

A Limited Compendium of National
and Regional Environmental and Human
Data Sources and Monitoring Initiatives
in Canada, Mexico and the United States

Commission for Environmental Cooperation



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INTRODUCTION

Environmental and human biomonitoring of chemicals involves collecting and analyzing information on the levels of contaminants in order to identify changes and trends over time and location. The routine collection of monitoring data serves many purposes. The primary uses of monitoring data are to characterize contaminant concentrations for a specified geographic area, to provide data to support and evaluate models, to evaluate the effectiveness of toxics reduction efforts, to identify hot spots and sensitive subpopulations, to establish environmental and human exposure trends, and to meet other information needs and research objectives (e.g., long-range transport, exposure pathways, regulatory assessment).

The purpose of this work was to provide an initial review including, for each country of the NAFTA region, a synopsis of major past or ongoing national or regional programs, initiatives and activities contributing to the assessment of the status, trends and potential impacts of chemical substances. Mexico emphasized the importance of taking advantage of existing monitoring initiatives in the United States and Canada in developing its own national monitoring initiative (*Programa Nacional de Monitoreo y Evaluación*—Proname).

This survey provides information on available information by country in an effort to foster monitoring and assessment initiatives that will lead to data that are comparable to analogous data from all three North American free trade partners.

This work was undertaken as part of the CEC's Environmental Monitoring and Assessment project.

Background

The Sound Management of Chemicals (SMOC) Working Group is a trilateral initiative under the auspices of the Commission for Environmental Cooperation (CEC) to reduce the risks to human health and the environment of chemicals of mutual concern in Canada, Mexico and the United States. Upon its establishment in 1995 by the CEC Council of Ministers, the initial focus of the SMOC Working Group was for the three Parties, working with stakeholders, to develop North American Regional Action Plans (NARAPs) to guide the Parties in the reduction and eventual elimination of persistent and toxic substances of mutual concern.

The SMOC Working Group recognizes the importance of identifying and keeping abreast of emerging issues, utilizing flexible approaches with the potential for a broad impact, and increasingly engaging stakeholders in its work. As such, it is expanding its approach to identify and address issues related to chemicals management by utilizing policy instruments, applying broad-based strategies to industrial sectors, and developing information for decision-making through monitoring and assessment of chemicals, in addition to its ongoing work on specific toxic substances and groups of substances. Among the proposed areas of work, the development and implementation of a sustainable regional approach to monitoring, including biomonitoring, will include work under the Environmental Monitoring and Assessment Standing Committee with the objective of enhancing North American monitoring capacity, especially in Mexico. The SMOC Working Group mandated the Secretariat of the Commission for Environmental

Cooperation (CEC) to provide an overview of past and current monitoring initiatives in the three countries that would aid Mexico in building or taking advantage of existing initiatives as the country develops its own national monitoring initiative.

As a national priority, Mexico has identified the development and implementation of a national monitoring initiative (Proname). The availability of such monitoring information is important for the analysis, assessment, management and the communication of risks to targeted groups and the general population. Proname is a potentially important tool for policy-makers as well as for scientific specialists and, grounded in strong political support, will help Mexico comply with its Stockholm Convention National Implementation Plan (NIP) commitments.

For Mexico, comprehensive and sustainable long-term environmental monitoring and assessment data will enable decision makers to:

- understand whether and how contaminants may be affecting the environment and health of Mexicans and to develop appropriate risk reduction policy initiatives;
- determine long-term contaminant trends in humans and the environment and to understand the effectiveness of implemented policies;
- determine the degree to which the country is meeting its obligations under the international conventions it has ratified, such as those of Stockholm, Basel, Rotterdam and the World Summit on Sustainable Development (WSSD); and
- assess the potential trade and economic implications of chemicals reduction strategies.

Successful adoption of a sustainable environmental monitoring and assessment infrastructure would provide valuable information for decision makers to make sound environmental decisions thereby helping Mexico to meet its domestic, regional and international obligations. As a long-term sustainable monitoring and assessment initiative, Proname is being led by a working group of experts from the three NAFTA countries with support from the CEC Secretariat.

This upcoming national environmental monitoring and assessment program will also support the CEC's "Capacity Building" priority area by enhancing Mexico's ability to collect, analyze and assess contaminant specific information in a quality assured, compatible manner.

A cooperative regional approach to monitoring is also critical to understanding short- and long-range transport mechanisms of chemicals and to monitoring chemicals and products in trade throughout their life cycles. Developing and implementing an integrated North American monitoring network will enable decision-makers to identify areas that are the most affected on a regional scale. In addition, a regional approach to monitoring will help link the effects of environmental policies and chemicals management and will assist Mexico in the fulfillment of obligations under international agreements such as the Stockholm Convention on Persistent Organic Pollutants. Short-term, local monitoring initiatives can provide limited, focused information, while a long-term approach to monitoring provides more robust information about long-term trends in substance levels and allows for the detection of changes, whether or not such changes are negative or positive in nature.

Environmental Monitoring and Assessment Project

Adopted in 2002 through Council Resolution 02-08, the NARAP on environmental monitoring and assessment (EM&A NARAP) set the course for the EM&A project of the CEC. With its trilateral membership, the North American Standing Committee on Environmental Monitoring and Assessment (EM&A Standing Committee) lends technical expertise to these activities. The CEC's project "Monitoring and Assessing Pollutants Across North America" encompasses the work of the EM&A Standing Committee and is nested in the CEC's Information for Decision-making priority area.

The EM&A NARAP provided a framework for a regional-scale strategy (based on geographic/climatic regions) for monitoring and assessing persistent toxic substances in the North American environment. It is also intended to provide Canada, Mexico and the United States with an agreed-upon course of action to increase the comparability, reliability, relevance and availability of data and information on persistent toxic substances in the North American environment and provides an overall strategic framework to assist in achieving this purpose. The EM&A Standing Committee also encourages cooperation and collective action in planning, conducting, validating and reporting of baseline surveys as well as monitoring, modeling and research programs on the status, trends and effects of persistent and toxic substances. A major priority is capacity building and international collaboration, with a particular emphasis placed on increasing the capacity of Mexican scientists to measure, monitor and assess persistent and toxic substances in Mexico.

Compilation of available information on Chemicals Monitoring Initiatives in Canada, United States and Mexico

The work consisted of:

- Assessing the available information on past or current chemicals monitoring initiatives and data sources in each country through Web searches.
- Elaborating an inventory on existing information including a short description based on available information provided on websites of the Canadian, Mexican and US governments.

The information on National and major Regional past and current monitoring initiatives on chemicals, has been identified through searches on Web Pages of US EPA, Health Canada, Environment Canada, Semarnat and INE, and summarized to provide, when available, a short description of publicly available information. Extensive information was found for some initiatives; others were less documented. Therefore, the lack of a systematized reporting scheme in this document reflects information availability on the websites. Although this inventory does not pretend to be completely exhaustive, effort was made for it to be as extensive as possible and to integrate several types of monitored biota. This inventory will also need to be updated on a regular basis if it is to be kept current.

Input was provided through the EM&A Standing Committee and the information was reviewed by each country's monitoring specialists.

