British Columbia Air Quality Monitoring Networks:

Description of British Columbia Air Quality Monitoring Networks

Prepared by
Ministry of Environment Lands and Parks
Air Resources Branch
for the Atmosphere and Air Quality Ecosystem Task Force
Resources Information Standards Committee

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The Resources Information Standards Committee evolved from the Resources Inventory Committee which received funding from the Canada-British Columbia Partnership Agreement of Forest Resource Development (FRDA II), the Corporate Resource Inventory Initiative (CRII) and by Forest Renewal BC (FRBC), and addressed concerns of the 1991 Forest Resources Commission.

For further information about the Resources Information Standards Committee, please access the RISC website at: http://ilmbwww.gov.bc.ca/risc/index.htm.

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1. Introduction

The British Columbia Ministry of Environment, Lands and Parks, Air Resources Branch, on behalf of the Resource Inventory Committee contracted with Pacific Meteorology Inc. to collect, compile and document information regarding British Columbia Air Quality Monitoring Networks and Emissions Inventories. This report contains the network and emission inventory descriptions.

2. Networks

Networks may be defined and classified by various criteria. To name a few, a network may by defined by its purpose, by the owner/operator of the network, by the method of data collection, by the instrumentation, or by the elements monitored. It is desirable for ease of manipulation to use a definition which results in networks that are mutually exclusive, that is, each observing station would belong to only one network. Theoretically, it is possible to define criteria which would result in such networks; however, the examples listed here do not lead to unique networks.

As data for the networks were obtained from the agencies, it became obvious that it would be extremely difficult and cumbersome to document the networks if a strictly mutually exclusive restriction were applied. Attempts were made to limit the overlap of networks but in the end, it was found expedient to accept the networks much as the agencies viewed them. By using this approach only a few overlaps result.

NETWORK : ARB Ambient Monitoring Network

AGENCY

BC Environment, Lands and Parks

ADDRESS

Environmental Protection Division
Air Resources Branch, BC Environment, Lands and Parks
777 Broughton Street
Victoria, B.C.
V8V 1X5

AIR QUALITY PROGRAMS

The collection of ambient air quality data began with the creation of the Pollution Control Branch in the early seventies. The first ambient air monitoring data archived was for the year 1970.

At the outset, all monitors were operated by the Ministry of Environment. The program was under the control of the Environmental Laboratory which was responsible for quality assurance/quality control and network operation.

The Environmental Laboratory was privatized in 1989; at that time the responsibility for the network was turned over to the Data Standards Group. In 1991 the responsibility for all aspects of ambient air monitoring was centralized in Victoria under the Air Resources Branch.

NETWORK DESCRIPTION

BC Environment operates monitoring stations in most large urban centres of BC. Data are transferred once per day to the Victoria headquarters and transferred into the automated air quality system for final verification and validation.

In the early years, only data from stations operated by MOE were included in the archive. Since 1982, however, data from most of the GVRD stations have been included in the archive (indicated in the station database).Data for such stations may be obtained from ARB or GVRD. Data from some of the Lower Fraser Valley sites are collected by the GVRD telemetry system. Selected stations of the network (indicated in the station database) are included in the NAPS (National Air Pollution Surveillance) network.

Data for these stations may be obtained from Supervisor, NAPS Data Publications, Conservation and Protection, Environment Canada, 3439 River Road, RRETC, Ottawa, Ont., K1A 0H3 as well as from ARB.NAPS data are available online; accounts may be arranged through the Downsview AES Computing Centre (416-739-4476).

CONTACTS

DATA: Quality Assurance Scientist

TECH.: Senior Networks Analyst

PHONES

DATA: 604-387-9940 FACSIMILE: 604-356-7197

TECH.: 604-387-9941

DATA

STORAGE: VAX mini-computer

FORMAT: Data are stored in indexed RMS files.

ACCESS: Available through contact on floppy disk or hard copy.

CHARGE FOR DATA? None

STATISTICS: Exceedances and simple statistics

ROUTINE REPORTS/REPORT MEDIA AND FORMAT

Annual reports are in progress.

ELEMENT AND SENSOR DESCRIPTION

SO2: Pulsed fluorescence.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/secRESOLUTION 1 ppb

TRS: Pulsed fluorescence.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

NO2: Chemiluminescence.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

NO:Chemiluminescene.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

CO:Infrared absorption.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 10 ppb

OZONE (low-level): Ultraviolet absorption.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

PM10: Tapered Element Oscillating Microbalance.

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 5 ug/m3

DUST:Cylindrical canister.

