and awareness must take place at all levels with multiple stakeholders. It is recommended that an initiative to educate all stakeholders about IAQ be undertaken and an education and training strategy developed. This includes target audiences of the parents, students, teachers, custodians and maintenance managers, Occupational Health and Safety staff, school board representatives, unions, government staff in the relevant departments affected by IAQ issues (Education, Public Works/Infrastructure, Labour, Environment, and Health), health professionals, and others with an interest in this area. General awareness and education initiatives should also involve community-based interest groups and IAQ consultants where appropriate or those with expertise in IAQ issues, and should be multi-disciplinary in nature. Training should be targeted by stakeholder group, should focus on the specific roles of parties in responding to the problem, and be tied to policies and practices they are expected to follow to ensure good IAQ.

Seize opportunities at the local school level to increase awareness, knowledge and understanding among all stakeholders of the importance of healthy IAQ and good IAQ management practices, and the roles of stakeholders in addressing the problem. Activities and forums such as school assemblies, school newsletters, student council activities, staff meetings, memos, and presentations to the school board are suggested.

Incorporating the issue into the curriculum in formal and informal ways is suggested by using teaching opportunities in the classroom and through project assignments or other IAQ focused activities. Making the *Tools for Schools Kit* available as a formally acknowledged resource endorsed by the Department of Education is also recommended.

3. **Develop IAQ Management Guidelines** – Develop a set of policies and best practices for IAQ management which apply to both the design and new construction of school buildings and the maintenance of existing buildings. This could be developed with the leadership of the federal government (Health Canada) in cooperation with the provinces and other key stakeholders, or at the provincial level with the collaboration of other key departments (although this seems a duplication of effort). Most practice guidelines should have standard applicability across the country, with some flexibility for application at the regional, provincial, and local level. Once developed they can be adapted with local stakeholders for local use.

Guidelines should cover topics such as: scented products, smoking, carpet removal, use of environmentally friendly cleaning products, cleaning schedules, replacement of air filters, inspection schedules of school ventilation and other operating equipment, temperature control and the like, preventive maintenance steps, design considerations and materials for new construction, renovation or repair guidelines (materials, off gassing and time required prior to occupancy) and other areas.

These guidelines should reflect the importance of undertaking preventive maintenance and remedial measures early. It is critical to ensure sufficient routine monitoring systems are in place to enable early detection and repair of problems, engage in preventive maintenance practices, and undertake activities to remediate problems and improve IAQ through the observance of good management practices. Some examples include:

- Employ a rigorous and continual cleaning regimen.
- Use least toxic cleaning products.
- Conduct routine monitoring and inspection, including air and mould checks.
- Remove carpets.

- Replace chalkboards with white boards, or preferably technology to display material.
- Adopt reduced or no scent policies.
- Improve air circulation; install proper functioning, well regulated and well maintained air exchange systems.
- Arrange for routine maintenance (such as floor stripping and waxing), painting, repairs, new construction and renovations to be done when the school is not occupied and allow sufficient time for off gassing of new products.
- Ensure regular cleaning of ducts and filters.
- Train custodians on proper procedures to identify potential IAQ problems or increase inspections by trained staff to ensure proper vigilance in detecting and responding to problems early.

Involve key stakeholders in the process of development as well as implementation of guidelines so stakeholders do not see them as an imposition but rather as an opportunity to build or re-build trust relationships among partners.

4. **Training** – Accompany any guidelines, practices, policies, or tools introduced with general IAQ education and specific training including initial orientation and on-going in-service opportunities for those involved with implementation; and more advanced or specific technical training for maintenance staff or others where needed. Increase awareness about any existing guidelines, policies, practices, regulations and protocols as part of this process.

5. **IAQ Standards** - Explore development, at the national level, of IAQ standards for non-industrialized settings tailored to children which accounts for, or uses as its test standard, a typical six-year-old child rather than a 40-year-old adult male to determine sensitivity and acceptable limits for the school population, recognizing the increased sensitivity levels of children. The intent is to reduce subjectivity in the application of standards, and implement more refined and appropriate, if possible, standards for school settings. If developed, these standards should be accompanied by information and education as to their appropriate use, and the limits of their use, as well as how to interpret results. These should not be viewed as "stand alone" measures, but rather, be accompanied by other diagnostic steps (including visual inspection). Continue to improve the science supporting the relationship between air quality and health.

6. **Build Collaborative Relationships** - Develop/enhance mechanism to build positive working relationships among stakeholders at various levels in this area. Seek out opportunities to build partnerships to increase understanding of IAQ issues and problems, share perspectives and concerns, build trust and credibility among stakeholders, and seek solutions together. *Tools for Schools* and the *Supplemental Guide* developed by this Project are models of such an approach at the local level. However, a collaborative approach is also required at other levels

of effort, influence, and decision-making. As policies and practices are developed and implemented and other elements of a coordinated strategy are executed (as identified in recommendation #1), processes for involvement and meaningful input of stakeholders ought to be developed.

7. **Leadership, Coordination, and Responsibility** – Assign a focal point of responsibility for IAQ issues at various levels of influence and authority. It is critical that leadership be exercised to coordinate and implement the components of the management strategy or it is likely the effort will falter.

   Each level of governance should take a leadership role and identify a focal point of coordination for management of IAQ issues and implementation of healthy IAQ in schools. Each provincial/territorial jurisdiction should take a leadership role, in collaboration with other relevant departments, to formalize an IAQ program in schools. It is important to assign a coordinator to take the lead role at the school board and school levels as well.

   It is also suggested that any new practices or guidelines be incorporated into already existing procedures, structures, committee mandates, and staff roles to the degree possible to increase likelihood of sustainability. At the school level, many saw the Occupational Health and Safety Committees as being the most appropriate vehicles to assume responsibility for implementation of the *Kit* or guidelines as it was consistent with their current mandate. Others preferred a separate IAQ Committee with links to the OH&S Committee to retain the element of community participation and not dilute the focus on IAQ.