CANADA: NATIONAL, REGIONAL MONITORING INITIATIVES AND DATA SOURCES

GLOSSARY OF ACRONYMS, CANADA

AMAP	Arctic Monitoring and Assessment Programme
AOCs	Areas of Concerns
CAC	Criteria Air Contaminants
CAMNet	Canadian Atmospheric Mercury Measurement Network
CAPMoN	Canadian Air and Precipitation Monitoring Network
CCEA	Canadian Council on Ecological Areas
CEPA	Canadian Environmental Protection Act
CES	Canadian Environmental Sustainability Indicators
CHMS	Canadian Health Measures Survey
CWS	Canadian Wildlife Service
DFO	Department of Fisheries and Oceans
EC	Environment Canada
EEM	Environmental Effects Monitoring
EHIs	Environmental Health Indicators
EMAN	Ecological Monitoring and Assessment Network
EPHI	Environmental Public Health Indicators
ESDI	Environment and Sustainable Development Indicators
GAPS	Global Atmospheric Passive Sampling Study
GBAP	Georgia Basin Action Plan
GPHIN	Global Public Health Intelligence Network
GRULAC	Group of Latin America and Caribbean Countries
HAE	Human Activity and the Environment
HC	Health Canada
HERS	Hedgehog Environmental Reporting System
IADN	Integrated Atmospheric Deposition Network
IODE	International Oceanographic Data and Information Exchange
ISDM	Integrated Science Data Management
LRTAP	Long-Range Transport of Air Pollutants
NatChem	National Atmospheric Chemistry Database
NAPS	National Air Pollution Surveillance Network
NCIS	National Contaminants Information System
NCP	Northern Contaminants Program
NPRI	National Pollutant Release Inventory
NRTEE	National Round Table on the Environment and the Economy
POPs	Persistent organic pollutants
SLAP	St. Lawrence Action Plan

A. INDEX OF RELATED SURVEILLANCE, MONITORING INITIATIVES AND ACTIVITIES IN CANADA

1. AIR QUALITY

1.1. *Canadian Air and Precipitation Monitoring Network (CAPMoN) (Environment Canada)*

The Canadian Air and Precipitation Monitoring Network is a non-urban air quality monitoring network with siting criteria designed to ensure that the measurement locations are regionally representative (not affected by local sources of air pollution). Scientists involved with the measurement of atmospheric pollution in urban centres would consider most CAPMoN sites to be remote and pristine. There are currently 28 measurement sites in Canada and 1 in the United States.

Network Objectives

Determine the spatial patterns and establish the temporal trends of atmospheric pollutants related to acid rain and smog; provide data for long-range transport model evaluations and effects research (aquatic and terrestrial); ensure the compatibility of federal, provincial and US measurements; study atmospheric processes.

http://www.msc.ec.gc.ca/capmon/index_e.cfm

1.2. *Canadian Atmospheric Mercury Measurement Network (CAMNet) (EC)*

Consists of 11 ambient air monitoring sites located across Canada. Atmospheric mercury concentrations are determined on a continuous basis and are converted to one-hour or six-hour means for data analysis and interpretation.

1.2.1. CAMNet Objectives

The objectives of CAMNet are to:

1. improve the current understanding of the atmospheric transport, transformation and removal processes of elemental mercury and its ecologically significant compounds released into the environment;
2. establish spatial variability and temporal trends in Hg concentrations in the atmosphere and precipitation on a regional/national basis;
3. identify major points and/or regional sources of atmospheric mercury emissions;

4. define representative background ambient air concentrations in various parts of the country;
5. investigate transboundary atmospheric transport of this pollutant and establish how Canadian values compare with those measured elsewhere;
6. provide input to and scientific data for validating numerical models describing the atmospheric pathways and characteristics of mercury species emitted into the environment; and
7. provide scientific data for future health-based studies and risk assessments involving atmospheric aspects of mercury in the Canadian environment.

1.2.2. Measuring Atmospheric Mercury

Ambient mercury vapor concentrations are monitored on a continuous basis using cold vapour atomic fluorescence spectrometric (CVAFS) analysers. Currently, CAMNet uses the Canadian-made Tekran Model 2537A Ambient Mercury Vapour Analyser to monitor total gaseous mercury (TGM) concentrations at each network site. A Standard Operating Procedures Manual has been compiled for TGM measurements and is available upon request. This manual contains guidelines for site selection/establishment and operational protocols. The TGM concentrations are based on one-hour sample integration periods.

Wet deposition precipitation mercury measurements are taken at some of the same sites and adhere to the US NADP-Mercury Deposition Network (MDN) sampling protocol where the same contract laboratory performs low concentration total mercury and methyl mercury analyses.

1.2.3. QA/QC Procedures

Both site auditing guidelines and data management guidelines have been established for CAMNet. Annual national audits are being undertaken as a way of ensuring the quality, comparability and representativeness of the data collected throughout the network. A data management protocol is also being developed using the Research Data Management and Quality Control System (RDMQ). This system provides a computer-based platform to document, store, format, manipulate, access and quality control the TGM data from the various sites. Precipitation data will be handled in ways similar to NADP-MDN procedures.

http://www.smc-msc.ec.gc.ca/arqp/camnet_e.cfm

1.3. Air Quality Measurement: the NAPS Program

The National Air Pollution Surveillance (NAPS) Network was established in 1969 as a joint program of the federal and provincial governments to monitor and assess the quality of the ambient air in Canadian urban centres.

Air quality data for sulphur dioxide (SO₂), carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃) and total suspended particulates (TSP) are measured at over 152 stations in 55 cities in the ten provinces and two territories. Various statistics derived from the measurements and comparisons with the National Air Quality Objectives prescribed under the Canadian Environmental Protection Act are published in annual data reports.

In addition to the criteria pollutants, the Division, with the assistance from provincial and municipal NAPS network cooperating agencies, carries out a number of other monitoring activities to support priority national air issues.

For Canada's national Smog (Ground-Level Ozone) Management Program, data for nitric oxide, nitrogen oxides and volatile organic compounds (VOCs) are being collected. The NAPS database has been expanded to include ozone observations from Canadian and U.S. rural monitoring locations in order to allow analysis of regional ozone episodes.

Measurements of PM₁₀ (suspended particles with aerodynamic diameters less than 10 micrometers) and PM_{2.5} have been made at Canadian sites since 1984. Sample filters are analyzed for 50 elements (including toxic metals such as arsenic, lead and mercury) 14 inorganic and organic anions and 11 inorganic cations.

Since 1988, the Centre has been developing and applying improved techniques for measuring potentially toxic air contaminants. Measurements of VOC (aromatics, aldehydes and ketones) and semi-volatile organic compounds (PAHs, dioxins and furans) are now carried out at 40 urban and rural locations in Canada. The data have formed the principal ambient air exposure data base for 14 Canadian Environmental Protection Act (CEPA) Priority Substances List (PSL) assessments. A number of reports which provide results from the toxic air monitoring programs are available upon request.

http://www.etc-cte.ec.gc.ca/NAPS/index_e.html

1.4. *Global Atmospheric Passive Sampling Study (GAPS)*

The GAPS Network is a key program for producing comparable global-scale data for POPs. This program was initiated in December 2004 as a two-year pilot study before evolving into a global network, and consists of more than 60 sites on seven continents.

Its objectives are to:

- demonstrate the feasibility of passive air samplers for POPs;
- determine spatial and temporal trends for POPs in air; and
- contribute useful data for assessing regional and global long-range atmospheric transport of POPs.

Passive air samplers (PAS) are advantageous because of their low cost, simple construction and electricity-free operation. Deployment of PAS worldwide over several years will allow for temporal trends to be established and thus, the effectiveness of POPs control measures to be

evaluated. This program supports Canada's obligations under international agreements on POPs—in particular, Article 16 (Effectiveness Evaluation) of the Stockholm Convention on POPs.

The first year results (January–December 2005) from the Global Atmospheric Passive Sampling (GAPS) Network provided baselines of air concentrations for persistent organic pollutants (POPs) at 23 sampling sites in the Western Europe and Others Group (WEOG) region. These data will be useful for assessing temporal and spatial trends and regional and global transport of POPs in air.

www.msc-smc.ec.gc.ca/gaps/

2. WATER QUALITY / AQUATIC

2.1. Environment Canada: Water Quality Monitoring

Water quality monitoring is a scientifically designed system of long-term, standardized measurement, systematic observation, evaluation and reporting of water quality in order to define status and/or trends.

The quality of water is determined by its physical, chemical and biological characteristics. To ensure the health of aquatic ecosystems in Canada, maximum allowable limits exist for most potentially harmful contaminants. The monitoring programs of Environment Canada and its partners are designed to measure these characteristics to determine if these maximum allowable limits are exceeded.