OBSERVATION FREQ. 30 days AVERAGING PERIOD 30 days

SAMPLING FREQ. 30 days RESOLUTION 0.1 mg/dm2 day

TSP/PM10:Hivol sampler (measures TSP and PM10).

OBSERVATION FREQ One/6 daysAVERAGING PERIOD 24 hr

SAMPLING FREQ. One/6 days RESOLUTION 1 ug/m3

PRECPITATION CHEMISTRY

Weekly samples are collected with an automatic opening collector. Analysis of the major ions only is carried out - trace element analysis is not done.

PAH

Samples are collected using a polyurethane foam (PUF) plug; XAD2 inserts are used in some plugs. The US EPA protocol is followed.

OTHER SENSORS

Hydrogen fluoride is measured by drawing a sample of ambient air into an impinger containing sodium hydroxide solution. The sample is subsequently analyzed for fluoride using the selective ion procedure.

SAMPLING SOFTWARE

Environmental Information Systems (EIS) model 6002.

OPERATING PERIOD

Continuous.

QUALITY ASSURANCE PROGRAM

A rigid quality assurance/quality control program is followed using ARB/EPA protocols.

STANDARDS

The US EPA standards which specify instrumentation, observing frequencies, etc. are followed.

Standards for NAPS sites may be found in "NAPS Network Site Documentation. “This manual is under review and will be re-issued in database format.

Latest update 06/16/93

NETWORK : CANSAP

AGENCY

Atmospheric Environment Service

ADDRESS

Atmospheric Issues and Services Branch
Atmospheric Environment Service
700 - 1200 W. 73rd Avenue
Vancouver, B.C.
V6P 6H9

AIR QUALITY PROGRAMS

The Atmospheric Environment Service is the federal agency charged by statute with the responsibility for meteorology in Canada. It provides generalized meteorological and climatological services for the general public, for aviation, marine interests, engineers, scientists, etc. It is also involved in air quality studies, particularly in acidic deposition, and conducts many air quality-related studies.

NETWORK DESCRIPTION

The Canadian Network for Sampling Precipitation (CANSAP) was established in 1977.Precipitation sampling commenced at a number of meteorological stations across Canada, mainly at airports. Monthly samples were collected with an automatic opening rain sampler and forwarded to the Canada Centre for Inland Waters at Burlington, Ontario for analysis. Sampling continued until 1985 in B.C. The network was superseded by the CAPMoN network established to monitor "background" concentrations of various elements.

CONTACTS

DATA: Atmospheric Chemist

TECH.: Atmospheric Chemist

PHONES

DATA: 604-664-9125 FACSIMILE: 604-664-9195

TECH.: 604-664-9125

DATA

STORAGE: Mainframe (Downsview) & Regional Office microcomputer.

FORMAT: A standard AES format for precipitation chemistry data is used.

ACCESS: Through agency contact.

CHARGE FOR DATA? Charges are levied.

STATISTICS: None.

ROUTINE REPORTS/REPORT MEDIA AND FORMAT

Irregular reports of monthly data were published.

ELEMENT AND SENSOR DESCRIPTION

PRECPITATION CHEMISTRY

Event samples were collected using an automated wet-only sampler. The samples were composited for a period of one month and forwarded to the Canada Centre for Inland Waters (Environment Canada) Laboratory at Burlington, Ontario. Analysis was for the main ions, i.e. pH, SO4, NO3, NH4, Mg, Na, Cl, K, Ca.

SAMPLING SOFTWARE

Not applicable

OPERATING PERIOD

Continuous.

QUALITY ASSURANCE PROGRAM

STANDARDS

Chemical analysis methods were specified in the "NAQUADAT Dictionary of Parameter Codes" published by Data Systems Section, Water Quality Branch, Environment Canada, Ottawa K1A 0E7.

Latest update 04/16/93

NETWORK : CAPMoN

AGENCY

Atmospheric Environment Service

ADDRESS

Atmospheric Issues and Services Branch
Atmospheric Environment Service
700 - 1200 W. 73rd Avenue
Vancouver, B.C.
V6P 6H9

AIR QUALITY PROGRAMS

The Atmospheric Environment Service is the federal agency charged by statute with the responsibility for meteorology in Canada. It provides generalized meteorological and climatological services for the general public, for aviation, marine interests, engineers, scientists, etc. It also is involved in air quality studies, particularly in acid deposition, and conducts many air quality-related studies.