   This is to also recognize the value of a team approach in terms of creating a sense of shared responsibility for IAQ, bringing the necessary expertise to bear on the problem, building credibility, and promoting joint problem solving. Whichever method is chosen, it is critical a point person be identified as coordinator to assume leadership of the effort.

   Ensure the support and involvement of those strategically positioned to have a significant influence on implementation - such as principals, facilities operation personnel (who have knowledge of the building envelope) and the OH&S Committees (who have knowledge of industrial hygiene matters) at the school/school board levels.

8. **Complaint investigation protocol** - Develop and implement, for those jurisdictions or school boards/districts which have not done so already, a complaint investigation protocol which details, at minimum, how and to whom an IAQ complaint is to be made; what steps will be taken, and how individuals will be informed of the results or the outcome. A protocol identifies a process which helps to create a safe environment for a person to report a complaint without fear of retribution.

9. ***Tools for Schools Kit*** - Offer the *Tools for Schools Kit* as a resource to schools as a practical, low cost strategy for implementing IAQ sensitive practices, along with the *Supplemental Guide*, but adopt a flexible approach to implementation. Particular attention should be paid to addressing the time constraint issue either by amending the checklists prior to distribution or suggesting this or other approaches to participants to minimize the burden on staff, and to including a cover briefing about the *Kit* and its placement within an integrated IAQ management strategy, and the requisite components of the strategy. The necessary supports – endorsement by the school board and Departments of Education, a "champion" to lead the effort at each school, training (initial orientation and on-going in-servicing), funding for coordination and for remediation associated with implementation, access to expertise at the school board level, prompt response to concerns, a planning and accountability framework, and others identified within this report must be in place. Particular attention must be paid to how the *Kit* is introduced. The potential benefits, how to address barriers identified in this report such as time (e.g. reduction of checklists, that staff time be made available to conduct this work based on the OH&S model, and other measures), the critical success factors, and supports that will be provided.

   It is recommended that the results of this project and pilot test of *Tools for Schools* be made available (via print, presentations, and the like) to school boards and principals throughout Nova Scotia and across the country, and to the Departments of Education in the various jurisdictions, to identify the merits of such an approach. Each jurisdiction/ province should assume a leadership role in doing so. Health Canada might also assist in this regard. It is recommended that each school board consider implementing the *Tools for Schools Kit* along with a set of management practices, complaint investigation protocols, communications and partnership initiatives, and other elements of an effective response to manage IAQ as per recommendation No.1.

10. **Planning, Monitoring, and Accountability Framework** - Develop an IAQ management plan (as per recommendation #1) and implement monitoring and accountability mechanisms to ensure not only adequate identification, reporting, and follow-up of problems but also monitor progress in implementing the elements of the IAQ management strategy. Various mechanisms are necessary: complaint investigation protocols, communication plans, reporting of repairs made and budgets spent to school boards and provincial departments to improve planning, the development of IAQ plans, and mechanisms to report and track progress for example.

    Undertake periodic monitoring and testing to ensure the maintenance of good IAQ and gather sufficient data to determine scope and depth of IAQ problems through monitoring the occurrence of poor health symptoms and the functioning of school building systems.

Activities such as conducting periodic air quality testing, surveying school occupants to identify the number of people with poor health symptoms potentially attributable to IAQ, and keeping an IAQ health log to enable identification of types of illnesses that may be associated with IAQ are suggested, as is development of baseline surveillance data to monitor the occurrence of illness and its patterns against the baseline rate of occurrence to detect any deviance from the norm. This would provide supporting data to indicate the types of problems that may exist in order to develop plans of action to address IAQ concerns in the school. An incident-based reporting system (of IAQ complaints) would provide a centralized mechanism of reporting to monitor trends and determine whether the problem is improving.

Develop a plan of action to ensure the implementation of good IAQ management practices and regularly track and report progress. Inform stakeholders about IAQ issues and concerns as they arise, the nature and cause of problems identified, the results of any testing done, the status of plans and actions taken or required to ameliorate the problem, and the results. Schools should inform their local stakeholders, and the school board, who should inform the province. Suggestions were made that this type of information is needed to improve planning at the school board and provincial levels with respect to the implantation of guidelines, the state of the asset stock, and funding allocations that may be needed. Mechanisms to regularly track and report progress toward achievement of IAQ goals and implementation of plans is needed. One suggestion was to implement an automated maintenance management system that would allow the department to monitor the quality of buildings on an annual basis, the amount of money put in to building repair and maintenance, and the overall condition of the asset base. Better planning tools would assist in identifying and justifying need based on hard evidence which, in many cases, is absent.

Consider integrating adoption and compliance with IAQ guidelines into the accreditation process to enhance accountability and ensure implementation.

11. **Communication and Participation** - Enhance communication among stakeholders and implement mechanisms to ensure broad-based participation and involvement of all stakeholders. Develop a communications plan at the school level which identifies what information should be shared with stakeholders (e.g., the status of current IAQ management initiatives, why IAQ is important, etc.) how they will be informed (periodic newsletters or bulletins, memos, public forums, committees, etc.), when (e.g., quarterly intervals) and by whom. The plan identifies goals, intended audiences, and various mechanisms by which information will be communicated. This is related to the complaint protocol, in that the investigation protocol should specify how complaints will be acted upon and communication mechanisms associated with the complaint (e.g., the process for making complaints, how and what information about the complaint will be

shared and with whom, etc.). However, this is much broader than simply a complaint process.

Communication was universally identified as both an issue and a recommended solution to correct misinformation, promote trust among stakeholders, and a critical component of good IAQ management practice. A preventive proactive approach includes both shaping public opinion through the promotion of education and awareness initiatives and open communication with stakeholders and mechanisms to encourage their involvement. This is a highly charged and emotional environment and improving trust relationships among parties will improve the outcome for all concerned. Governments, schools, and school boards need to learn how to work with each other internally, and with community externally, and do a better job of sharing responsibility for solutions.

