Chapter

2

Air Quality Health Index

Health Canada and Environment Canada

All of the audit work in this chapter was conducted in accordance with the standards for assurance engagements set by The Canadian Institute of Chartered Accountants. While the Office adopts these standards as the minimum requirement for our audits, we also draw upon the standards and practices of other disciplines.

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Air Quality Health Index

Health Canada and Environment Canada

Main Points

What we examined

The Air Quality Health Index is an indicator of the health risks associated with air quality, based on measuring air pollutants known to harm human health. It takes into account how even low levels of exposure to multiple pollutants, such as ground-level ozone and other components of smog, can affect the health of Canadians.

Under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), Health Canada has federal responsibility for health research; Environment Canada monitors air pollution and establishes standards.

In 2002 and 2003, two environmental petitions were submitted through the Commissioner of the Environment and Sustainable Development asking what the government was doing to manage air pollution and cross-border pollution. In response, Environment Canada and Health Canada reiterated the commitment made at the 2001 Toronto Smog Summit that they would develop a Canada-wide air quality index based on health risks. We examined their progress toward meeting that commitment.

Why it's important

According to various sources, the people who are most vulnerable to air pollution are those over 65, infants, children, individuals who engage in strenuous outdoor activity, and people who already have health problems.

Public opinion research shows that Canadians recognize air pollution as a major environmental problem that poses a risk to human health. The Air Quality Health Index is intended as a communication tool providing a measure of air quality and its potential impact on human health; individual Canadians can then decide what precautions they will take when air pollution is high. The air quality index used to date provides information on air quality but not on potential health effects, and the science behind the index was also seen as outdated.

What we found

- Environment Canada and Health Canada have made satisfactory progress in developing an air quality health index, which is currently being pilot-tested in selected locations. In the development stage of the Index, the departments carried out scientific research leading to

the selection of three key pollutants affecting human health that are included in the Air Quality Health Index (ground-level ozone, fine particulate matter, and nitrogen dioxide).

- From the beginning of the Air Quality Health Index development process, Environment Canada and Health Canada consulted with a wide variety of provincial governments and stakeholders, such as municipalities and non-government organizations, and have incorporated their ideas as appropriate. Most participants said that they were satisfied with the consultation process.
- Elements of the new index that working groups identified as remaining challenges include working with the provinces on issues related to the total or partial phase-out of their existing air quality indices. Further, the monitoring data apply to large population centres but not to smaller, rural areas, where the capacity to monitor pollutants is limited. In addition, there is an increased risk that a common index may not be put in place across the country, since not all jurisdictions participated in the index development process. Finally, the Index covers three pollutants monitored nationwide; it does not cover local and regional concentrations of other pollutants that also are assumed to have harmful health effects.

Introduction

2.1 Air pollution is primarily caused by the burning of fossil fuels (oil, diesel fuel, natural gas, and coal) in activities that both industry and individuals undertake. Industrial activities include power generation, oil and gas production, metal smelting, transportation, and the production of consumer products. Activities connected to individuals include residential heating and transportation. These activities generate air pollutants that include, but are not limited to, ground-level ozone, particulate matter, nitrogen oxides, volatile organic compounds, sulphur dioxide, and carbon monoxide. Exhibit 2.1 describes these air pollutants and their health and environmental effects.

The impact of air pollution in Canada

2.2 Public opinion research commissioned by Health Canada in the 2004–05 fiscal year found that Canadians recognize air pollution as a major environmental problem that poses a risk to human health. In August 2008, the Canadian Medical Association (CMA) estimated that some 2,600 Canadians would die prematurely in 2008 from the effects of acute, short-term exposure to air pollution. The vast majority of premature deaths from air pollution occur among people aged 65 or older. This link between short-term exposure to air pollution and premature deaths is consistent with findings of recent studies in the United States and in Europe. Health Canada has also acknowledged that air pollution is associated with thousands of premature deaths in Canada every year.

Shared responsibility for air quality

2.3 The federal, provincial, and territorial governments share responsibility for air quality in Canada. The federal government regulates interprovincial and international air pollution, negotiates and enters into international treaties, and is responsible for federally owned lands and works. The provinces have broad power to regulate pollution within provincial boundaries, and are historically the primary regulators of industrial air polluters. In addition, they are responsible for operating the air quality monitoring networks. To clarify roles and responsibilities and to establish a standard approach to environmental protection across Canada, the federal, provincial (except Quebec), and territorial governments agreed to work in partnership under the framework of the 1998 Canada-wide Accord on Environmental Harmonization, a consensus document agreed to by the Canadian Council of Ministers of the Environment (CCME), and its Canada-wide Environmental Standards Sub-Agreement.

