

GOVERNANCE OF AIR QUALITY MONITORING PROGRAMS WITHIN CANADA

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ABSTRACT

Within Canada, air quality monitoring programs are operated by Environment Canada and by the provinces (10), territories (3), regional governments (2) and a number of industries. The modes of operation are quite different. The largest of these programs is the National Air Pollution Surveillance (NAPS) Network, which is a cooperative program between Environment Canada and the provinces and territories. The NAPS Network has been in operation for over 30 years and has developed according to the needs of air quality managers at all levels of government. Environment Canada also manages directly another monitoring network, CAPMoN, which although initially designed for measuring acidic deposition is now also an important real-time air quality network, especially for ozone. Some provinces, notably Alberta and Ontario, have requirements that industry operate monitoring stations for key pollutants as a requirement of their permits to operate. All these different networks will be examined for their varied management characteristics. Comparison will be made to examples overseas.

INTRODUCTION

There are several ways that air quality networks can be managed. There is direct management and funding by the government agency concerned, following the usual line management responsibilities and rules. At the other extreme the management of the network can be contracted to a private sector company, which provides either all the services or some of the services required. In this model, the degree of control will vary depending on what is written into the contract. There are also networks in which industry is required through a permit system to operate stations and report the data on a specified schedule to a government agency and the public. In this paper, we will discuss these models and examine the advantages of each.

As a prelude to this discussion, we should examine why we indeed monitor air quality. These are:

- 1 to determine the day by day air quality and report on it to the public through air quality indices and warnings
- 2 to determine health and environmental impacts of air pollutants over the longer term
- 3 to track the progress and effectiveness of and to refine abatement strategies
- 4 to determine impact of Long Range Transport
- 5 to verify emission inventory estimates
- 6 to support atmospheric models and air quality prediction programs
- 7 to establish the factual basis for negotiating international agreements.

It should be noted that most of these outputs are for public information, government agencies, scientific research, in other words for the public good.

CANADIAN SITUATION

Given this, it is no surprise that in many countries, including Canada air quality networks are managed as part of environmental monitoring programs. Obviously, the level of government that operates these networks will reflect the powers held at the jurisdictional level. In Canada, the level of government which is mainly responsible for air quality is at the provincial level, though two of these governments have delegated the authority down further to regional or city governments for specific areas. However, the federal government through Environment Canada (EC) is responsible for national air quality and for inter jurisdictional concerns and for trans boundary pollution. Thus each provincial or territorial government operates its own network and EC coordinates these to give a national picture. In addition, EC operates other networks for specific purposes, e.g mercury.

THE NATIONAL AIR POLLUTION SURVEILLANCE NETWORK (NAPS) NETWORK

This is a cooperative network between the provinces and territories and EC. It also includes the two regional governments of the Ville de Montréal and GVRD. It is a cooperative partnership to provide a national picture of air quality and has been in existence since 1969 without a formal agreement. However, times change and a Memorandum of Understanding has been developed, signed this summer.

As part of this arrangement, EC provides new instruments worth over \$2M CDN annually to partners. EC maintains a national Quality Assurance (QA) program by performing audits of provincial and territorial network stations. It also runs inter-lab studies of gases containing criteria pollutants at unknown concentrations (to them). These two key QA programs are essential to ensuring national consistency. EC publishes national data summary reports which are available on the web. We are also making our data available through a map-based web site. EC analyzes all of the chemical samples at single laboratory in Ottawa and provides training on new equipment and software.

The provinces and territories contribute to the NAPS program by operating over 280 stations across Canada. There are now about 760 instruments (monitors and samplers) operating as part of the NAPS and provincial programs. The stations are located primarily in urban areas but sometimes are located in small communities or even provincial parks, usually to measure the impact of a particular point source or transboundary flow of pollutants. Sites are designated NAPS sites if they contain one or more pieces of equipment belonging to EC but otherwise they are operated as part of the provincial or territorial networks. Provinces share their data from NAPS and non-NAPS stations with EC for inclusion in the national database. This allows EC to have and to disseminate a truly national picture of air quality. Note that provinces also use the data for publication of Air Quality Indexes on a daily basis. The provinces have collaborated with EC on many special projects of mutual interest over the years.