Some suggested examples of a participatory approach at the school board/school level included:

- Involve everyone in the development of policy, approaches, and plans, including students, to encourage buy-in from all stakeholders. Students in particular emphasized the need for inclusion on committees and in efforts undertaken to ensure the voice of students is heard and to shape peer attitudes and behaviour.
- Ensure student, parent, and teacher participation on IAQ committees or Occupational Health and Safety Committees; form a student-based IAQ committee.
- Encourage adoption of a policy of open communication, transparency of decision-making, and feedback from the school board.
- Use memos in mailboxes to facilitate communication as well as a health and safety bulletin board to communicate IAQ issues; add IAQ information to the school newsletter.
- Encourage joint decision-making between OH&S Committee/IAQ Committee and School board.

12. **Funding and Support** – Ensure the necessary funding and support is in place to prevent and respond to IAQ problems in schools to ensure the maintenance of good IAQ in all schools.

All participants stated that, without funding to ameliorate IAQ problems and the support and willingness of the school board and others in authority to support healthy IAQ, efforts to improve IAQ would be compromised and would have little impact.

10.5 Conclusion

This report gathered data on IAQ perspectives, experiences, and views from a variety of key stakeholders - parents, students, teachers/school staff, administration, school boards (both staff and elected officials), government policy makers and deputy ministers - from most jurisdictions across Canada. It also tested the USA Environmental Protection Agency's *Tools for Schools* as a model for managing IAQ in schools. The critical success factors that need to be in place to make implementation of this tool or any other set of IAQ management guidelines are documented herein. Through qualitative data, the report captures the voices and experiences of those working or learning with the school system and strategies suggested come from the voice of experience. It identifies IAQ problems most common across Canada and the health symptoms related to these IAQ problems. Both current and best practices for managing IAQ are described, including, legislative and regulatory regimes, funding allocated by jurisdictions, and protocols or procedures for proactive or reactive response. Current and proposed roles of stakeholders in supporting good IAQ are outlined. Barriers and contributing factors to good IAQ management practices are identified, along with communication barriers and facilitators. The *Tools for Schools Kit* was tested as a model for good IAQ practice and suggestions are made both about this tool and about ways to support implementation of such practices.

The report includes perceptions and significant issues associated with IAQ; problems experienced with IAQ; current policies or practices; best practices; keys to successful IAQ management; barriers and contributing factors to good IAQ management; recommended process to implement good IAQ management practice and/or guidelines, and the respective roles and mandates of stakeholders; communication - current and proposed practices; and comments on *Tools for Schools*.

The report includes a discussion of perceptions, issues, views, and experiences provided by all respondents regardless of jurisdiction or stakeholder group they represent; an overview of current funding programs, policies and practices by federal, provincial, and territorial government jurisdiction as it relates to IAQ; unique perspectives of other stakeholders - school boards/districts, Teachers Federation, IAQ consultants, and a community-based advocacy group, as well as parents, students, school administrative staff, and custodian/maintenance staff.

Because of its qualitative nature, the project was able to explore the range of views and experience in this field, examine the many difficult issues facing stakeholders involved in IAQ management, and provide a depth of analysis that is not otherwise apparent in quantitative data reports alone. It also provides a "first voice" perspective, that is, the views experiences, opinions, and suggestions of those directly involved in the issue.

The report provides a useful insight into the issues many departments and schools are grappling with as they attempt to respond to IAQ concerns in their respective jurisdictions, as well as the perspectives of key stakeholders involved. Recommendations

are made based on participant suggestions to ensure the maintenance of good IAQ in school environments.

All stakeholders share the common goal of ensuring a positive, healthy, learning and teaching environment in schools across the country. As one respondent said,

> *"I look forward to seeing a good and comprehensive program in place to deal with this so that parents are comfortable that their concerns are being addressed and so that kids are not at risk, so that we get to the majority of problems before they become problems, [and] so that we have good facilities and facilities that run properly."*

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RELEVANT WEB SITES

For other relevant information and references, the following web sites are offered.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES Hazard Evaluation System and Information Service
http://www.dhs.ca.gov/ohb/HESIS/hesispub.htm

CALIFORNIANS FOR PESTICIDE REFORM
http://www.igc.org/cpr
P is for Poison
Pesticides and Human Health
Poisoning the Air
Toxic Secrets

CANADIAN ENVIRONMENTAL LAW ASSOCIATION
http://www.cela.ca/ch_health/ch_health_index.htm
Environmental Standard Setting and Children's Health

CHILDREN'S ENVIRONMENTAL HEALTH NETWORK
http://www.cehn.org/
Children's Environmental Health: Research Practice Prevention Policy
Preventing Child Exposures to Environmental Hazards

CITIZENS FOR A SAFE LEARNING ENVIRONMENT
http://www.chebucto.ns.ca/Education/CASLE

ENVIRONMENTAL HEALTH PERSPECTIVES
http://ehis.niehs.nih.gov/roc
Ninth Report on Carcinogens

ENVIRONMENTAL WORKING GROUP
http://www.ewg.org/
Poisoned Playground
Reading, Writing and Risk: Air Pollution Inside California's Portable Classrooms

HEALTH CANADA
http://www.hc-sc.gc.ca/ehp/ehd/
Exposure Guidelines for Residential Indoor Air Quality
Fungal Contamination in Public Buildings: A Guide to Recognition and Management
Health and the Environment

Indoor Air Quality in Office Buildings: A Technical Guide
National Ambient Air Quality Objectives For Ground Level Ozone
Office Air: A Worker's Guide
Particulate Matter Science Assessment
Particulate Matter Science Assessment - Executive Summary
Respiratory Disease in Canada
The Health and Environment Handbook for Health Professionals

HEALTH CANADA, INDOOR AIR QUALITY
http://www.hc-sc.gc.ca/ehp/ehd/bch/air_quality/indoor_air.htm

HEALTH CANADA - LABORATORY CENTER FOR DISEASE CONTROL
http://www.hc-sc.gc.ca/main/lcdc/web/publicat/asthma/index.html
Childhood Asthma in Sentinel Health Units

HEALTH CANADA -POPULATION AND PUBLIC HEALTH BRANCH
http://www.hc-sc.gc.ca/pphb-dgspsp/publicat/rdc-mrc01/index.html
Respiratory Disease in Canada