NETWORK DESCRIPTION

The Canadian Air and Precipitation Monitoring Network (CAPMoN) began operations in mid-1983 replacing the Canadian Network for Sampling Precipitation (CANSAP) and the Canadian Air and Precipitation Network (APN).The main objective of the network is to provide regional-scale spatial and temporal variations, and long-term trends in the chemical composition of air and precipitation, wet and dry deposition. Data are used for model verification and for phenomenological and process studies.

One CAPMoN station is operated in British Columbia, on Saturna Island. Most of the stations are in eastern Canada, the region where the impact of acidic deposition has been the greatest.

CONTACTS

DATA: Atmospheric Chemist

TECH.: Atmospheric Chemist

PHONES

DATA: 604-664-9125 FACSIMILE: 604-664-9195

TECH.: 604-664-9125

DATA

STORAGE: AES Regional Office Computer

FORMAT: Data are maintained in a database file on a Regional Office (Vancouver) computer. The program CAPSTAR may be used to output the data in hard copy, ASCII files, Tab-delimited files, spread-sheets or other formats.

ACCESS: Through agency contact.

CHARGE FOR DATA? Charges are levied.

STATISTICS: Program CAPSTAR provides summary statistics, plots, etc.

ROUTINE REPORTS/REPORT MEDIA AND FORMAT

No routine reports are published; quality-assured data may be obtained in various formats using program CAPSTAR.

ELEMENT AND SENSOR DESCRIPTION

OZONE (low-level): Dasibi Ozone Analyzer

OBSERVATION FREQ. One/min AVERAGING PERIOD One hour

SAMPLING FREQ. One/min RESOLUTION

OZONE (upper level): Brewer Spectrophotometer

OBSERVATION FREQ. One/min AVERAGING PERIOD One hour

SAMPLING FREQ. One/min RESOLUTION

PRECPITATION CHEMISTRY

Daily precipitation samples are collected using an automated wet-only sampler known as the Type A-M Wet Deposition Collector. Samples are submitted weekly for laboratory analysis. The samples are analyzed for pH, SO4, NO3-N, Cl, NH4-N, Ca, Mg, Na, K at the CAPMoN laboratory, Downsview, Ontario operated by AES, Environment Canada.

OTHER SENSORS

Air sampling is carried out using a filter pack system. Daily samples are collected by drawing air through a three-layer filter which collects or absorbs particulate and gases. The pack consists of eight three-layer filters, one for each day of the week and one control filter - no air is drawn through the latter. Samples are forwarded weekly to the CAPMoN laboratory where the filters are analyzed for compounds and elements such as SO2, Ca, Cl, Mg, NH4NO3, HNO3, and ions such as SO4, NO3, NH4, etc.

SAMPLING SOFTWARE

Not applicable

OPERATING PERIOD

Continuous.

QUALITY ASSURANCE PROGRAM:

The quality assurance program for precipitation monitoring includes the following: analysis of dynamic field blanks (dry bags), participation in laboratory comparison studies, duplicate sampling at various sites for publication of semi-annual laboratory quality assurance reports, and the initiation of a number of special studies on sampling methodologies.

The filter pack quality assurance program includes a field "blank" sample which is exposed to the air for seven days but does not have air drawn through it. Analysis of the blank provides an estimate of gas diffusion from the collector filters.

Procedures using duplicate samples and inter-laboratory comparison are part of the quality assurance program.

STANDARDS

Standards for siting, sample handling and standard operating procedures are contained in the manual, "Site Operations Reference Manual - Precipitation" published by Environment Canada in April 1985. Chemical analysis methods are described in the "NAQUADAT Dictionary of Parameter Codes" published by the Data Systems Section, Water Quality Branch, Environment Canada, Ottawa K1A 0E7 in 1985.

A manual, "Low Volume Air Filter Pack System - Operating Protocols" is under development. This manual will set out standards for air quality monitoring at CAPMoN sites.

Latest update 04/16/93

NETWORK : GVRD Ambient Air Monitoring (Dustfall and Particulate)

AGENCY

Greater Vancouver Regional District

ADDRESS

Air Quality and Source Control
Greater Vancouver Regional District
4330 Kingsway
Burnaby, B.C.
V5H 4G8

AIR QUALITY PROGRAMS

Air Quality management in the Greater Vancouver Area began in 1949 when the city of Vancouver initiated an air pollution control program. By 1959, the City of Vancouver program had been expanded to provide contract services to Richmond and the North Shore municipalities.

Provincial government concerns about air pollution led to the 1970 amendment of the Pollution Control Act (now the Waste Management Act)which established a provincial regulatory program for air emissions. Shortly afterwards, in 1972, the issue of Letters Patent and a further amendment of the Pollution Control Act established the Greater Vancouver Regional District as a single agency under which all provincial and municipal air pollution control activities in the Greater Vancouver urban area would be recognized. This GVRD mandate is continued under the current provincial Waste Management Act.