CANADIAN AIR AND PRECIPITATION MONITORING NETWORK (CAPMoN),

This major air quality network is wholly operated by the federal government. It operates 26 stations located mainly in rural or remote regions of Canada and one in the United States. CAPMoN was originally designed to monitor acidic deposition and remains the primary tool used to assess the effectiveness of acid gas emission control programs which have been implemented to date in Canada and the United States. The Network's measurement locations were sited to be regionally representative which has made them very effective for determining source receptor relationships, background concentrations and for determining long term trends for a wide variety of pollutants. Measurements have been expanded to include aerosols and trace pollutants at 12 sites, PM_{2.5} and PM₁₀ at 5 and ground level ozone at 9. All integrated samples collected are analysed in a dedicated laboratory. This network is also used for many air quality research initiatives.

INTERNATIONAL COMPARISONS

In contrast, other countries have very different arrangements. In some countries, unlike Canada, most of the air quality monitoring is handled by contractors engaged for the purpose. This is the method used by governments in the UK and Taiwan. In Korea a publicly owned company manages the air monitoring network. Some countries do not operate national programs, for example Mexico is just in the process of designing a national program. In the USA, the Environmental Protection Agency (EPA) contributes financially to state networks, contributing from some 25 to 50% of the cost. These contributions are linked to progress in attaining specific air quality targets under the US Clean Air Act. In Germany, the Lander and federal government appear to have separate programs. In France, air quality regions operate programs, which cover one or more departments, but there is no central management at the national level.

GOVERNANCE OF THE NAPS PROGRAM

The federal Minister of the Environment, under the Canadian Environmental Protection Act, has an obligation to monitor the environment, including air quality, although specifics are delivered through EC work plans and funding allocations. The NAPS Program is part of this high-level obligation. The success of the NAPS program can be measured by the fact that it has operated without a formal agreement for nearly 35 years simply because it is a cooperative program requiring strong linkages between the two levels of government. The new Memorandum of Understanding (MOU), which has been in the works for about 3 years, reflects the diverse but common interests of all the NAPS partners (provinces, territories, regional governments and EC programs in the regions). The work is largely by consensus and is only limited by the constraints imposed by staffing levels and finances. The NAPS MOU covers such issues as the designation of NAPS sites as compared with truly provincial sites. It defines the roles and responsibilities of the parties, as well as who owns which data and the rules for sharing of data. This agreement clarifies that there are no financial obligations on the part of the participating governments other than those expressed in the MOU. The MOU indicates when and where meetings will be held and who will be the co-chairs. It has a length of five years but hopefully, it will be renewed.

Canada has provinces and territories that greatly differ in both size and population. At one end of the range we have Prince Edward Island, with a population of about 125,000, covering an area not much larger than a large city. At the other, we have Ontario with about 10 million population, covering an area about the size of France. Since the distribution of equipment depends on the size of the provincial networks, we have agreed that there will be at least one NAPS site in each province or territory. Hence, there is one site in each of the territories. To manage this diverse network, there is a series of appendixes in the MOU, one for every jurisdiction which addresses the type of equipment that will go to each site. These annexes can be modified easily at the local-manager level, and do not require signatures of senior managers.

WHO PAYS FOR AIR QUALITY MONITORING?

Apart from the NAPS network, most air quality and, indeed, most environmental monitoring is paid for by governments. This is because the information derived from the monitoring is for the public good or information. By public good, it is available to governments to develop policies or to track implementation of management strategies. This is true of most countries, in that government pays for the majority of monitoring even if delivered by contract. However, some sites and some industrial networks are paid for and even operated by industry. This is usually a requirement of the air emission permits given to a particular emitter e.g., smelters, electrical power plants, pulp mills, chemical and petroleum refineries, etc. The cost of the permit is usually linked to the amount of pollution emitted. Some of these sites are what we call “fence line” and are designed to measure pollution moving off the industrial site. Others are sites located where the pollution may impact. Generally, the focus has been on large emitters of selected compounds such as sulphur dioxide, and most of these emitters have a permit issued by the province or territory they operate in. Hence, some of these permits require continuous emission monitors, a subject which will not be addressed here. Some networks become a joint venture of government and industry because the industrial emitter is not the total cause of the pollution. Normally, part of the permits fee is used for monitoring or a rebate is given if the industry conducts its own monitoring. The problem that is not often resolved is how to manage or monitor the multitude of small point sources. In Canada, many small sources contribute significantly to the total load of some key pollutants. For example, dry cleaners and automotive body shops emit, on a national basis, considerable volumes of volatile organic compounds. It is largely to address the emissions from these multitudinous stationary sources and the large number of transport-related emissions that publicly financed networks are implemented. I know of no government that has successfully fully applied the “polluter pays” principle to these sources except through general taxation.