HEALTH EFFECTS INSTITUTE
http://www.healtheffects.org/
Airborne Particles and Health

HEALTHY INDOORS
http://www.healthyindoors.com/discussion_paper.htm#View%20Documents
Achieving Healthy Indoor Environments: A Review of Canadian Options
Healthy Buildings-Healthy People

HEALTHY SCHOOLS
http://www.healthyschools.com
Building Air Quality: A Guide for Building Owners and Facility Managers

HEALTHY SCHOOLS CAMPAIGN
http://www.calhealthyschools.org/
Failing Health
P is for Poison
Poisoned Schools
Unthinkable Risk: How Children are Exposed and Harmed When Pesticides are Used at School

INFORM, INC.: STRATEGIES FOR A BETTER ENVIRONMENT (New York)
http://www.informinc.org/cleanforhealth.php

MASSACHUSETTS HEALTHY SCHOOLS NETWORK
www.mphaweb.org/pol_schools.html

NATIONAL SAFETY COUNCIL'S ENVIRONMENTAL HEALTH CENTER
http://www.nsc.org/public/ehc/iaq/teachgde.pdf
Teacher's Guide to Indoor Air Quality

NATURAL RESOURCE DEFENSE FUND
http://www.nrdc.org/
Breathing in the Aisles
Exhausted by Diesel
Our Children at Risk

NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH
http://www.cdc.gov/niosh/pubs.html
Health Effects of Occupational Exposure to Asphalt
Carbonless Copy Paper
A Guide to Working Safely with Silica
Occupational Health Guidelines for Chemical Hazards

NEW BRUNSWICK LUNG ASSOCIATION
http://www.nb.lung.ca/schools/index.htm

NOVA SCOTIA ALLERGY AND ENVIRONMENTAL HEALTH ASSOCIATION.
www.environmentalhealth.ca
The AEHA Guide to Less Toxic Products

NOVA SCOTIA DEPARTMENT OF ENVIRONMENT AND LABOUR
http://www.gov.ns.ca/enla/ess/libr/airqual.htm (also see other provincial-territorial web sites)

NORTHWEST COALITION FOR ALTERNATIVES TO PESTICIDE
http://www.pesticide.org/
Getting Pesticides out of our Schools
School Pesticide Use Reduction Program: Where There's A Will, There's A Way
Toxic Secrets
Unthinkable Risk: How Children are Exposed and Harmed When Pesticides are Used at School
Worst Kept Secrets

PESTICIDE WATCH
http://www.pesticidewatch.org/
Reducing Pesticide Use in Schools

PHYSICIANS FOR SOCIAL RESPONSIBILITY
http://www.igc.org/psr/
Endocrine Disruptors
Generations at Risk
In Harm's Way
No Room to Breathe
Pesticides and Human Health

POLLUTION PROBE
http://www.pollutionprobe.org/
Achieving Healthy Indoor Environments: A Review of Canadian Options
Healthy Schools - Healthy Children: Improving the Indoor Environment in Ontario Schools

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA. Architectural and Engineering Services.
www.pwgsc.gc.ca/rps/aes/content/iaq_pub_toc-e.html
Remediation Procedure Guidelines for Water Damage in Buildings

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
www.cfpub.epa.gov/schools/index.cfm
www.epa.gov/iaq/pubs
www.epa.gov/iaq/molds/graphics/moldremediation.pdf

U.S. ENVIRONMENTAL PROTECTION AGENCY - AIR DIVISION
http://www.epa.gov/air/
An Office Building Occupant's Guide to IAQ
Building Air Quality Action Plan
Clear Your Home of Asthma Triggers: Your Children Will Breathe Easier
Indoor Air Pollution: An Introduction for Professionals
The Inside Story: A Guide to Indoor Air Quality
Mold Remediation in Schools and Commercial Buildings

U.S. ENVIRONMENTAL PROTECTION AGENCY - IAQ DIVISION
http://www.epa.gov/iaq/schools/index.html
Playground Safety
Teacher's Guide to Indoor Air Quality
Tools for Schools Kit

U.S. EPA'S OFFICE OF CHILDREN'S HEALTH PROTECTION
http://www.epa.gov/children/indicators/ACE-Report.pdf
America's Children and the Environment: A First View of Available Measures

U.S. GENERAL ACCOUNTING OFFICE
http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.21&filename=rc00017.txt&directory=/diskb/wais/data/gao
Pesticides: Use, Effects, and Alternatives to Pesticides in Schools

- "Conditions of America's Schools", U.S. General Accounting Office, Health, Education, and Human Services Division, Document#: GAO/HEHS-95-61, Report#: B-259307, February 1, 1995.

- "America's Schools Report Differing Conditions" U.S. General Accounting Office, HE&HS Division, Document#: GAO/HEHS-96-103, Report#: B-260872, June 14, 1996.

- "Profiles of School Conditions by State" U.S. General Accounting Office, HE&HS Division, Document#:GAO/HEHS-96-148, Report#: B-272038, June 24, 1996.

WASHINGTON STATE DEPARTMENT OF HEALTH
http://www.doh.wa.gov/ehp/ts/iaq.pdf
School Indoor Air Quality Best Management Practices Manual

APPENDIX A
COMMITTEE STRUCTURE/ORGANIZATIONAL PARTNERS

Atlantic Health Promotion Research Centre (AHPRC)

The Atlantic Health Promotion Research Centre (AHPRC) is a centre of excellence supported by the three health science faculties at Dalhousie University (Medicine, Health Professions and Dentistry), and the Atlantic Provinces' Departments of Health. The mission of the AHPRC is to conduct and facilitate health promotion research that influences policy and contributes to the health and well-being of Atlantic Canadians. The Centre's work frequently involves designing and managing large projects with community, government, and academic partners.

Nova Scotia Environmental Health Centre

This Centre is the only government funded centre, worldwide, that has a mandate to conduct research and treatment (in a research context) on environmental sensitivities. This centre is based in the Department of Community Health and Epidemiology, Faculty of Medicine, at Dalhousie University. The Centre has developed expertise in the management of individuals with environmental sensitivities. Indeed, a substantial proportion of the 750 active patients of the Centre, including children, come as a result of environmental problems encountered in schools. Both the Director of the Centre and the Director of Research have participated actively in the investigation of outbreaks or problems associated with poor indoor air quality (IAQ) in numerous schools, in some instances in collaboration with the Nova Scotia Department of Health.