Exhibit 2.1 Air pollutants and their effects on health and the environment

Pollutant	Description	Health and Environmental Effects
Ground-level Ozone (O_3)	Ground-level ozone is a colourless and highly irritating gas that forms just above the earth's surface. It is a secondary pollutant produced when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) mix.	• Nausea, eye irritation and headaches, decreased lung function; increased respiratory illness; increased mortality. • Destroys vegetation, forests, and synthetic materials.
Particulate Matter (TPM, PM_{10} and $PM_{2.5}$)	Particulate matter (PM) consists of airborne particles in solid or liquid form. The size of PM particles largely determines the extent of environmental and health damage caused. There are three different sizes of PM: Total Particulate Matter (TPM), less than 10 microns (PM_{10}), and less than 2.5 microns ($PM_{2.5}$).	• Increased respiratory symptoms, stress, and illness; worsening of cardio-respiratory diseases; increased mortality rates. • Can have adverse effects on vegetation and structures, and contributes to regional haze.
Nitrogen Oxides (NO_X)	Nitrogen oxides include the gases nitrogen oxide (NO) and nitrogen dioxide (NO_2). NOx is formed primarily when nitrogen contained in fuel is used (e.g. driving a car). NO emitted during combustion quickly oxidizes to NO_2 in the atmosphere.	• NO_2 itself can cause adverse effects on respiratory systems of humans and animals, and damage to vegetation; it helps form respirable particulate matter ($PM_{2.5}$).
Volatile Organic Compounds (VOCs)	Volatile organic compounds (VOCs) are carbon-containing gases and vapours such as gasoline fumes and solvents (but excluding carbon dioxide, carbon monoxide, methane, and chlorofluorocarbons). The more reactive VOCs combine with nitrogen oxides (NO_x) in photochemical reactions in the atmosphere to form ground-level ozone.	• Many individual VOCs are known or suspected of having direct toxic effects on humans, ranging from carcinogenesis to neurotoxicity. • VOCs are also precursor pollutants to the secondary formation of fine particulate matter ($PM_{2.5}$).
Sulphur Dioxide (SO_2)	Sulphur dioxide, or SO_2, belongs to a family of sulphur oxide gases (SO_x). It is formed from the sulphur contained in raw materials such as coal, oil, and metal-containing ores during combustion and refining processes.	• Can cause adverse effects on respiratory systems of humans and animals, and damage to vegetation. • When transformed into sulphate particles that are subsequently deposited on aquatic and terrestrial ecosystems, acidification can result.
Carbon Monoxide (CO)	Carbon monoxide (CO) is a colourless, odourless, tasteless, and poisonous gas.	• Helps create a compound that inhibits the blood's capacity to carry oxygen to organs and tissues. • CO can impair exercise capacity, visual perception, manual dexterity, learning functions, and ability to perform complex tasks.

Sources: Environment Canada, Clean-Air Online (www.ec.gc.ca/cleanair-airpur/) and Exhibit 4.2, Chapter 4, May 2000 Report of the Commissioner of the Environment and Sustainable Development.

2.4 At the federal level, Environment Canada and Health Canada are responsible for regulating and assessing air pollution, through the *Canadian Environmental Protection Act, 1999*. In general, Environment Canada is responsible for measuring air pollutants, carrying out research, and regulating interprovincial and international air pollution. Health Canada is responsible for conducting research and studies relating to the health impacts of pollutants.

Measuring and reporting air quality

2.5 Two nationwide air monitoring networks collect air pollutant data in Canada. The first is the National Air Pollution Surveillance Network (NAPS) and the second is the Canadian Air and Precipitation Monitoring Network (CAPMoN). NAPS, the larger of these two networks, is operated as a partnership between Environment Canada, the provinces and territories, and municipal monitoring agencies. NAPS receives data from a total of 289 stations in 216 communities, most of them in large urban centres. Environment Canada manages CAPMoN, which receives data from 30 air quality monitoring stations located in rural settings.