Water quality monitoring has been a core program function of Environment Canada since the Department's inception in the early 1970s. The bulk of the activities in this area have focused on the assessment and reporting on status, trends and surveillance in fulfillment of many federal and international legislative obligations. Monitoring is carried out through federal-provincial-territorial, international and inter-provincial agreements. In addition to inland water quality monitoring, Environment Canada monitors marine shellfish waters through the Canadian Shellfish Sanitation Program and [Marine Water Quality Monitoring](#).

<http://www.ec.gc.ca/qualitedeleau-waterquality/Default.asp?lang=En>

2.2. National sediment program (Environment Canada)

The federal government has conducted a national sediment program since 1961 in cooperation with the provinces, territories, and other interested agencies, such as hydroelectric companies. Data-collection techniques are standardized across the country to maintain data quality and comparability. Provincial governments also collect sediment data either as part of a regular

sampling program or for specific studies. Consulting engineers and planners, as well as university researchers, also carry out sampling for site-specific projects.

These data have been used extensively to address reservoir sedimentation, environmental impact assessment, sediment-associated contaminant transport, and other concerns.

Sediment data and information are available from a variety of sources. A large amount of data is contained in a national computer data base operated by Environment Canada. The data base contains historical and current data for about 750 stations throughout the country, about 300 of which are currently monitored.

The types of data that are stored in the national computer data base are as follows:

- suspended-sediment concentrations
- suspended-sediment loads
- suspended-sediment particle size
- bed load
- bed-load particle size
- bed-material particle size
- sediment quality

The data are published annually on CD-Rom and are available from:

[Water Survey of Canada](#)

http://www.ec.gc.ca/water/en/nature/sedim/e_data.htm

3. FISH AND WILDLIFE QUALITY

3.1. Contaminants Monitoring (Canadian Wildlife Service)

The Canadian Wildlife Service (CWS) is the Canadian agency responsible for managing migratory birds and other wildlife of federal interest. Monitoring activities have taken place since the 1960s in order to ensure that wildlife populations and communities are healthy, sustainable, and maintained within desired abundance and distribution limits. Monitoring is the repeated observation, through time, of selected parameters to determine the state of ecosystems. The key purpose of monitoring is to serve as the feedback mechanism that provides information on the ecological integrity of complicated and complex systems and the effects of disturbances on those systems. Different species may integrate environmental conditions in different ways, necessitating a multi-species approach to environmental assessment. Therefore, CWS has maintained long-term chemical monitoring of Herring Gulls (*Larus argentatus*) in the Great Lakes, as well as a variety of seabird species on the Atlantic and Pacific coasts and, more sporadically, seabirds and polar bears in the Arctic.

- Contaminants in Herring Gull Eggs from the Great Lakes: 25 Years of Monitoring Levels and Effects: http://www.on.ec.gc.ca/wildlife/factsheets/fs_herring_gulls-e.html
- marine seabird egg monitoring programs:
http://www.ecoinfo.ec.gc.ca/env_ind/region/seabird/seabird_e.cfm;
http://www.ecoinfo.ec.gc.ca/env_ind/region/cormorant/pcbs_e.cfm
- Great Blue Herons (*Ardea herodias*) from the Georgia Basin:
http://www.ecoinfo.ec.gc.ca/env_ind/region/gbhtoxin/gbhtoxin_e.cfm

<http://www.cws-scf.ec.gc.ca/nwrc-cnrf/default.asp?lang=en&n=7D2707F7>

4. HUMAN EXPOSURE STUDIES

4.1. *Canadian Health Measures Survey (CHMS) (Statistics Canada)*

The Canadian Health Measures Survey will collect key information relevant to the health of Canadians in the form of direct physical measurements such as blood pressure, height and weight, blood and urine sampling and physical fitness testing. Also, through questionnaires, it will gather information related to nutrition, smoking habits, alcohol use, medical history, current health status, sexual behaviour, lifestyle, physical fitness, as well as demographic and socioeconomic variables.

- Physical measures
- Blood and urine samples will allow measuring environmental exposure to metals, phthalates, polychlorinated biphenyls (PCBs), brominated flame retardants, organochlorine pesticides, organophosphate insecticide metabolites, phenoxy herbicides, cotinine, perfluorinated compounds and bisphenol-A.

The CHMS will collect measures from 5,000 people as a representation of 97 percent of the Canadian population aged 6 to 79 (including the territories). Survey development and testing are planned for 2003–2006, with the survey occurring in 2006–2008. Data dissemination is planned for late 2009. Although funding for the CHMS is one time only, the survey may become an ongoing part of Canada's health information system.

<http://www.statcan.ca/english/concepts/hs/measures.htm>

http://www.hc-sc.gc.ca/ewh-semt/contaminants/health-measures-sante_e.html

4.2. *Total Diet Survey*

The Total Diet Study, also known as Market Basket Survey/Study, is recommended by the [World Health Organization](#) (WHO) for accurate estimates of dietary intakes of contaminants.

Since 1969, Health Canada has conducted Total Diet Studies in six different periods of time to estimate the levels of chemicals to which Canadians in different age-sex groups are exposed through the food supply. The first Total Diet Study was conducted between 1969 and 1973, the second, from 1976 to 1978, the third from 1985 to 1988, the fourth from 1992 to 1999, the fifth, from 2000 to 2004, and the most recent one started in 2005. These studies are organized by the Food Research Division in the Bureau of Chemical Safety, and are supported by partners both within Health Canada (e.g., the Nutrition Research and Evaluation Divisions, the Regional Laboratories of the Health Products and Food Branch, [Pest Management Regulatory Agency](#)) and outside of Health Canada (e.g., the [Canadian Food Inspection Agency](#)). Each study is conducted in several major Canadian cities over the period, normally one city each year.

<http://www.hc-sc.gc.ca/fn-an/surveill/total-diet/index-eng.php>

4.3. Maternal-Infant Research on Environmental Chemicals (MIREC)

MIREC is a national five-year research study that is recruiting about 2,000 women over a 2 – 3 year enrolment period from the following cities: Vancouver, Calgary, Winnipeg, Sudbury, Ottawa, Kingston, Hamilton, Toronto, Montreal and Halifax. Women will be recruited during the first trimester of pregnancy and followed through pregnancy and up to eight weeks after birth. Participants must be 18 years of age or older and six to 12 weeks pregnant to be eligible for the study. The main goals of this study are:

1. To measure the extent to which pregnant women and their babies are exposed to environmental chemicals, as well as tobacco smoke;
2. To assess what pregnancy health risks, if any, are associated with exposure to heavy metals (lead, mercury, cadmium, arsenic and manganese);
3. To measure the levels of environmental chemicals, pre- and post-natal, and some of the beneficial components (nutritional and immune constituents) of breast milk.

Biological markers of environmental chemicals and tobacco smoke exposure will be measured in the mothers' blood, urine, hair, and breast milk and in their babies' umbilical cord blood and meconium (which is the baby's first stool). Mothers will also be asked to complete questionnaires throughout their pregnancy and after birth.

The MIREC study is a collaborative effort among Health Canada scientists, the Sainte-Justine Hospital in Montreal, and clinical researchers from the other participating cities. Sainte-Justine Hospital in Montreal is the coordinating centre for the study. Laboratories at the Centre de Toxicologie du Québec and Health Canada will conduct the analysis of tissues and fluids.