Citizens for A Safe Learning Environment (CASLE)

CASLE is an information-based, charitable organization that works with parents, government, school boards and others to improve the condition of school buildings and the products and practices used within them, so that school children and staff have safe and healthy places to spend their days. Since its inception in 1994, CASLE has had intense involvement with school IAQ issues at both the grass roots and political levels. CASLE frequently serves as a resource for government departments, parents, media, workers' unions, and major political parties.

Institute of Health Promotion Research (IHPR), University of British Columbia

The Institute was established in 1990 to provide a focus for interdisciplinary collaboration on research, education and community partnerships in health promotion. IHPR seeks to bridge the University's research and educational programs across the behavioural, biomedical, educational, environmental and social sciences disciplines and to bring them into closer working relationships with community groups and agencies pursuing health. Research areas include policy analyses, study of social, behavioural and environmental causes of health, illness or injury, design and evaluation of innovative approaches to bring

about change in these factors, and studies on the implementation and diffusion of these innovations. The Institute has been actively involved in environmental health promotion. IHPR also has strong links to the "clean-air" community in BC through its work on smoking cessation and tobacco-related issues with the BC Lung Association. The Institute has conducted school-based, health promotion initiatives with a number of school districts across BC.

School of Occupational and Environmental Hygiene (SOEH), University of British Columbia

The School of Occupational and Environmental Hygiene is a teaching and research unit whose mandate is to study exposures, health effects, and control strategies in the work and community environments. The School aims to prepare professional and research hygienists with the expertise to evaluate risks from physical, chemical and biological exposures, as well as the skills and sensitivities to effect changes which will protect human health and well-being. Staff at the School have been involved in research on indoor air quality in elementary schools.

APPENDIX B - WEB SITE SURVEY

The following survey asks basic questions about indoor air quality in your school(s), how your school(s) deals with indoor air quality concerns, and how your school(s) works to maintain good indoor air quality. Your responses will be informing a larger project that intends to develop practical, user-friendly and cost-effective strategies for the implementation of IAQ guidelines in Canadian schools. We believe that the resulting strategies will provide direct benefits to all schools across Canada thus encouraging a nation wide approach focused on optimizing the learning and working environment for everyone. In order to achieve this objective, it is important that we receive input from all those who would be affected by these strategies such as students, teachers, administrators, school board officials, department heads, etc. **Your responses will remain anonymous unless you indicate a desire to give further input to your answers at the end of this questionnaire.** If you have any concerns or questions please feel free to contact us at iaqcs@dal.ca

Questionnaire

1) Relationship to the school system:
   Student *Parent* *Teacher* *Administrator*
   Custodian *Operations* *School board*
   *Other*_____

2) Location of school(s) you are associated with:
   *Country*_____
   *Province/State*_____
   ___ *City*
   ___ *Town*
   ___ *Rural*

3) Approximately when was/were the school(s) built?
   18__ 19__ 20__

4) Has your school ever had any major renovations?

   Yes *No* *Not Sure*

5) What is the estimated population of your school(s)? (Please give an approximate range if you deal with several schools) _____

6) Has/have your school(s) ever had indoor air quality concerns?

   Yes *No (go to #14)*

7) How many indoor air quality concerns has/have your school(s) had? (Please give an approximate range if you deal with several schools)
Number____ Continuous_____

8) What type of indoor air quality concerns has/have your school(s) experienced?

9) Who usually reports indoor air quality concerns? Check as many as needed.
You *Teachers* *Parents* *Maintenance*
Administration *Other*_____

10) In general, to whom are the concerns reported? Check as many as needed.
You *Teachers* *Parents* *Maintenance*
Administration *Other*_____

11) Are problems usually reported as soon as they are noticed?
Yes *No (Please explain)*

12) How are indoor air quality concerns dealt with?
____ *No action*
____ *Insufficient or inappropriate action*
____ *Action(s) dealt with the symptoms only*
____ *Actions dealt with the cause of the problem*
____ *Problem resulted in a change in procedures*
____ *Problem resulted in change in management strategies*
____ *Unsure*
Further comments related to your answer: _____

13) Why are the problems dealt with in this way?

14) What do you think prevents or would have prevented indoor air quality concerns in your school(s)? Check as many as needed.
____ *Administrative support*
____ *Good Maintenance*
____ *Parental concern/action*
____ *Regular IAQ monitoring*
____ *Use of IAQ policies (Which ones? Please explain)*
____ *Use of IAQ guidelines (Which ones? Please explain)*
____ *Proper building structure*
____ *Education/Training*
*Other, please specify*_____

15) What are the facilitators to managing indoor air quality concerns in your school(s)?

16) What are the barriers to managing indoor air quality concerns in your school(s)?

17) Please rate the importance of how each of the following actions could help maintain good indoor air quality management in schools.
10=very important to 0=not important.

____ *Commitment from school administration*
____ *Creation of an indoor air quality policy*
____ *Proper maintenance practices*
____ *Financial commitment*
____ *Presence of indoor air quality coordinator*
____ *Education/training within schools to increase awareness of indoor air quality issues*
____ *Creation of indoor air quality guidelines and everyday procedures*
____ *Regular indoor air quality monitoring*

18) Do you have any further comments?

19) How did you find out about this survey and website?
Word of mouth *Professional Notification* *School*
Internet *Other*_____

20) Are you willing to give further input to your answers if we need to research some of your responses in more depth?

____ *Yes* *Name:* _____
Email: _____

____ *No*

Thank you very much for your participation!
Research Team
IAQ in Canadian Schools

We would like to acknowledge the contribution of Karen Rollins (nee Beaulieu) to this questionnaire from her thesis *Management of Indoor Air Quality in Canadian Schools* from the University of Calgary.