NETWORK DESCRIPTION

The GVRD operates a network of particulate and dustfall monitoring stations throughout Greater Vancouver. The network is designed to facilitate the planning of control and abatement programs.Some of the stations in this network are listed in the Air Resources Branch network; data for such sites may be obtained from either source. Selected stations of the network are included in the NAPS (National Air Pollution Surveillance) network. Data for those stations may be obtained from Supervisor, NAPS Data Publications, Conservation and Protection, Environment Canada, 3439 River Road, RRETC, Ottawa, Ont. K1A 0H3 as well as from GVRD.NAPS data are available online; accounts may be arranged through the Downsview AES Computing Centre (416-739-4476).

CONTACTS

DATA: Supervisor, Air Monitoring & Computer Services

TECH.: Supervisor, Air Monitoring & Computer Services

PHONES

DATA: 604-436-6746 FACSIMILE: 604-436-6707

TECH.: 604-436-6746

DATA

STORAGE: Digital PDP 11/84 micro-computer hard disk

FORMAT: Data are stored on computer hard drive and as hard copy.

ACCESS: Floppy disk (IBM or MAC) or hard copy, on request.

CHARGE FOR DATA? None.

STATISTICS**:** Exceedances of air qual. pollutant concentration objectives

ROUTINE REPORTS/REPORT MEDIA AND FORMAT

Quarterly and Annual Summary Reports. Environment Canada (C & P) publishes an annual summary for NAPS sites.

ELEMENT AND SENSOR DESCRIPTION

DUST: Cylindrical canister

OBSERVATION FREQ. One/month AVERAGING PERIOD 30 days

SAMPLING FREQ. One/30 daRESOLUTION 0.1 mg/dm2 day

TSP/PM10:GMW 2000H

OBSERVATION FREQ One/6 days AVERAGING PERIOD 24 hr

SAMPLING FREQ. One/24 hrRESOLUTION 1 ug/m3

SAMPLING SOFTWARE

Not applicable

OPERATING PERIOD

Continuous.

QUALITY ASSURANCE PROGRAM

TSP samplers are calibrated twice annually. Sample "blanks" are analyzed in the laboratory along with the dustfall samples.

STANDARDS

US EPA standards for air quality monitoring are followed. Standards for the NAPS sites are found in "NAPS Network Site Documentation Manual" which is under review and will be re-issued in database format.

Latest update 05/18/93

NETWORK : GVRD Ambient Air Monitoring (Gaseous)

AGENCY

Greater Vancouver Regional District

ADDRESS

Air Quality and Source Control
Greater Vancouver Regional District
4330 Kingsway
Burnaby, B.C.
V5H 4G8

AIR QUALITY PROGRAMS

Air Quality management in the Greater Vancouver Area began in 1949 when the City of Vancouver initiated an air pollution control program. By 1959, the City of Vancouver program had been expanded to provide contract services to Richmond and the North Shore municipalities.

Provincial government concerns about air pollution led to the 1970 amendment of the Pollution Control Act (now the Waste Management Act)which established a provincial regulatory program for air emissions. Shortly afterwards, in 1972, the issue of Letters Patent and a further amendment of the Pollution Control Act established the Greater Vancouver Regional District as a single agency under which all provincial and municipal air pollution control activities in the Greater Vancouver urban area would be recognized. This GVRD mandate is continued under the current provincial Waste Management Act.

NETWORK DESCRIPTION

The GVRD operates an extensive ambient air quality monitoring network located across 14 communities. Data from many of them are transmitted continuously by telemetry to the Air Quality Monitoring System (AQMS) computer in the Air Quality and Source Control Office. In addition, data from several BC Ministry of Environment Fraser Valley stations are logged on the AQMS computer.

The network is designed to provide information about the nature and extent of air pollution in the Regional District to facilitate the planning of control and abatement programs and to measure their effectiveness.

Many of the stations in this network are listed in the Air Resources Branch network; data for those stations may be obtained from either source. Selected stations of the network (indicated in the station database) are included in the NAPS (National Air Pollution Surveillance) network. Data for NAPS sites may be obtained from Supervisor, NAPS Data Publications, Conservation and Protection, Environment Canada, 3439 River Road, RRETC, Ottawa, Ont. K1A 0H3 as well as from GVRD.NAPS data are available online; accounts may be arranged through the AES Downsview Computing Centre (416-739-4476).