<http://www.hc-sc.gc.ca/ewh-semt/contaminants/mirec/>

5. INTEGRATED MONITORING, SURVEILLANCE ACTIVITIES OR PROJECTS (GENERAL / MULTIPLE SOURCES) IN CANADA

5.1. Canada Center for Remote Sensing (Environment and Health Program)

The Environment and Health Program provides a foundation of earth science knowledge for a cleaner environment and healthier Canadians. E&H projects will support the development of policies and regulations to this end, and will collaborate with provincial and federal government agencies as well as international bodies to reduce risk to environment and human health. Project activities will include baseline characterization and risk identification, with targeted work in high-risk areas. These activities are based on expertise from environmental geochemistry and remote sensing and include:

1. monitor the state of the Canadian superficial environment temporally and spatially to identify risks to a clean environment
2. identify areas of concern, where metals from natural or anthropogenic sources pose a risk to the environment, and
 - o inform regulators and policy makers
 - o aid in risk-management decisions

http://ccrs.nrcan.gc.ca/index_e.php

http://ess.nrcan.gc.ca/eh-esh/index_e.php

5.2. The Ecological Monitoring and Assessment Network (EMAN)

The Ecological Monitoring and Assessment Network (EMAN) is made up of linked organizations and individuals involved in ecological monitoring in Canada to better detect, describe, and report on ecosystem changes. The network is a cooperative partnership of federal, provincial and municipal governments, academic institutions, aboriginal communities and organizations, industry, environmental nongovernmental organizations, volunteer community groups, elementary and secondary schools and other groups/individuals involved in ecological monitoring.

Environment Canada's Ecological Monitoring and Assessment Network (EMAN) Coordinating Office is mandated to work collaboratively with the EMAN partners in improving the effectiveness of ecosystem monitoring to ensure informed decision-making and to create environmental awareness among Canadians. The EMAN CO has been combined with the Indicators group of the State of Environment Reporting Branch. The new Indicators, Monitoring and Assessment Branch (IMAB) will play a coordinating and facilitating role in the generation of data, the use of standard indicators, and in the production of issue or area related assessments. The assessments will provide a report to the Canadian people and decision-makers on the ecological condition of Canada.

The overall operating objective of IMAB is to promote the gathering and use of scientific information for the policy and management decision-making processes, and to provide a better link between the policy requirements and the scientific community.

<http://www.eman-rese.ca/eman/>

5.3. Canadian Aquatic Biomonitoring Network

CABIN is a collaborative programme developed and maintained by Environment Canada to establish a network of reference sites available to all users interested in assessing the biological health of fresh water in Canada. The initial focus of the CABIN network is the use of benthic invertebrate communities in ecological assessment. A critical part of this programme is the establishment of a standard set of protocols and methods for the various phases of data collection and processing.

http://cabin.cciw.ca/Main/cabin_about.asp

5.4. Environmental Effects Monitoring (EEM) (Environment Canada)

The National Environmental Effects Monitoring (EEM) Office of the **Public and Resources Sectors Directorate, Environment Canada**, promotes environmental effects monitoring as an assessment, regulatory and decision-making tool to protect aquatic ecosystems. The National EEM Office:

- Coordinates delivery of regulated EEM programs for the pulp and paper and metal mining sectors under the *Canadian Fisheries Act*;
- Works with research scientists to ensure that the EEM program evolves in step with advances in research on monitoring and assessment techniques;
- Analyzes and interprets EEM data at a national level and communicates results to stakeholders;
- Develops, updates and maintains EEM databases, electronic reporting systems and website;
- Provides opportunities for stakeholder discussions on EEM;
- Addresses stakeholder concerns in a national context;
- Develops tools to implement the program in a cost-effective and nationally consistent manner;
- Develops guidance documents for EEM practitioners; and
- Develops environmental quality objective frameworks for assessment of impacts of other sectors such as aquaculture and municipal wastewater.

<http://www.ec.gc.ca/eem/>

<http://www.ec.gc.ca/esee-eem/default.asp?lang=En&n=4CDB9968-1>

6. REGIONAL INITIATIVES IN CANADA

6.1. *Ecosystem Initiatives*

Ecosystem initiatives respond to the unique problems of targeted areas and communities and address environmental, economic, and social concerns. They are characterized by a number of principles, including :

- an ecosystem approach — recognizing the interrelationships between land, air, water, wildlife, and human activities;
- decisions based on sound science — including natural and social sciences combined with local and traditional knowledge;
- federal–provincial–territorial partnerships — governments working together to achieve the highest level of environmental quality for all Canadians;
- a citizen/community base — working with individuals, communities, Aboriginal peoples, industry, and governments in the design and implementation of initiatives;
- pollution prevention — promoting a precautionary approach.

Environment Canada works with a broad spectrum of partners to achieve environmental results and sustainable development. Through ecosystem initiatives, Environment Canada is able to address priority areas and issues of concern — ensuring that Canadians have clean air and water, protecting and conserving nature, and taking action on climate change.

<http://www.ec.gc.ca/ecosyst/backgrounder.html>

6.2. *St. Lawrence Action Plan (SLAP)*

After 15 years of action and collaboration to protect, conserve and enhance the St Lawrence River, the governments of Canada and Québec and their partners are moving toward developing an increasingly integrated management approach.

Objective: Contribute to a sustainable development that promotes ecological integrity, environmentally responsible economic activities, community commitment and informed, concerted and integrated governance of the St. Lawrence.

http://www.slv2000.qc.ca/index_f.htm

6.3. *Great Lakes Action Plan*

The Great Lakes comprise the world's largest freshwater ecosystem. Programs by the federal government and the province of Ontario involve working in close partnerships with community organizations, individual citizens, industry groups, academics, and municipal governments to improve the ecosystem by restoring degraded areas, reducing and preventing pollution, and

protecting human and ecosystem health. Since, the Great Lakes are a shared ecosystem between Canada and the United States, a successful partnership has been essential to deal with binational problems. <http://www.on.ec.gc.ca/greatlakes/>

Great Lakes projects and programs

- Great Lakes Water Quality Surveillance Program
<http://www.on.ec.gc.ca/monitoring/water-quality/greatlakes-e.html>
- Ontario Region Information System for the Environment (ORISE)
<http://www.on.ec.gc.ca/ORISE/orise.html?Lang=e>
- Water quality monitoring on the Interconnecting Channels Tributary Track-down Program
<http://www.on.ec.gc.ca/monitoring/water-quality/intro-e.html>
- Acid Rain Biomonitoring
<http://www.on.ec.gc.ca/wildlife/acidrain/ar-intro-e.html>
- Integrated Atmospheric Deposition Network (IADN) – Air and precipitation monitoring in the Great Lakes : The Integrated Atmospheric Deposition Network (IADN) is a system of monitoring stations created under the Canada-US Great Lakes Water Quality Agreement and delivered jointly by Environment Canada and the US EPA (see also 5.6 in US section). Its purpose is to identify and track airborne toxic substances and their sources and to define trends in atmospheric deposition to the lakes. The stations yield data on wet and dry deposition, and gas exchange of pesticides, metals, combustion products and industrial chemicals. The IADN determines the atmospheric loadings of toxic substances to the Great Lakes system and defines temporal (1990 to present) and spatial trends. With one master station on each of the five Great Lakes and 10 additional satellite stations, IADN currently monitors the atmospheric deposition of PAHs (including benzo[a]pyrene), PCBs, Level 1 pesticides, and HCB, among other toxic chemicals (including chemicals of emerging concern). The goals of IADN are not only to determine atmospheric loadings and trends of priority toxic chemicals to the Great Lakes, and to acquire air and precipitation measurements, but also to help determine sources of the toxic chemicals monitored.
http://www.msc-smc.ec.gc.ca/iadn/overview/index_e.html
<http://www.msc-smc.ec.gc.ca/iadn/>
<http://www.epa.gov/glnpo/monitoring/air2/index.html>
- Atmospheric Hazard Website
<http://www.hazards.ca/>
- Binational Toxics Strategy
http://www.on.ec.gc.ca/laws/tenth-ijc-response/toxics_strategy-e.html
- Contaminants in Herring Gull eggs from the Great Lakes: Changes in the concentrations of four selected organochlorine compounds found in Herring Gull eggs between 1971 and 1995 has been documented as well as the biological effects associated with these chemicals which have been observed in both Herring Gulls and other fish-eating

waterbirds living on the Great Lakes. Two of the compounds reported originally entered the environment as organochlorine pesticides: dieldrin and dichlorodiphenyldichloroethylene (DDE), which is the stable breakdown product of the pesticide dichlorodiphenyltrichloroethane (DDT). The other two compounds discussed are a polychlorinated biphenyl (PCB) and a dioxin known as 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD).