APPENDIX C –
FOCUS GROUP GUIDES AND SUPPORTING MATERIALS

BC Focus Group Questions

IAQ Issues in Schools

1. Does your school have an IAQ problem?

If Yes:

2. What are some of the main IAQ issues in your school?
    a. What are the differences in IAQ issues at your school compared with Nova Scotia schools?
    b. What are the similarities in IAQ issues at your school compared with Nova Scotia schools?

If No:

3. What makes you think your school does not have an IAQ problem?

Tools for Schools

4. (If your school does not have an IAQ problem) How do you think *Tools for Schools* would help maintain good IAQ in your school?
5. (If your school has an IAQ problem) How do you think *Tools for Schools* would help solve the IAQ problem at your school?

Everybody

6. What are your opinions concerning the content of *Tools for Schools*?
    a. What would you like to see changed about the content?
    b. What would you like to see omitted?
    c. What would you like to see added?

Implementation & Communication

7. What steps would you include in a step-by-step process to successfully implement *Tools for Schools* in your school?
    a. Who should be responsible for implementing the program?
    b. What do you see as your role in the implementation process?
    c. What do you see as the role of others?
    d. What are some of the keys to successful implementation?
    e. What are some potential barriers to successful implementation?
    f. What are some potential facilitators to successful implementation?
8. What do you see as the role of communication in the implementation process?
    a. Between student and teacher
    b. Between teacher and administration
    c. Between administration and the school district
    d. Between the school district and the provincial government
    e. Etc...

Nova Scotia Focus Group Questions

These questions are guides for the process, but will not be systematically asked since discussions may have already covered some of the points.

1. **When I say IAQ in schools, what kind of feelings do you have?**
   BRAINSTORMING on flip chart (from media, other schools)
   WHAT MAKES YOU FEEL THIS WAY?
   Examples: Successful, in control, angry, frustrated

2. **Do you feel your school(s) had or has a problem with indoor air quality?**
   Total: Max 5 minutes

   If yes: If past....Think back and tell me....

3. **How do you think the problem with indoor air quality began in your school(s)?**

4. **When did the problem begin?**

5. **Who first noted that a problem existed?**

6. **Who was approached to deal with the problem? What happened?**

7. **What was done to correct the problem?**
   a. **If nothing, why do you feel this way?**

   b. **What factors do you believe continue to maintain this problem?**

   c. **Do you feel enough was done or is being done? What makes you think this way?**

8. **What do you believe should be done now to solve this problem?**

9. **What barrier(s) do you see making this difficult?**

10. **What would you suggest to overcome these barrier(s)?**

11. **What guidelines or policies would you like to see to ensure that the air quality in your school(s) will improve?** May need to distribute *TOOLS FOR SCHOOLS* checklists

12. **Who do you believe should be responsible to ensure your school(s) has good air quality?**

13. **What role do you see yourself playing in solving the problem(s) in your school(s)?**

14. **What role do you see others (admin, school boards, students, parents, teachers, etc.) playing in solving the problem(s) in your school(s)?**

15. **How could IAQ problems be prevented in schools?**

If no:

1. **What makes you feel that your school(s) does not have an indoor air quality problem?**

2. **What has been done, or is being done to maintain good indoor air quality in your school(s)?**

   Policies/Guidelines: **Who created, how are they implemented/ enforced, facilitators & barriers, are they successful?**

   No guides: **Probe and then.... Should there be any? What kind of guidelines/policies would you like to see?Who do you believe should be responsible to ensure that your school(s) continues to have good air quality?**

3. **What role do you see yourself playing in maintaining good IAQ in this school?**

4. **What role do you see others (admin, school boards, students, parents, teachers, etc.) playing in maintaining good air quality in this school(s)?**

Summary of Nova Scotia Findings on Indoor Air Quality Issues

The following is a summary of findings of perceptions of indoor air quality (IAQ) as found by the *Indoor Air Quality in Canadian Schools Project.* Information was gathered over several months of focus groups and interviews and is representative of participants' perceptions of IAQ in Nova Scotia schools. **As you read this summary, think of differences or similarities that exist in regards to IAQ issues in your school and province.**

- Many people believe that IAQ is taken for granted and that it is only thought about when it becomes a problem. Most participants believe that this issue is becoming more common as schools age and maintenance needs increase.
- Others believe that awareness of IAQ issues in schools is increasing due to media coverage.
- When people attribute not feeling well to indoor air quality or miss time from school, it is seen as an important issue by those 'affected' yet not always by those 'unaffected' by IAQ problems.
- Some of the symptoms participants identify as effects of IAQ include: allergy and asthma-like symptoms; headaches and dizziness; fatigue; mental confusion; lowered immune systems; dry eyes, mouth, and nose; temperature-related discomfort; and difficulty learning and teaching in the school environment.
- Factors attributed to the effects of IAQ include: the design of the building; building materials; inadequate ventilation systems; cleanliness of the school; presence of carpet in the school; materials found/used in the school (furniture, teaching materials etc.); and scents.
- There are also those who believe not enough is being done to fix IAQ problems in schools. Some reasons for the lack of action include: lack of funds to fix the problem properly; IAQ is a low priority when compared to other school issues; administration and school boards turn a 'blind eye' to the issue; only a minority of people become ill or attribute their illness to IAQ; and the difficulty of pinpointing the cause of someone's illness, which may be IAQ related.
- Solutions for IAQ problems suggested by participants include: more money; a commitment from administration, school boards, and government to make IAQ a priority; a champion in the school to move IAQ issues forward; and accessible guidelines (both existing and new) that can be easily implemented.
- Communication of IAQ issues was identified as another area of concern. In particular, the communication process involved in reporting a problem through to its resolution. Teachers, students, parents, and administration report problems most often, while principals, administration, the school board, and Occupational Health & Safety Committees most often receive reports of problems.
- Disclosure of information is also a concern when it comes to IAQ testing. Often school occupants are unaware of what is being tested, when it is being tested, what the results are, and what, if any, health effects the air quality may be causing.
- Everyone who contributes to IAQ in schools must be involved in a cooperative effort and take on various roles and responsibilities. The following roles and responsibilities were identified: teachers, students, and administration must create more awareness of IAQ issues; parents and school committees must advocate for safe indoor air; teachers, students, parents, and administration must report IAQ problems; OHS committees, school boards, and maintenance personnel must ensure the health and safety of workers; administration, maintenance personnel, school boards, and government must ensure the health and safety of students; maintenance personnel, school boards, and government must fix IAQ problems; government must provide funds; and teachers, principals, and administration must act as champions for safe IAQ in schools.
- As a final point, many actions have been suggested to help solve IAQ issues in schools including: regular IAQ testing; reduced scents; removal of carpets; increased emphasis on clean schools; creating more awareness of IAQ, creation of an 'IAQ Day or Week'; making IAQ part of the curriculum; tighter IAQ regulations; regular preventative maintenance; proper design of (new) schools; keeping a log of IAQ issues / complaints and their solutions; keeping a log of health issues; and the successful implementation of IAQ guidelines.