2.6 To date, under the existing systems, provinces and select municipalities have communicated data from these networks through their own air quality indices. Environment Canada's Meteorological Service of Canada has been using the network data to issue forecast maximums for the current and next day's air quality. In the case of Ontario, forecasting is carried out by the Ontario Ministry of the Environment in partnership with the Meteorological Service of Canada. Some provinces also issue air quality warnings or advisories (such as smog alerts) with associated health messaging to their population. Some also have air management programs that may trigger regulatory action if levels of pollutants exceed established thresholds.

2.7 The basis for these air quality indices has been the **Index of the Quality of the Air (IQUA)**, a measurement methodology introduced in 1979. In early 2001, Environment Canada began to investigate concerns from various stakeholders about identified shortcomings in the methodology used to calculate the IQUA and the index's failure to reflect the health risks posed by the additive effect of the air pollutants. At the June 2001 Smog Summit in Toronto, the then-Minister of the Environment committed to help develop and implement a new air quality index based on health risks. In its 2004–2006 sustainable development strategy, Environment Canada also made a commitment to introduce this new health-based index. Both Environment Canada

Index of the Quality of the Air (IQUA)

Developed by an Ad Hoc Sub-Committee of the Federal-Provincial Committee on Air Pollution in 1976, the Index of the Quality of the Air was based on National Ambient Air Quality Objectives, a set of voluntary national goals for outdoor air quality. These objectives currently include sulphur dioxide, total particulate matter, carbon monoxide, nitrogen dioxide, and ground-level ozone. Provinces and territories may adopt and implement the air quality objectives according to their needs, such as incorporating them and the IQUA methodology in their air quality indices. The indices generally report on the pollutant with the highest monitored reading at the time of measurement, converted to a 0–100 scale, and this is used to represent the overall air quality relative to health impacts and/or environmental targets.

and Health Canada reiterated the commitment in their respective 2007–2010 strategies.

2.8 This commitment to introduce an air quality index based on health risks was also highlighted in the departments' responses to two **environmental petitions** that the Office of the Auditor General received relating to air quality. In 2002, the Office received petition number 55, which raised concerns about the federal government's alleged failure to create adequate regulations to control air pollution. In his response, the then-Minister of the Environment noted his previous commitment to introduce a revised IQUA. In 2003, a petitioner submitted petition number 83, relating to the issue of transboundary air pollution at the Canada–US border. The Minister of Health's response referred to the Department's commitment to play a major role in revising the IQUA, to better protect public health.

Environmental petitions

Under the *Auditor General Act*, the environmental petitions process provides Canadians with a formal means to bring their concerns about environmental issues to the attention of federal ministers and departments and to obtain a response to those concerns. With the consent of petitioners, petitions and responses are posted in our petitions catalogue on the Office of the Auditor General website (www.oag-bvg.gc.ca).

Focus of the audit

2.9 To determine the progress Environment Canada and Health Canada have made on their commitment to develop a Canada-wide air quality index based on health risks, we examined the work the departments have undertaken on the index.

2.10 More details about the objective, scope, approach, and criteria are in **About the Audit** at the end of this chapter.

Observations

The existing air quality index

2.11 As a first step in developing an air quality index based on health risks, we expected Environment Canada and Health Canada to have identified areas of weakness with the existing Index of the Quality of the Air (IQUA).

Environment Canada identified key issues with the existing air quality index

2.12 We found that in 2001, Environment Canada commissioned a report on the concerns various air quality stakeholders had expressed about the IQUA. This report reviewed the underlying criteria for the index, summarized how it had been used across the country since its introduction, and provided a comparison to the United States' air quality index. The reviewers identified three major issues with the existing index:

- **Validity of the science.** The report stated that there was substantial scientific evidence that the threshold levels the existing air quality index used to determine air quality levels and categories were outdated, and that there are no safe thresholds for these pollutants. The thresholds the existing air quality index used to determine air quality levels and categories emphasized environmental regulatory requirements, such as the levels that triggered regulatory action to get industry to reduce pollution, rather than public health concerns.
- **Inconsistency of the calculations.** The report found that the monitoring of air pollutants, including their safe level thresholds and corresponding health messages, varied by jurisdiction. The air quality index readings were based on whichever monitored pollutant was the highest at the time of measurement. In addition, different provinces used different methodologies to calculate the same air quality index value.
- **Lack of clear health messages**. The air quality index numbers the provinces generated were, in almost all cases, not accompanied by clear text explaining either the health risk or the behavioural changes individuals should undertake on days with poor air quality.