http://www.on.ec.gc.ca/wildlife/factsheets/fs_herring_gulls-e.html

- Great Lakes Fish Contaminants Surveillance Program
This is a basin wide long-term monitoring program, which provides data on contaminant burdens in Great Lakes fish and the forage base. The data are analyzed to provide information on spatial and temporal trends in contaminant burdens but also shifts in contaminant dynamics and pathways for various Great Lakes food webs. There are also concurrent fish community measurements of contaminant stress indicators.
<http://binational.on.ec.gc.ca/bec/ViewRecord.cfm?CFID=19404111&CFTOKEN=21214e67aa11ec82-55B0F807-BCD9-DDBE-F576AF732F26E3F1>
- Fish and Wildlife Health Effects and Exposure Study: Environment Canada initiated this study in 2001. The goal of this systematic assessment in Canadian Areas of Concerns (AOCs) is to determine if there are fish and wildlife health effects, similar to those reported for the human population, that are associated with contaminants in the aquatic environment. Phase I (2001–2005) of the study investigates conditions in the Canadian AOCs of the lower Great Lakes. Upon completion, the need for assessments at AOCs in the upper Great Lakes will be determined.
<http://www.cws-scf.ec.gc.ca/theme.cfm?lang=e&category=14>
http://www.on.ec.gc.ca/wildlife/factsheets/fs_fish_and_wildlife-e.html

As part of the federal government's Long Range Transport of Air Pollutants (LRTAP) Program, the Canadian Wildlife Service (CWS) initiated a research program in 1980 to assess the impacts of acid rain on wildlife and their habitats in eastern Canada. Its objectives were to determine which species and habitats were most at risk from acidification, and to establish cause-and-effect relationships between acid rain and biological changes, chiefly in bird communities. Various LRTAP Project and Information Holdings for Biomonitoring and Research Programs, contained in WILDSPACE™, are listed below and linked to metadata descriptions:

- [LRTAP Biomonitoring Database: Algoma and Muskoka Regional Long Term Monitoring](#)
- [LRTAP Biomonitoring Database: Food Chain Monitoring Program](#)
- [LRTAP Biomonitoring Database: Sudbury Regional Waterfowl Monitoring](#)
- [LRTAP Biomonitoring Database: Sudbury Short Term Recovery Study](#)
- [LRTAP Research Database: Aquatic Food Chain Research](#)
- [LRTAP Research Database: Cavity-nesting Waterfowl Reproduction](#)
- [LRTAP Research Database: Waterfowl Diet and Condition](#)
- [LRTAP Research Database: Waterfowl Distribution and Habitat Use](#)

- [LRTAP Research Database: Wetland-dwelling Wildlife](#)
- [LRTAP Scientific Publications Database](#)
- [LRTAP Wildlife and Habitat Slide Collection](#)

6.4. Federal Water Quality Monitoring (EC), Pacific and Yukon Region

The Federal Water Quality Monitoring Program in the Pacific and Yukon Region currently consists of eleven long-term ambient water quality monitoring stations on rivers in British Columbia, and seven stations on rivers in the Yukon Territory. These stations are primarily operated on rivers of federal interest (e.g., transboundary, national parks, major fisheries).

Most sites are sampled every two weeks for a range of water quality variables, including trace metals, nutrients, major ions, fecal coliforms, and other parameters of site-specific importance. Samples are collected by contractors, or by Environment Canada or Parks Canada staff. Although the program is primarily designed to detect long-term changes in water quality (i.e., trend assessment), the data are used for a variety of other purposes. The information is used for watershed and water resource planning initiatives, the formulation of water quality guidelines and objectives, environmental assessments, the determination of and reporting on the state of water quality and ecosystem health, the assessment of compliance with existing guidelines and objectives and subsequent evaluation of the effectiveness of policies and programs affecting watershed uses, the calculation of loadings of contaminants to the environment, and the detection of emerging issues.

<http://www.waterquality.ec.gc.ca/EN/navigation/3188/3191/3206.htm>

<http://www.waterquality.ec.gc.ca/EN/navigation/search.htm>

6.5. Georgia Basin Action Plan, British Columbia

The Georgia Basin Action Plan (GBAP) is a multi-partnered initiative working to improve sustainability in the Georgia Basin. GBAP began as the Georgia Basin Ecosystem Initiative, a five-year program, in 1998. This program was renewed as GBAP in 2003 and is now expected to conclude in 2010.

The GBAP partnership has undertaken many projects ranging from research studies, planning initiatives, monitoring, outreach and education.

http://www.pyr.ec.gc.ca/georgiabasin/Index_e.htm

6.6. Contaminants in Sport fish in Ontario

The Guide to Eating Ontario Sport Fish is published every other year by the Ministry of the Environment in co-operation with the Ministry of Natural Resources. Staff at the Ministry of Natural Resources and Ministry of the Environment collect fish which are analyzed at the

Ministry of the Environment laboratory in Toronto. The fish are analyzed for a variety of substances, including mercury, PCBs, mirex, DDT and dioxins. The results are used to develop the tables in the Guide, which give size-specific consumption advice for each species tested from each location. This advice is based on health protection guidelines developed by Health Canada.

The Sport Fish Contaminant Monitoring Program, which started in 1976, is the largest testing and advisory program of its kind in North America. Fish have been tested from approximately 1,700 locations in Ontario's inland lakes and rivers and Great Lakes. Between 4,000 and 6,000 fish per year are tested through the program.

<http://www.ene.gov.on.ca/envision/guide/index.htm>

<http://www.ene.gov.on.ca/en/water/fishguide/index.php>

<http://www.ene.gov.on.ca/publications/590b14.pdf>

6.7. Arctic Council's Arctic Monitoring and Assessment Programme (AMAP)

The **Arctic Monitoring and Assessment Programme** is one of six Working Groups of the [Arctic Council](#).

The primary function of AMAP is to advise the governments of the eight Arctic circumpolar countries (Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden and the United States) on matters relating to threats to the Arctic region from pollution, and associated issues.

AMAP was originally established in 1991 to implement parts of the [Arctic Environmental Protection Strategy](#) (AEPS). It was requested by Ministers of the eight Arctic countries to:

"provide reliable and sufficient information on the status of, and threats to, the Arctic environment, and to provide scientific advice on actions to be taken in order to support Arctic governments in their efforts to take remedial and preventive actions relating to contaminants."

AMAP is responsible for:

"measuring the levels, and assessing the effects of anthropogenic pollutants in all compartments of the Arctic environment, including humans; documenting trends of pollution; documenting sources and pathways of pollutants; examining the impact of pollution on Arctic flora and fauna, especially those used by indigenous people; reporting on the state of the Arctic environment; and giving advice to Ministers on priority actions needed to improve the Arctic condition."

AMAP has produced a series of high-quality scientifically-based [assessments](#) of the pollution status of the Arctic. The AMAP assessment reports (both the popular readable versions and detailed scientific background documents) are available as electronic documents elsewhere on this website. The AMAP assessments are the result of cooperative efforts involving a large number of scientists, indigenous peoples' representatives, and representatives of the Arctic countries and AMAP observing countries and organizations. These assessments have provided a basis for development of the **Arctic Monitoring Action Plan** (AMAP).

AMAP's assessments are based to a large extent on information and results from recent (largely unpublished) monitoring and research work. Data from such activities are compiled together with routine monitoring data within AMAP Thematic Data Centres (TDCs). Data are made available from the TDCs to scientists engaged in AMAP assessments under strict conditions that protect the rights of data originators. These conditions are described in **AMAP's Data Policy** documentation. Consideration of quality assurance issues is an integral component of the AMAP monitoring and assessment process.