CONTACTS

DATA: Supervisor, Air Monitoring & Computer Services

TECH**.:** Supervisor, Air Monitoring & Computer Services

PHONES

DATA: 604-436-6746 FACSIMILE: 604-436-6707

TECH.: 604-436-6746

DATA

STORAGE: Digital PDP 11/84 micro-computer hard disk

FORMAT: Data are stored in a non-standard database on hard drive.

ACCESS: Dialup, floppy disk (IBM or MAC) or hard copy, by request.

CHARGE FOR DATA? None.

STATISTICS**:** Exceedances of air quality pollutant conc. objectives.

ROUTINE REPORTS/REPORT MEDIA AND FORMAT

Quarterly and Annual Summary Reports. Environment Canada (C & P) publishes an annual summary for NAPS sites.

ELEMENT AND SENSOR DESCRIPTION

SO2: Pulsed fluorescence

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

TRS: Pulsed fluorescence

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

NO2: Chemiluminescence

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

NO:Chemiluminescence

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

CO:Infrared absorption

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 10 ppb

OZONE (low-level): Ultraviolet absorption

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 1 ppb

THC: FID

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 0.1 ppm

COH: Light transmittance

OBSERVATION FREQ. HourlyAVERAGING PERIOD One hour

SAMPLING FREQ. One/sec RESOLUTION 0.1 coh

PM10: Special PM10 studies are done; real-time data not available.

OBSERVATION FREQ.AVERAGING PERIOD

SAMPLING FREQ.RESOLUTION

VOC: Special VOC studies are done: real-time data not available.

OBSERVATION FREQ.AVERAGING PERIOD

SAMPLING FREQ.RESOLUTION

SAMPLING SOFTWARE

Customized in-house.

OPERATING PERIOD

Continuous.

QUALITY ASSURANCE PROGRAM

Quality assurance procedures include:

- hourly and daily data review;

- zero and span checks carried out every four days (at least);

- multi-point calibration done four times per year;

- Federal government audits.

All calibration and zero/span gases are NIST traceable.

STANDARDS

US EPA standards for air quality monitoring are Followed. Standards for the NAPS sites may be found in "NAPS Network Site Documentation" which is under review and will be re-issued in database format.

Latest update 05/18/93

NETWORK : Organics in Precipitation

AGENCY

Environmental Surveys Branch, Environment Canada

ADDRESS

Environmental Surveys Branch
Conservation and Protection, Environment Canada
224 West Esplanade
North Vancouver, B.C.
V7M 3H7

AIR QUALITY PROGRAMS

Environmental Surveys Branch, Conservation and Protection of Environment Canada is responsible for generalized environmental monitoring in Canada. It is thus responsible for the general monitoring of fresh water quantity and quality.

NETWORK DESCRIPTION

To aid in determining the pathways of toxic pollutants entering freshwater lakes and streams, the Environmental Surveys Branch on behalf of the National Water Resource Institute (NWRI) operates a precipitation sampling network across Canada. The network was first established in B.C. in 1986. Chlorinated organics only are monitored at the stations.

CONTACTS

DATA: Head, Environmental Networks

TECH.: Head, Environmental Networks

PHONES

DATA: 604-666-8009 FACSIMILE: 604-666-3325

TECH.: 604-666-8009

DATA

STORAGE: NWRI mainframe and microcomputers

FORMAT: Data are stored and are available in ASCII text files.

ACCESS: Through agency contact

CHARGE FOR DATA? None.

STATISTICS: None

ROUTINE REPORTS/REPORT MEDIA AND FORMAT

No routine data reports are published. Irregular reports are published in scientific journals.

ELEMENT AND SENSOR DESCRIPTION

PRECPITATION CHEMISTRY

Precipitation is collected during non-freezing periods with an automatic opening sampler; the collector is teflon-coated. The precipitation is filtered through a resin column which collects the organics - the precipitation is discarded, however the resin column is kept moist. Once per month the column is forwarded to the NWRI laboratory in Burlington for analysis of chlorinated organics such as Lindane, DDT, Alpha BHC and Toxophene.

SAMPLING SOFTWARE

Not applicable

OPERATING PERIOD

Operates only during periods of non-freezing temperatures.

QUALITY ASSURANCE PROGRAM

The NWRI chemical analysis quality assurance program is followed. Triplicate samples are forwarded from the Kanaka Creek station as a control procedure.

STANDARDS

Chemical analysis methods and standards are described in the "NAQUADAT Dictionary of Parameter Codes" published by the Data Systems Section, Water Quality Branch, Environment Canada, Ottawa K1A 0E7 in 1985.

Latest update 04/15/93