2.13 By carrying out an analysis of air quality indices in Canada, we found that the federal government identified areas of weakness in the existing index and the key issues to be addressed as it developed a new air quality index based on health risks.

Developing a new air quality health index

2.14 The development of the new air quality index based on health risks consisted of three phases. In the first phase (June 2001 to July 2002), the objective was to develop a vision for improving the air quality indices and to present recommendations for moving forward. The second phase (October 2002 to June 2003) focused on the underlying statistical and scientific basis for a new index. The third phase (July 2003 to March 2007) focused on pilot tests.

The federal government created a broad-based consultation process

2.15 We found that Environment Canada and Health Canada carried out an analysis and consulted with stakeholders as part of developing the Air Quality Health Index, which was particularly important given the shared jurisdiction over air quality, the national nature of air quality indices, and the impact of air quality on Canadians in general.

2.16 We found that in June 2001, shortly after the Toronto Smog Summit, the federal government convened a group of stakeholders from across Canada at the "Towards a Canadian Air Quality Index" workshop to develop a consensus on how to proceed to improve the state of Canadian air quality indices. This workshop identified important characteristics for an air quality index based on health risks derived directly from the observed linkage between individual health and air pollutants. In addition to the representatives from the federal government, participants included representatives from provincial governments, and stakeholders from industry, non-governmental organizations, and health authorities.

2.17 While other governance processes such as the Canadian Council of Ministers of the Environment (CCME) were available, the federal government's decision to use a broad-based process to develop the new index allowed a wider variety of stakeholders to participate in the process, rather than relying on the federal government's traditional provincial and territorial partners alone.

2.18 In the fall of 2001, the federal government created a management committee and three working groups (Health Aspects, Monitoring and Data Analysis, and Market Research and Marketing). A secretariat, jointly administered by Health Canada and Environment Canada, supported their activities. The management committee, co-chaired on a rotating basis by one federal department and one non-governmental organization, included representatives from nine provinces. It reported ad hoc to the Deputy Minister Committee of the CCME through the Deputy Minister of Environment Canada. Alberta withdrew from the entire process after April 2002, expressing concerns that the process was not following established federal-provincial consensus procedures such as those the CCME follows. Alberta had also questioned the need to develop a new, national index instead of modifying the existing air quality index.

2.19 The consultations engaged approximately 30 stakeholders in addition to the federal government and its provincial partners. The Canadian Council of Ministers of the Environment was also briefed on progress in developing the Air Quality Health Index.

2.20 We found that Environment Canada and Health Canada conducted a consultation process for developing the Air Quality Health Index that followed the principles the Treasury Board of Canada Secretariat laid out in its Guidelines for Effective Regulatory Consultations. These principles emphasize the importance of ongoing, constructive, professional relationships with stakeholders, along with

meaningfulness, openness and balance, transparency, and accountability. During the development of the Air Quality Health Index, stakeholder participation was obtained at the outset of the project. All stakeholders were considered full participants in the process, and the federal departments have maintained a continuous dialogue with the participants. Most stakeholders involved in these consultations told us that they were satisfied with the process.

The working group considered various health index options

2.21 We found that, in accordance with generally accepted scientific method, Environment Canada and Health Canada evaluated and validated the underlying science and data needed to support the development of an air quality index based on health risks.

2.22 In Phase 1 of the project, the Health Aspects working group studied two options to improve the IQUA. The first option consisted of adding fine particulate matter as one of the pollutants the existing index measured. The second option was to create a new index that would correlate the health risks of air quality, including ozone, nitrogen dioxide, carbon monoxide, sulphur dioxide, and fine particulate matter to mortality statistics. The management committee ultimately decided to proceed with the second option, which was to create a new index correlating the health risks of air quality to mortality statistics. The Monitoring and Data Analysis working group carried out a technical analysis of this recommended option.

2.23 The working group's technical analysis focused on the following:

- **The correlation of pollutants to health risks.** An analysis published by Health Canada scientists in a peer-reviewed article showed that ozone and fine particulate matter had a higher correlation to health risks than the other three pollutants. However, the analysis also found that these two pollutants alone were not sufficient to characterize the health risk in an air quality index.
- **The monitoring of pollutants.** Analyses of ozone, nitrogen dioxide, and fine particulate matter levels using the three most recent years' (1998–2000) data from the NAPS database at that time showed that readings for ozone and nitrogen dioxide at one monitoring site in a region could be considered representative of the entire region. Though the data were limited, this regional correlation was also noted for fine particulate matter. Sulphur dioxide and carbon monoxide values, on the other hand, were shown to be highly influenced by local conditions and,

consequently, measuring these pollutants at one site could not be considered regionally representative.