<http://www.amap.no/>

6.8. Northern Contaminants Program (NCP)

The NCP determines temporal and spatial trends of contaminants in the Arctic ecosystem and its peoples. Purpose is to develop a sound scientific basis for international action to reduce the input of pollutants (e.g., POPs, heavy metals) from distant sources. The results of NCP research and monitoring activities are the main Canadian contribution to the Arctic Council's AMAP, and also support the North American Regional Action Plan on Monitoring and Assessment.

http://www.ainc-inac.gc.ca/ncp/index_e.html

7. INDEX AND INDICATORS

7.1. Canadian Environmental Sustainability Indicators (CESI)

In 2004 the Government of Canada committed to establishing national indicators of freshwater quality, air quality and greenhouse gas emissions. The goal of these new indicators is to provide Canadians with more regular and reliable information on the state of their environment and how it is linked with human activities. Environment Canada, Statistics Canada and Health Canada are working together to develop and communicate these indicators. Reflecting the joint responsibility for environmental management in Canada, this effort has benefited from the co-operation and input of the provinces and territories.

The indicators in this first annual report are as follows:

The **freshwater quality indicator** reports the status of surface water quality at selected monitoring sites across the country. For this first report, the focus of the indicator is on the protection of aquatic life, such as plants, invertebrates and fish.

The **air quality indicator** tracks Canadians' exposure to ground-level ozone—a key component of smog and one of the most common and harmful air pollutants to which people are exposed.

The **greenhouse gas emissions indicator** tracks the annual releases of the six greenhouse gases that are the major contributors to climate change. The indicator comes directly from the greenhouse gas inventory report prepared by Environment Canada for the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

7.2. Air Quality Index (EC)

Provides a common scale for integrating individual pollutant concentrations by relating each pollutant measured to its corresponding National Ambient Air Quality Objectives (NAAQO).

An air quality forecast, issued daily, is a one to two day prediction of air quality conditions. The air quality is expressed using the [Air Quality Index \(AQI\)](#). The air quality forecasting program works as a partnership between Environment Canada and the provinces.

AQI provides information on the adverse effects of the more common air pollutants. It is designed to identify the worst effects that may result from the mixture of pollutants currently being measured and to describe the prevailing air quality.

Air Quality advisories are issued when the air pollution levels exceed national standards. They are issued in partnership with provincial and municipal environment and health authorities and contain advice on action that can be taken to protect the health of Canadians and the environment.

<http://airnow.gov/>

http://www.msc-smc.ec.gc.ca/aq_smog/index_e.cfm

7.3. Proposed Health-Based Air Quality Indicator (HC/EC)

The Federal/Provincial/Territorial Joint Health and Environment Deputy Ministers Meeting proposed making a direct link between air quality and health by measuring improvements in population health based on reductions in ambient air fine particulate matter over time. This would be based on methodology used in a number of epidemiological studies.

http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/air_quality_e.html

7.4. NRTEE Air Quality Indicators

As part of their Environment and Sustainable Development Indicators (ESDI) initiative, the National Round Table on the Environment and the Economy (NRTEE) is developing a range of air quality indicators, e.g., population exposure to air pollutants, emissions of oxides of sulfur and of nitrogen, and total greenhouse gas emissions.

<http://www.nrtee-trnee.ca/eng/publications/sustainable-development-indicators/index-sustainable-development-indicators-eng.htm>

7.5. National Environmental Indicator Series (EC)

These environmental indicators are based on selected key statistics that summarize a significant aspect of the state of the environment, natural resource sustainability, and related human activities. They include indicators on urban air pollution (e.g., average levels of specific air

pollutants in Canadian cities); acid rain (e.g., emissions of sulfur dioxide and wet sulfate deposition); and stratospheric ozone depletion. Detailed lists of areas are summarized below

Ecological Life-support Systems

1. [Biodiversity and protected areas](#)
2. [Toxic substances](#)
3. [Acid rain](#)
4. [Climate change](#)
5. [Stratospheric ozone](#)

Human Health and Well-being

1. [Municipal water use](#)
2. [Municipal wastewater treatment](#)
3. [Urban air quality](#)

Natural Resources Sustainability

1. [Forestry](#)
2. [Agricultural soils](#)

Human Activities

1. [Energy consumption](#)
2. [Passenger transportation](#)
3. [Municipal solid waste](#)

http://www.ec.gc.ca/soer-ree/English/Indicator_series/default.cfm#pic

7.6. Environmental Public Health Indicators (EPHI) (HC, EC, CIHI)

In January 2000, a group of Environment Canada (EC) and Health Canada (HC) officials and the Canadian Institute for Health Information (CIHI), met to assess the need and potential for developing a framework and set of environmental public health indicators for use in Canada.

That meeting decided to move forward on this work, beginning with collaboration between the federal environment and health departments. A Steering Committee was created, chaired by the Policy Research Directorate, Environment Canada and the Environmental Health Directorate, Health Canada, to embark on a project to determine a set of core indicators that link environmental factors to health outcomes. A Working Group was created to prepare the present framework paper with a view to holding an expert workshop on this topic in October 2001.

<http://www.unece.org/stats/documents/2001/10/env/wp.24.e.pdf>

7.7. Environmental Health Indicators (EHIs) (HC, EC)

A general overview, including definitions of EHIs, how they are developed, criteria for selection, uses, benefits, and examples (e.g., air quality-health link). Article in Health Policy Research Bulletin; published in October 2002.

<http://www.hc-sc.gc.ca/sr-sr/pubs/hpr-rpms/bull/2002-4-environ/intro-eng.php>

7.8. G8 Children's Environmental Health Indicators Initiative

At their meeting in Banff in April 2002, G8 Environment Ministers agreed to collectively advance work on the development of children's environmental health indicators (EHIs) as a means for monitoring progress, in consultation with relevant multilateral organizations.

<http://www.hc-sc.gc.ca/sr-sr/finance/hprp-prpms/results-resultats/2006-armstrong-eng.php>

B. INDEX OF FEDERAL DATA SOURCES

1. DATABASES

1.1. National Contaminants Information System (NCIS) (Fisheries and Oceans Canada)

Purpose of Database

Secures data on waterborne contaminants for Fisheries and Oceans Canada, in support of the *Fisheries Act*, the *Oceans Act* and the Canadian Environmental Assessment Agency. The National Contaminants Information System was begun as part of the Department's Green Plan.

Content

The NCIS is a computerized warehouse of information on toxic chemicals in fish, other aquatic life and their habitats. It was built to help manage the growing base of data and information.

Environmental data on water quality (other than drinking water); contaminants in water, sediment, and organisms. Also information on domestic, industrial and farm pesticides.

Occupational data on solvents, chemicals, pesticides, heavy metals, and hydrocarbons, as they affect occupational health.

Data elements: analysis method, storage method, treatments, date sampled, area sampled, date analyzed, and the name of the data producer and who took the measurements. The database size is approximately 100 MB per region (seven regions in all), with about three million measurements (with some metadata being considered a measurement). *Geolocators*: postal code; province; geo-coordinates.

Year Database Established 1995

Coverage Period 1970 to 2000

Data Updates Irregularly; the database is updated as new information becomes available.

Data Provider Not specified

Data Availability

Access to the data is restricted; requests for access must be approved by a regional data manager of the Marine Environmental Data Service, Fisheries and Oceans Canada.

Reports

For more information about the NCIS including a description of how the system works, questions that it is intended to answer and contacts:

- [Brochures](#)
- [Definitions](#)
- [Regional Information](#)
- [Data Manager Private Web Site](#)

http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/inventory-repertoire/ncis_e.html

1.2. Marine Environmental Data Services, Integrated Science Data Management (ISDM) (Fisheries and Oceans Canada)

Integrated Science Data Management (ISDM) is a branch of Canada's Federal Department of Fisheries and Oceans (DFO).

ISDM's mandate is to manage and archive ocean data collected by DFO, or acquired through national and international programmes conducted in ocean areas adjacent to Canada, and to disseminate data, data products, and services to the marine community in accordance with the policies of the department.