There are some issues with industries managing their own networks. There have been instances of poor quality in the collected data. These arise from use of unskilled staff or because there is a lack of technical knowledge. Indeed, we know of one case where as part of the union contract the employees rotate every three months, which makes it hard to get continuity of operating conditions. In order to verify consistency and quality, audits and inspections can be performed by either government specialists or independent consultants. Often governments have been reluctant to get involved due to the cost and questions of

liability if bad data are produced, but to be successful, especially for industry-owned monitoring, public acceptance of the data is imperative, otherwise there is little point in producing the data.

EXAMPLES OF CANADIAN INDUSTRIAL AIR QUALITY NETWORKS

At least three provinces have industrial networks. Alberta uses industrial associations to manage and support the monitoring. Their data are warehoused and accessible to the public. The province audits the sites and provides a certain amount of technical support. It is largely regarded as successful. On the other hand, Ontario has just moved a number of its own monitoring sites to industry and industrial associations, largely in an effort to reduce its own cost. Industry has not been running most of these sites for long enough to judge the success of this change. British Columbia also requires monitoring by industry and we will examine this within the context of Greater Vancouver.

The Greater Vancouver Regional District is supported by 21 local municipalities for common issues such as public transportation, highway and land-use planning, water and sewage services, garbage disposal and air quality management. GVRD serves some 2M people. GVRD has assumed, through provincial legislation, the ability to act as a province in some matters, which includes air quality, and as a result, GVRD is one of our NAPS partners. GVRD is responsible for the air quality for the most populated area of British Columbia and can issue air emission permits for most stationary sources, which are related to the amount of pollution anticipated. Furthermore, due to its expertise in air monitoring, it also acts for the adjacent Lower Fraser Valley Regional District. Thus, GVRD operates an extensive air quality monitoring network. Local industry and other non-industrial partners pay GVRD to operate selected stations. The funds GVRD receives are dedicated for air monitoring and must be used in an accountable manner. We believe that this arrangement of a transfer of funds from industry to a government is unique in Canada for air quality monitoring, and that it is not common for this type of arrangement to occur in other countries.

There are some distinct advantages to this arrangement, which may be applicable elsewhere. The expertise that is available within GVRD and has been acquired over many years is available to both the publicly funded and privately funded networks. Merging of funds from these two sources allows the proper planning of equipment replacement and allows sufficient density of monitoring to address multiple issues and goals. This is also the most effective way to use resources, whatever the source, as there is no duplication. Further, there are no issues regarding the quality of the networks being different for public or private networks since it has the advantage of being audited by EC.

Alberta has established in March 1994 the Clean Air Strategic Alliance (CASA) as a new way to manage air quality issues in Alberta. CASA is a non-profit association composed of diverse stakeholders from three sectors - government, industry, and non-government organizations such as health and environmental groups. The Alberta government provides roughly 52% of the funding for the program with industry supplying 28% and NGOs the balance. Stakeholders are committed to developing and applying a comprehensive air quality

management system for all Albertans. All participants of the CASA consensus-based model work towards a shared vision and mission. CASA air sheds along with the provincial government conduct passive and continuous ambient air quality monitoring in regions where local stakeholders from each sector have joined work on air quality issues for their region. There are currently four air sheds in the province. They are independent non-profit organizations that use the CASA consensus decision-making process. The four air sheds contributing to CASA operate 18 continuous monitoring stations in addition to the 10 operated by Alberta Environment. In addition, there are 70 passive monthly stations. About 93% of the funding for these air sheds comes largely from industries with government (provincial and municipal contributing a mere 4%

CONCLUSIONS

Are these model applicable elsewhere? We believe so. They have worked well for a number of years and has been acceptable to both public and industry partners. We do recognise the limitation if these models are applied over a large geographical area but otherwise there are no other constraints except the political and legal realities of the jurisdiction in which it is being applied.

ACKNOWLEDGEMENTS

I would like to close by thanking various managers of the NAPS program for their comments.

FURTHER INFORMATION

For information on the National Air Pollution Surveillance Program visit

<http://www.etc-cte.ec.gc.ca/naps/>

For map-based access to air quality data within Canada visit

<http://www.etc-cte.ec.gc.ca/NapsStations/Default.aspx>

For further information on air quality programs within the Greater Vancouver Regional District visit

<http://www.gvrd.bc.ca/air/index.htm>

For further information on the CASA visit:

<http://www.casadata.org/index.asp>