- **Averaging times used to assess pollutants.** Under the existing system, the choice of averaging times was generally based on air quality objectives. As a result, different averaging periods were used to monitor the various pollutants (for example, one hour for carbon monoxide or 24 hours for fine particulate matter). Since the new air quality health index was expected to reflect prevailing air quality at the time it was issued, the working group's analysis concluded that a moving, three-hour averaging period provided a stable alternative that would better relate to expected population exposure over the shorter term.
- **The monitoring network.** The analysis concluded that the existing National Air Pollution Surveillance network, if its scheduled upgrades were completed as planned by 2005, would be able to supply the data for a health-based model utilizing the three major pollutants with strong regional homogeneity (ozone, fine particulate matter, and nitrogen dioxide).

2.24 Phase 1 led the working groups and the management committee to put forward 14 recommendations that participants at the May 2002 "Steps Toward Improving Canadian Air Quality Indices" workshop endorsed prior to their presentation at the June 2002 Toronto Smog Summit. These recommendations have directed the further development of the index.

The federal government led scientific analysis to support the Air Quality Health Index

2.25 In Phase 2 of the project, Health Canada scientists carried out **epidemiological** studies to correlate the impact of individual and multiple pollutants on mortality rates associated with specific geographic and census boundaries. Mortality statistics were used because they are the most readily available and most extensively analyzed source of long-term health data. In a peer-reviewed article published in March 2008, Health Canada scientists noted that although there is no worldwide consensus on how to construct and interpret multi-pollutant models, they reported that the Canadian approach of a linear, no-threshold model was consistent with the position of the World Health Organization in its Guidelines for Air Quality Global Update (2005).

Epidemiology—A branch of medicine dealing with the incidence, distribution, and possible control of diseases and other factors relating to health.

2.26 Since 2001, the federal government has undertaken several initiatives to validate the underlying science behind the Air Quality Health Index:

- In 2002, the Monitoring and Data Analysis working group and the Health Aspects working group produced reports summarizing the technical analysis carried out.
- In June 2003, the "Science in Support of a Health Risk Based Air Quality Index" workshop was held where the scientific analyses in support of the air quality index based on health risks were presented.
- In Phases 1 and 2, Health Canada scientists had several peer-reviewed articles published in scientific journals that described the connection between air quality and health effects. The working groups also reviewed additional related research published earlier by the Health Canada scientists that confirmed the correlation between air pollutants and health impacts.
- In 2005, Health Canada commissioned a peer review of the health science issues underlying the index. While the reviewers provided general support for a health-based index, they noted that because there is no scientific consensus on nitrogen dioxide's relationship to health, the proportional weight given to nitrogen dioxide in the index could become a debatable issue and advised that Health Canada be prepared to defend the weighting it uses. The Department responded to the comments raised in the peer reviews and the revised document was reviewed again in 2006.
- The federal government initiated three pilot projects to test the Air Quality Health Index, beginning with British Columbia in 2005, followed by Nova Scotia in 2006 and Toronto in 2007.

2.27 We found that this scientific process resulted in a new health-based index (Air Quality Health Index) formulated to ensure that the provinces, territories, and municipalities that generate and report air quality values will apply the same methodology consistently. Doing so will allow Canadians to compare the health impacts of varying air quality between geographic areas.

The format for reporting the Air Quality Health Index emphasizes health messages

2.28 Current air quality indices measure and report air quality based on the highest single reading of five major pollutants monitored at a specific site. The reported air quality reading does not calculate the combined effect of the five pollutants on human health, nor is it

accompanied by specific wording or information needed by public health organizations to advise people what actions to take to reduce their exposure, such as rescheduling or reducing the intensity or duration of strenuous outdoor activity.