ISDM is a member of the UNESCO's International Oceanographic Data and Information Exchange ([IODE](#)) whose mission is to enhance marine research, exploitation and development by facilitating the exchange of oceanographic data and information between participating Member States and by meeting the needs of users for data and information products.

http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Databases/Data_e.htm

1.3. Geochemical Database (SMGV1Published) (Geological Survey of Canada)

Purpose of Database

The purpose is to collect and preserve geochemical and geoscientific data which may, over time, become otherwise irretrievable; with the goal of improving management of and access to these data in order to further the understanding of geology and geological processes.

Content

Geological and geochemical data on all collected samples (e.g., minerals, heavy metals, radioactive geological samples). Data are national and provincial (Saskatchewan, Manitoba, and Nova Scotia). *Data types*: metals; ionizing radiation. All analytical chemical testing results (e.g., both high and low values) and metadata are stored in the database. Where contamination of material may have taken place, the values received are entered but flagged to show contamination and to indicate that the numbers are not reliable. *Geolocators*: geo-coordinates.

All collected data are entered for all the samples that have been gathered. Metadata for each sample are maintained, as are the analytical results from chemical testing. As both the high values and the low values have significance in the field of geology, all analytical results are recorded.

Year Database Established 2000

Coverage Period 1998 to 1999

Data Updates Irregularly

Data Providers

This is a distributed data system that uses a common data model; data are supplied by a variety of providers but they are all the collectors of the information, including Saskatchewan Energy and Mines, Manitoba Energy and Mines, and Nova Scotia Natural Resources.

Data Availability

The primary users of the data are geochemists, exploration companies, prospectors and geoscientific researchers. There are protocols restricting access to the database; guests have only specified permissions under SQL server protocols, and other access is limited to the development team. Restrictions on disclosure and use of the data: a user agreement and business rules to release only published data are the main restrictions. Some data are available to the public and can be accessed via the website.

There are data-sharing agreements between geoscientific departments in Nova Scotia, Saskatchewan, and Manitoba; along with the Canadian Geoscience Knowledge Network (federal-provincial-territorial agency). See the [Geoscience Data Repository](#).

Reports

Geoserv is produced in electronic format and is available at:
<http://www.Geochemiatest.cgkn.net>

Additional Comments

Documentation on the database is available in printed and electronic formats.

http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/inventory-repertoire/geochemical_e.html

1.4. Arctic Contaminants Database (Health Canada)

Purpose of Database

To monitor tissue (blood, breast milk) levels of environmental contaminants in Arctic human populations.

Content

Data on environmental contaminants in tissues of arctic residents. *Data types*: biomonitoring; toxicological; blood and breast milk concentrations of contaminants (e.g., organochlorine pesticides, PCBs, lead, mercury, cadmium). *Data elements*: geographic location in Arctic Canada; year; demographic breakdown, e.g., age, sex, ethnic group (Inuit, Dene/Metís, Caucasian, Other).

Geolocators: Arctic region: NWT (including Inuvik), Nunavut (Baffin, Kitikmeot, Kivalliq), Yukon, northern Labrador, and Nunavik (northern Quebec). *Personal data*: ethnic group, gender, birth date.

Frequency of Data Updates

Variable (every three to five years)

Data Availability

Data are available to Arctic communities and authorized personnel at Health Canada and the Dept of Indian Affairs and Northern Development (guidelines on access are in place). Data can be made available to researchers in the eight circumpolar countries; policy-makers (e.g., Council of Arctic Ministers); the Secretariat of the Arctic Monitoring and Assessment Program (AMAP) (Copenhagen, Denmark). Contact: Jay Van Oostdam, Health Canada, tel: (613) 941-3570.

Data Provider

Provincial and territorial governments in the NWT, Nunavut, the Yukon, and Quebec; Aboriginal groups and associations.

Reports

Published reports which include data contained in the Arctic Contaminants Database:

1) Canadian Arctic Contaminants Assessment Report (1997, 2002) in printed format; disseminated to Northern aboriginal communities, Territorial governments, Dept of Indian Affairs and Northern Development, Health Canada, Tapirisat, and the Centre for Indigenous Peoples Nutrition and Environment.

2) Arctic Monitoring and Assessment Report (AMAP): Human Health chapter (1998, 2002). Disseminated to the eight circumpolar nations: Canada, the United States (Alaska), Russia, Finland, Sweden, Norway, Greenland (Denmark), Iceland; the Council of Arctic Ministers; and the Office of Sustainable Development, Health Canada.

Additional Comments

Data are categorized by Arctic region, ethnic group, and year, but sample sizes vary from year to year. Also, data for any particular region or ethnic group are not necessarily updated at the same

time as those for other regions or groups. Data are generated through various studies that may examine a specific region in a specific year.

Year Database Established 1996

Coverage Period 1994 to 2001

http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/inventory-repertoire/arcticdb_e.html

1.5. Canadian Childhood Cancer Surveillance and Control Program: Etiology Surveillance System (Health Canada)

Purpose of Database

Data are collected and analyzed to investigate factors that may increase the risk of children developing cancer, using a case-control design. The current data collection is for diagnosis of acute lymphocytic leukemia and brain tumours for individual cases. Subsequent analysis of risk factors will provide Health Canada with an ongoing evidence-based approach to risk management policy and control strategies.

Content

Case-control data on risk factors for and the diagnosis of childhood cancer (currently acute lymphocytic leukemia and brain tumours). *Data types*: demographic, risk factors, and case studies.

Data Providers Health Canada, and the Quebec Ministry of Health and Social Services.

Year Database Established 1997

Coverage Period 1994 to 1995

Data Provider Health Canada

Data Availability Not applicable

Reports Not specified

http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/inventory-repertoire/etiology_e.html

1.6. Environmental Cancer Risk Surveillance System (Health Canada)

Purpose of Database

Stores data used to assess the risk of cancer from environment-related factors, and monitors known environmental risk factors. The goal is to establish a nationwide, population-based cancer risk assessment surveillance system and to ensure effective use of the data by providing national,

provincial, and community-level information on cancer determinants. This information supports the development of policies (e.g., standards) and the implementation of recommended preventive measures.

Content

Data on environmental risk factors for cancer (e.g., chlorination byproducts); environmentally induced cancers; and cancer risk assessment. *Data types:* environmental, epidemiological, clinical, and behavioral risk factors.

Coverage Period 1995/1996 to 1996/1997

Data Updates Quarterly

Data Providers

Provincial cancer registries provide case-control data; the Environmental Quality Database (Centre for Chronic Disease Prevention and Control, Health Canada) generates information on individual environmental, lifestyle, and behavioral risk factors. Additional environmental data are derived from public sources (e.g., Environment Canada's National Pollutant Release Inventory and the US Environmental Protection Agency).

Data Availability Not applicable

Reports

Reports can be provided to local public health officials alerting them of potential "hot spots," or presenting them with data derived from residential information linked to environmental databases containing survey data on community air and water quality; and which indicate links to cancer risk. Information derived from this database may also be used in articles appearing in periodical literature.

http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/inventory-repertoire/cancerrisk_e.html

1.7. Global Public Health Intelligence Network (GPHIN) (Health Canada)

What is the Global Public Health Intelligence Network (GPHIN)?

GPHIN is a secure, Internet-based "early warning" system that gathers preliminary reports of public health significance in seven languages on a real-time, 24/7 basis.

This unique, multilingual system gathers and disseminates relevant information on disease outbreaks and other public health events by monitoring global media sources such as news wires and websites. The information is filtered for relevancy by an automated process and then analyzed by Public Health Agency of Canada GPHIN officials. The output is categorized and

made accessible to users. Notifications about public health events that may have serious public health consequences are immediately forwarded to users.

What types of surveillance does GPHIN conduct?

GPHIN has a broad scope. It tracks topics such as disease outbreaks, infectious diseases, contaminated food and water, bio-terrorism and exposure to chemical and radio-nuclear agents, and natural disasters. It also monitors issues related to the safety of products, drugs and medical devices.

<http://www.phac-aspc.gc.ca/gphin/index.html>

1.8. Hedgehog Environmental Reporting System (HERS) (Health Canada)

Purpose of Database

The purpose of this national database is to develop a system to capture environmental information on facilities in First Nations communities. This will include various aspects of environmental health (see below). The system will also have the capacity to produce reports by the environmental health officers in the field.