Canadian Tools for Schools Summary

The *Canadian Tools for Schools Kit* is a guide for schools that provides basic information to help schools address indoor air quality issues as part of their commitment to health & safety issues. It encourages the prevention of indoor air quality problems and the prompt resolution of problems as they arise. **Please read over the summary and think about potential changes you would make to the basic content of *Tools for Schools.***

Basic content of *Tools for Schools Kit:*

- Encourages a team-based approach using the skills and encouraging the commitment of everyone involved in facility planning, maintenance, operation and use of schools.
- Focuses primarily on controlling indoor air pollutants and on adequate maintenance, operation and use of schools.
- Emphasizes the need for an ***indoor air quality coordinator*** who will collect IAQ information, handle IAQ issues, ensure for adequate training/education, and establish communication guidelines for IAQ issues to the public and media.
- Establishes 10 separate checklists for those involved in IAQ management within the school
  a) Administration
  b) Teachers
  c) Air Handling
  d) Building Maintenance
  e) Custodial
  f) Food Service
  g) Health
  h) Relocatable Classrooms
  i) Renovation and Repair
  j) Waste Management
- These checklists are to be completed on a regular basis by appropriate personnel and given to the ***indoor air quality coordinator***. The checklists are specifically adapted to fit into the everyday responsibilities of these individuals.
- The checklists address such areas as policy development, ventilation and building maintenance, thermal regulation, general school cleanliness, classroom supplies, food handling, health education, site selection for relocatable classrooms, and proper renovation techniques for flooring and roofing.
- States that school administration should fulfill their ethical, legal and financial responsibilities as they apply to the health and safety of schools.
- Encourages the development of policies related to:
  a) Working practices
  b) The use of scented products
  c) Food/beverage consumption
  d) Purchase and storage of school materials
  e) Record keeping of IAQ management
  f) Facility use
  g) Team Building
  h) Special needs group
- Identifies the school principal, management staff and teachers as those responsible for implementing health and safety policies and programs within schools.
- *The Canadian Tools for Schools Kit* draws from the *United States Environmental Protection Agency's Tools for Schools Kit.* **See the *Implementation Suggestions* for additional aspects of the American version.**

APPENDIX D –
INDIVIDUAL AND EXPERT INTERVIEW QUESTIONNAIRES

INDIVIDUAL INTERVIEW QUESTIONNAIRE

1. What do you think of when you hear the term *"indoor air quality in schools"*?

2. What do you believe is the most significant issue related to indoor air quality and schools?

3. What guidelines or policies are currently being used to address the issue of IAQ management in BC schools? **If none, what kind of guidelines or policies they would like to see put into place?**

4. What was **(should be)** the step-by-step process used to implement these guidelines or policies?

5. Who should be responsible for implementing such guidelines or policies?

6. What do you see as your role in the implementation process?

7. What were **(are)** some of the barriers to successful implementation? How were they **(could they be)** overcome?

8. What are some of the factors that aided in successful implementation?

9. How are IAQ issues (i.e. IAQ test results, renovation details, or IAQ complaints) communicated between school occupants, administration, school districts and the Ministry of Education?

10. What should the step-by-step process be to communicating IAQ issues in schools?

11. What are some barriers or facilitators for effective communication?

EXPERT INTERVIEW QUESTIONNAIRE

1. What do you believe is the most significant issue related to indoor air quality in schools?

2. Under what circumstances are you called into a school? Could you give an example of one of your experiences?

3. What are the key steps you follow when evaluating schools? Is there are model that you use?

4. What kind of advice do you TYPICALLY offer schools? Who do you give the advice? WHAT KINDS OF RECOMMENDATIONS DO YOU MAKE FOR IMPLEMENTING THE SUGGESTIONS YOU HAVE MADE? **[Probe: School board, occupants, etc...]**

5. How important is the process of communication IN THE WORK THAT YOU DO? HOW WOULD YOU RATE THE IMPORTANCE OF COMMUNICATION GENERALLY IN IAQ MANAGEMENT?

6. How long does it usually take for your recommendations to be implemented?

7. What TYPE of guidelines or policies should schools use to specifically address IAQ? WHAT WOULD THEY LOOK LIKE AND WHAT KINDS OF INFORMATION WOULD THEY INCLUDE?

8. What ARE THE KEY STEPS IN IMPLEMENTING IAQ GUIDELINES?

9. Who should be responsible for implementing such guidelines or policies?

10. What are some of the potential barriers to successful implementation? How could these barriers be overcome?

11. What are some of the factors that could aid in the successful implementation?

12. Do you have any further comments about the questions I have asked or in general about IAQ in schools?

APPENDIX E
PRE AND POST PILOT INTERVIEW GUIDES

PRE-PILOT INTERVIEW QUESTIONS

1. What is your perception of IAQ within your school?
2. Do you think your perception is unique? Why or why not?
3. Could you tell me about an IAQ experience that you had in the past?

> **Interviewer guide:** If the interviewee hasn't given a firm answer on perceptions within the school from question #1 or 2 then ask--Has your school experienced IAQ concerns in the past? If yes, please explain. If no, why do you feel there are no concerns?