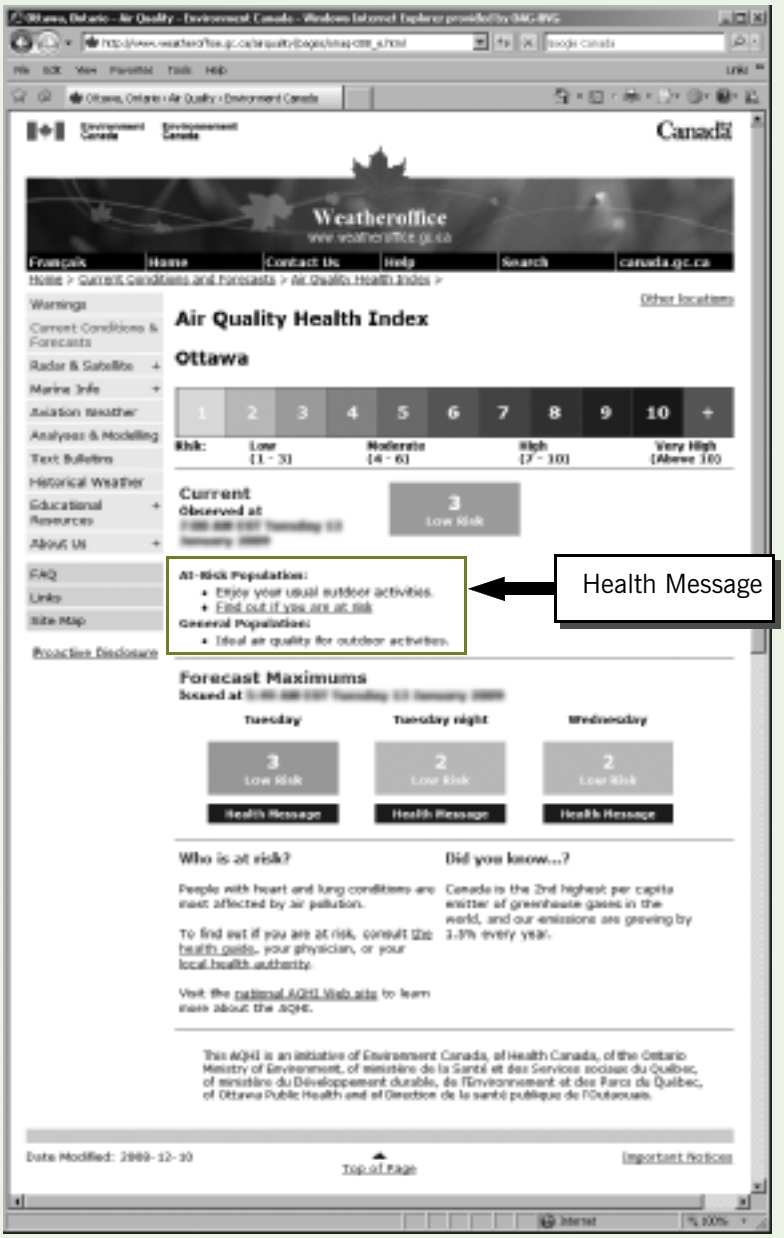
2.29 Health Canada sponsored public opinion research throughout 2004 and 2005 to measure public awareness, perceptions, and behavioural reactions to air quality, air pollution, and the air quality index. Those participating in the research reviewed the proposed Air Quality Health Index positively, including the new index's design elements and the health messaging attached to it. Subsequent reviews of the pilot projects had similar findings. This messaging, as shown in Exhibit 2.2, is expected to help Canadians reduce their exposure to air pollution by providing information to help them modify their outdoor activities on days with poor air quality.

The monitoring network covers major urban population centres

2.30 An important consideration for implementing the Air Quality Health Index was its ability to report on the same pollutants across Canada. The Monitoring and Data Analysis working group determined that if the index monitored only the three pollutants with the highest health-risk correlations (ozone, fine particulate matter, and nitrogen dioxide), the increased number of monitoring stations scheduled to be added to the NAPS network by 2005 would cover all major urban population centres with populations of more than 100,000.

2.31 In addition to data coverage, the quality of the data underlying the Air Quality Health Index is also important in correlating health risk. The participating NAPS network agencies–for example, provincial environment departments–provide quality assurance and quality control. That quality control seeks to ensure that the data the NAPS network collects are of acceptable precision, accuracy, completeness, comparability, and representativeness. The federal quality assurance and control program also includes audits and site visits. Environment Canada audits network agencies in five provinces each year, a process that includes site visits to three monitoring stations in each province. The Department carries out follow-ups to ensure that network agencies take any corrective action required. We found that the Analysis and Air Quality Division of Environment Canada manages the national NAPS data quality assurance program in accordance with generally accepted scientific methods and the government's information management guidelines.

Exhibit 2.2 **Format of Air Quality Health Index puts health messaging in the foreground**



Source: Adapted from Environment Canada, Weatheroffice online, 2008 (www.weatheroffice.gc.ca)

Air Quality Health Index pilot projects led to recommendations to improve health messages

2.32 We found that Health Canada and Environment Canada carried out testing of the new index through a series of pilot projects in various regions of the country. To date, three Air Quality Health Index pilot

projects have been initiated, in the provinces of British Columbia and Nova Scotia, as well as in the Greater Toronto Area. The British Columbia pilot project began in 2005. Based on its initial success in four communities, in 2006 it expanded to 14 communities. A 2007 review of the initial and expanded pilot projects led to a number of recommendations about how best to present and promote the index and its health information, including how to display the results of the index on websites, and ensuring the availability of information about the index in multiple media formats, for print, radio, and television.

2.33 The Nova Scotia pilot project began in 2006. In a qualitative research report that same year, most participants, including representatives from the general public and non-governmental organizations, expressed the belief that the Air Quality Health Index is valuable and should be implemented across Nova Scotia. The third pilot project began in Toronto in July 2007 and expanded to the Greater Toronto Area in 2008. Activities included development of education and outreach resources, including print and web information as well as an advertising campaign to generate awareness and interest in the Air Quality Health Index. A review of the results of these activities is underway and was to be completed in December 2008.

Air Quality Health Index has implementation funding until 2011

2.34 We found that in July 2007, the federal ministers of Environment and Health committed to spending $30 million over four years to support the further implementation and expansion of the Air Quality Health Index. This money will fund additional science to support the Air Quality Health Index, and assist in implementing the Air Quality Health Index in the remaining provinces and territories. It will also finance media campaigns informing Canadians about the new Air Quality Health Index and its benefits.

2.35 Implementing the Air Quality Health Index nationally is based on the federal government's partnerships with provinces, territories, and municipalities, as well as with local public health authorities, such as Toronto Public Health, and non-government organizations. We also found that the planned roll-out of the Air Quality Health Index will take place in a phased manner, beginning with the expansion of the British Columbia and the Greater Toronto Area pilot projects and the introduction of the index in Saint John, New Brunswick, in the 2008–09 fiscal year. Expansion to the remaining **census metropolitan areas** is planned to take place between 2009 and 2011.

Census metropolitan area—An area consisting of one or more adjacent municipalities centred on a major urban core. This area must have a total population of at least 100,000, of which 50,000 or more live in the urban core.

Clean Air Agenda—The Government of Canada's four-year, $1.9-billion horizontal strategy for improvements in Canada's environment, including reduced air pollution and greenhouse gas emissions. Eight federal departments and agencies are involved in designing and delivering more than 40 programs under 8 themes within the overall Agenda.

2.36 The implementation plan calls for an evaluation of the effectiveness and delivery of the Air Quality Health Index program in the 2009–10 fiscal year. In addition, since the Air Quality Health Index program is one of many programs in the federal government's **Clean Air Agenda**, the evaluation's results will also inform the planned 2010–11 evaluation of the Agenda.

Remaining challenges

2.37 Health Canada and Environment Canada will need to consider a number of remaining challenges as they work with their partners to implement the Air Quality Health Index across the country. These challenges, both short-term and long-term, were raised by the pilot projects, partners and stakeholders, and the two departments themselves. The following are some examples of short-term challenges:

- managing the increased implementation risk, in terms of having a common air quality index in place across the country, given that one province has not participated in the Air Quality Health Index development;
- working with the provinces on issues related to the total or partial phase-out of their existing air quality indices;
- considering whether to incorporate regionally specific pollutant issues, including smog or other advisories that may be relevant to only a few geographic areas; and
- determining, for large centres, whether to use a single averaged number derived from multiple monitors or to report these numbers separately.

2.38 In the longer term, issues that still need to be addressed include the following:

- The data collection, scientific analysis, and information developed for the Air Quality Health Index are not currently being done for smaller population centres because there are not enough monitoring sites in smaller population centres. In addition, monitoring in many of the smaller population centres does not include all the pollutants required to calculate the Air Quality Health Index, limiting its introduction in those communities. In rural areas without monitoring, it is not yet possible to estimate the health risk posed by local and transboundary pollution.
- In its progress report to the 2002 Toronto Smog Summit, the Management Committee recommended that the national air quality index based on health risks would require an ongoing development and implementation process that receives input

from environmental agencies, health agencies, outside experts, and stakeholders.