4. What is being done to maintain good IAQ in your school(s)?
5. Do you participate in maintaining good IAQ in your school? How? If no, who does?
6. How are IAQ topics presently communicated to the school occupants?
7. Do you think this pilot project will help your school to manage IAQ? How? If no, why?
8. Before this pilot, have you ever heard of the *Tools for Schools Action Kit*? If yes, what do you no about it? If no, what do you know about it now?

IAQ POST-PILOT INTERVIEW GUIDE

Introduction

1. Do you think IAQ in your school has changed since the beginning of the pilot project? Do you think IAQ management practices – the way your school deals with IAQ issues – has changed? How?

Tools for Schools Kit

2. Did your school implement the *Tools for Schools Kit*? Who used it (IAQ team, coordinator, classroom/student participation??) and how was it used?

3. What parts of the *Tools for Schools Kit* did your school use? (E.g. Were the checklists used and what was your experience with them? What kind of response did you get?) What was most and least useful? How?

Supplemental Guide

4. Included in the *Tools for School Kit* was a *Supplemental Guide* developed by the IAQ Project Team here which speaks to enlisting support of stakeholders in improving IAQ and offers other ideas in support of implementation.
   Did you use the *Guide*? Did you find it useful? Why or why not?
   Were there any particular parts of the implementation *Guide* you used?

Suggestions for Change

5. What changes would you make, if any, to the materials provided – firstly, *Tools for Schools Kit*? The *Supplemental Guide*? Would you add a work planning tool?

IAQ Management Plan/Outcomes

6. Did your Team also develop an <u>IAQ Management Plan</u> identifying the activities or tasks your team intended to undertake and the time frame?
   Was this a helpful process?
   Were you able to implement all or parts of your plan?
   What activities were undertaken? Which were not?
   What would you say were the *three* most significant positive outcomes of your school's participation in this pilot project?
   Any negative outcomes or unintended consequences arise as a result?
   What would improve outcomes?

Barriers and Success Factors

7. What barriers or problems did you encounter, if any? How did you address these problems?

8. Can you identify factors that helped to support your efforts? What, in your view, are the critical success factors to implementation of good IAQ practices? In your experience, were those factors present in your school?

9. Has the use of this IAQ management approach changed your school in any way and, if so, how?

Prevention Approach

10. One of the objectives of the *Tools for Schools Kit* and pilot project itself was to encourage schools to adopt a proactive, preventive approach to IAQ management in schools. Do you think the *Kit* and the project was effective in promoting such an approach in your school?
    Have you any suggestions for an improved approach to IAQ or ideas to support implementation? (eg. ideas for integrating it within existing procedures, securing additional support, etc.?)
    What would increase the likelihood that your school, or indeed others, would adopt a pro-active, preventive approach to the promotion of healthy IAQ?

Team Approach

11. Another objective of the pilot project was to encourage adoption of a shared sense of responsibility for IAQ in schools? Do you think the project was helpful in promoting a sense of this in your school? Was the use of a team approach - the IAQ Team - helpful?

For hands on schools provided with training:

Training Workshop

12. Was the workshop session provided in advance of the pilot helpful? Do you think it was important success factor in achieving the outcomes you did in the pilot or was it not necessary?

13. More specifically, on a scale of 1- 4 (with 1 being **not** effective at all, 2 - somewhat effective, 3 – mostly effective and 4 - very effective),
how effective was this workshop in:
    a. providing an overview of the purpose of the project and the pilot?
    b. helping to clarify what was expected in the pilot as well as your role and that of your IAQ Team?
    c. introducing you to the *Tools for Schools Kit*?
    d. helping you get started on development of a plan of action for your school?
    e. providing an opportunity to discuss ideas and pose questions about IAQ issues?
    f. identifying potential barriers and solutions to IAQ issues facing your school?
    g. helping to provide the impetus and focus to get started?
    h. promoting a cooperative and collaborative process or team approach?

14. Is there anything else you would like to add about the training workshop?

For "hands off" schools who did not receive training:

15. Do you think it would have been helpful to have had a workshop or training session to introduce the pilot, provide opportunity for discussion and clarification of issues, and provide support in development of an action plan to manage IAQ in your school?

For all study participants:

Sustainability

16. Will you/your school continue to use the *Kit* and/or the IAQ management approach? (retain the IAQ Team? Continue with implementation of the plan?)

APPENDIX F
POST – PILOT INTERVIEW GUIDE FOR SCHOOL BOARD STAFF

As you aware, several schools in your School board region have been participating in an Indoor Air Quality in Canadian Schools pilot project, the goal of which is to identify ways to promote good indoor air quality management practices within school environments. Specifically, these schools have been testing a product produced by the US Environmental Protection Agency called a *Tools for Schools Kit*, along with a *Supplemental Guide* developed by the project to enlist stakeholder support and address some of the implementation issues. The *Tools for Schools Kit* emphasizes taking a preventive approach to IAQ, requires development of an IAQ management plan, and encourages a team approach to addressing the issue.

1. Have you had any discussions with some of the pilot school sites in your area about the project and the status of their progress/their experience with it? What can you say about their experience? Do you think it was successful? How/in what ways?

2. What do you see as some of the potential benefits of the use of *Tools for Schools Kit* and development of an IAQ management plan?

3. Do you think that an approach such as the *Tools for Schools Kit* will work to promote healthy indoor air quality within schools? If not, why not? What is needed?

4. Would you recommend use of the *Tools for Schools Kit* in other schools in your region? Is it something that could be put into schools without much difficulty? What difficulties do you see associated with it?

5. What do you see as the critical success factors needed to support implementation of the *Kit*? Did the provision of additional funding resources and the support of project staff make a difference in your willingness to undertake the pilot project? Is this kind of support necessary for long term sustainability and expansion of the *Tools for Schools Kit* into other schools or could it be done without such measures?

6. Is it consistent with the current process for handling IAQ issues? Could it be readily integrated into existing practices and structures? (E.g. OH&S Committees? Policies, etc.) What do you see as the prospects for sustainability of this effort begun during the pilot? Do you think the pilot schools will continue to use the *Kit* and implement good management practices to promote healthy IAQ?