- Although the federal government allocated funding in 2007 to support the continued development and implementation of the Air Quality Health Index, it will provide this funding only until 2011. As such, there is a risk that the remaining issues, some of which are long-term, and the Index's ongoing development will not be fully addressed.

Conclusion

2.39 By developing an air quality health index, Environment Canada and Health Canada have made satisfactory progress in meeting the commitment they reiterated in responses to two environmental petitions (Exhibit 2.3). They carried out scientific research leading to the selection of three major pollutants affecting human health that need to be monitored across Canada (the combined impact of ground-level ozone, fine particulate matter, and nitrogen dioxide). They assessed whether the planned upgrades to the national monitoring network would permit it to focus on these substances and to cover major urban centres. The departments developed an underlying formula so that the air quality values used in the Air Quality Health Index would be consistent across the country. They also produced new health messaging to accompany the Index's air quality values, so individual Canadians can understand it more easily and decide what precautions they need to take when air pollution is high in their area.

Exhibit 2.3 Progress on addressing the commitment to develop a Canada-wide air quality index based on health risks

Health Canada and Environment Canada sustainable development strategies, reiterated in responses to petitions 55 and 83	
Commitment	**Progress**
Whether Environment Canada and Health Canada can demonstrate that they have made reasonable progress on their commitment to develop a Canada-wide air quality index based on health risks.	**Satisfactory**

Satisfactory—Progress is satisfactory, given the significance and complexity of the issue, and the time that has elapsed since the commitment was made.

Unsatisfactory—Progress is unsatisfactory, given the significance and complexity of the issue, and the time that has elapsed since the commitment was made.

2.40 While Environment Canada and Health Canada are working with their partners to roll out the Air Quality Health Index nationally, some long-term challenges remain. These challenges include

- dealing with an increased risk that a common index may not be put in place across the country, given that not all jurisdictions participated in the index development process;
- working with the provinces on issues related to the continued use of existing air quality indices;
- expanding monitoring to smaller, rural areas; and
- considering whether to incorporate local and regionally specific pollutant issues that could also have harmful health effects.

About the Audit

Objective

To determine whether Environment Canada and Health Canada can demonstrate that they have made reasonable progress on their commitment to develop a Canada-wide air quality index based on health risks.

Scope and approach

We examined the work carried out by Environment Canada and Health Canada in revising the Index of the Quality of the Air (IQUA) to reflect health risks. This work led to the development of the Air Quality Health Index.

Our audit approach focused on reviewing relevant documentation and interviewing with federal, provincial, and municipal officials, and representatives of non-governmental organizations.

Criteria

Listed below are the criteria that were used to conduct this audit and their sources.

Criteria	Sources

• We expected Environment Canada and Health Canada to have identified areas of weakness with the Index of the Quality of the Air (IQUA).
• We expected Environment Canada and Health Canada to have evaluated and validated (through peer review and other techniques) the underlying science and data needed to support the development of a health risk-based index, including the development of the Air Quality Health Index.
• We expected Environment Canada and Health Canada to have carried out analysis and consulted with stakeholders as part of the development of the Air Quality Health Index.
• We expected Environment Canada and Health Canada to have identified the information required for the calculation of the Air Quality Health Index.
• We expected Environment Canada and Health Canada to have assessed the adequacy of the data used for the Air Quality Health Index, including ensuring its ongoing accuracy and relevancy.
• We expected Environment Canada and Health Canada to have set timelines, objectives, and resources for the national implementation of the Air Quality Health Index.
	• Responses to petitions 55 and 83.
	  • Petition 83: Fourth paragraph under Health Canada's response to question 1—see Environmental Petitions Catalogue on the OAG website at www.oag-bvg.gc.ca
	  • Petition 55: Fourth bullet under the second paragraph of the joint response's air quality monitoring programs section.
	• Commitments made in Environment Canada's sustainable development strategies (2004–2006 (page 12) and 2007–2009 (page 16)) and Health Canada's sustainable development strategy (2007–2010 (page 25)).

These audit criteria represent a set of reasonable expectations and the departments' management agreed with the applicability of these criteria.

Audit work completed

Audit work for this chapter was substantially completed on 29 August 2008.

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