Content

National data on indoor and outdoor air quality, drinking water quality, other water quality, soil contaminants, food contaminants, housing conditions in First Nations communities, and sanitation in food establishments and public buildings. *Personal data*: individuals' names, telephone numbers, addresses. *Geolocator*: address.

Year Database Established Not specified

Coverage Period Not specified

Data Updates Annually

Data Provider Not specified

Data Availability

Main users of the data are environmental health officers, regional environmental health managers, and senior and assistant advisors at headquarters. There are security protocols restricting access to this database (e.g., a password is needed). There are no protocols or guidelines restricting the use or disclosure of the data.

Reports Not applicable

Additional Comments

In the future, this database will link/interface with information in the First Nations Health Information System (FNHIS).

Documentation on the database is available in paper format.

http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/inventory-repertoire/hers_e.html

1.9. Human Activity and the Environment (Statistics Canada)

Annual report by Statistics Canada that provides updated tables and highlights on population, economic activities and the environment.

- Climate change in Canada <http://www.statcan.ca/english/ads/16-201-XPE/index.htm>
- Transportation in Canada: <http://www.statcan.ca/bsolc/english/bsolc?catno=16-201-X&CHROPG=1#y2005>
- Solid Waste in [HAE 2005](#)
- Energy with [HAE 2004](#)
- Fresh Water Resources [HAE 2003](#)
- Air Quality with [HAE 2002](#)

1.10. Econnections (Statistics Canada)

Econnections is an information system from Statistics Canada that provides indicators that track the economy and environmentally sustainable development: natural resource stocks, land use, waste production and consumptions of materials and energy, and expenditures for environmental protection.

<http://www.statcan.ca/english/ads/16-200-XKE/index.htm>

1.11. EnviroStats (Statistics Canada)

This is a quarterly information bulletin from Statistics Canada, featuring special articles and regular publication of indicators.

<http://www.statcan.ca/bsolc/english/bsolc?catno=16-002-X&CHROPG=1>

1.12. Geo Connections (Statistics Canada)

GeoConnections helps decision-makers use online location-based (or "geospatial") information, such as maps and satellite images, to tackle some of Canada's most pressing challenges. The program focuses on working with partners in public health, public safety and security, the environment and sustainable development, Aboriginal matters, and geomatics technology development.

<http://www.geoconnections.ca/CGDI.cfm>

1.13. Canadian Council on Ecological Areas (CCEA) (Multi-Regional Agencies)

The CCEA (Canadian Council on Ecological Areas) jurisdictional representatives now consider the database out-of-date as their time over the past few years has been spent working on a new database. The new database, nominally called CARTS (Conservation Areas Reporting and Tracking System - <http://ccea.org/carts.html>), is expected to become available as a web mapping service later in 2008. For the time being, in order to access their data, please contact the protected areas officers from individual jurisdictions as found on the following website:

<http://ccea.org/jurrep.html>

<http://geodiscover.cgdi.ca/gdp/search?action=entrySummary&entryType=productCollection&entryId=3736&entryLang=en>

1.14. CORE Network Database (NAtChem/CORE Network Database) (Environment Canada)

The National Atmospheric Chemistry Database (NAtChem) is a data archiving and analysis facility operated by the Meteorological Service of Canada.

The purpose of the NAtChem database is to enhance atmospheric research through the archival and analysis of North American air and precipitation chemistry data. Such research includes investigations into the chemical nature of the atmosphere, atmospheric processes, spatial and temporal patterns, source-receptor relationships and long-range transport of air pollutants.

The NAtChem Database contains air and precipitation chemistry data from many major regional-scale networks in North America. To contribute to NAtChem, networks must operate for a period of at least two years, must have wide area coverage, and must have regionally-representative sites (rural and background).

The NAtChem Database consists of four smaller databases:

- [The NAtChem Particulate Matter Database \(NAtChem/PM\)](#)-follow the link for atmospheric particulate matter and related trace gas data and results
- [The NAtChem Precipitation Chemistry Database \(NAtChem/Precip\)](#)-follow the link for precipitation chemistry data and results
- [The NAtChem Air Toxics Database \(NAtChem/Toxics\)](#) - follow the link for atmospheric toxic substances data and results
- [The NAtChem CORE Database \(NAtChem/CORE\)](#) - follow the link for atmospheric data and results at CORE sites

http://www.msc.ec.gc.ca/natchem/index_e.html

2. EMISSIONS INVENTORIES

2.1. *National Pollutant Release Inventory (NPRI) (Environment Canada)*

What is the National Pollutant Release Inventory?

The National Pollutant Release Inventory (NPRI) provides Canadians with access to information on the releases and transfers of key pollutants in their communities. It is the only national, legislated, publicly accessible inventory of its kind in Canada.

NPRI is a major starting point for identifying and monitoring sources of pollution in Canada. It is an important consideration in managing risks to the environment and human health as well as in monitoring indicators for the quality of our air, land, and water. It is also emerging as an indicator for corporate environmental performance.

Who reports to NPRI?

Only facilities that meet established reporting criteria are required to report to NPRI. Pollutants from mobile sources such as trucks and cars, households, facilities that release pollutants on a smaller scale and certain sectoral activities, such as agriculture and education and some mining activities, are not included in NPRI but are reported under a separate program.

Are companies legally required to report to the NPRI?

Established in 1992 and legislated under the *Canadian Environmental Protection Act, 1999* (CEPA 1999), NPRI requires companies to report information on releases and transfers of pollutants to the Government of Canada on an annual basis. Environment Canada makes the information available to Canadians in an annual public report, and maintains a detailed inventory that can be accessed and searched through an online database. Criteria describing limits for reporting are provided for subscribers.

CEPA 1999 is designed to protect the environment and human health and to promote sustainable development. It contains information-gathering provisions, including some that allow the Ministers of Health and of the Environment to request information on certain substances. The provisions also require the Ministers to establish and publish a national inventory of releases of pollutants. These provisions under CEPA 1999 form the primary legislative basis for NPRI. For more information, browse the [fact sheet](#) on the NPRI and CEPA 1999.

Related Links

- [Alphabetical Listing of NPRI Substances for 2006](#)
- [Reporting Thresholds for 2006 NPRI Substances](#)
- [Contact the NPRI national and regional offices](#)

- Other environment Canada Inventories:
- [National Greenhouse Gas Emissions inventory](#)
- [Criteria Air Contaminants Inventory \(CAC\)](#)

http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm

MEXICO: NATIONAL AND REGIONAL MONITORING INITIATIVES

GLOSSARY OF ACRONYMS, MEXICO

Cenam	<i>Centro Nacional de Metrología</i> (National Centre for Metrology)
Conacyt	<i>Consejo Nacional de Ciencia y Tecnología</i> (National Science and Technology Council)
Conagua	<i>Comisión Nacional del Agua</i> (National Water Commission)
DGGIMAR	<i>Dirección General de Gestión Integral de Materiales y Actividades Riesgosas</i> (Materials and Risks Integral Management Office)
IMS	Internet Map Service
INE	<i>Instituto Nacional de Ecología</i> (National Institute of Ecology)
INEGI	<i>Instituto Nacional de Estadística, Geografía e Informática</i> (National Institute of Geographical Statistics and Informatics)
INSP	<i>Instituto Nacional de Salud Pública</i> (National Institute of Public Health)
LAN	Mexico's national water law
CEC	Commission for Environmental Cooperation of North America
OGC	Open Geospatial Consortium
PAH	Polycyclic aromatic hydrocarbons
PAHO	Pan American Health Organization
PBTS	Persistent, bioaccumulative, and toxic substances
PEMEX	Mexican Oil Company
PNMA	<i>Programa Nacional de Monitoreo Atmosférico</i> (National Atmospheric Monitoring Program)
Profepa	<i>Procuraduría Federal de Protección al Ambiente</i> (Federal Attorney for Environmental Protection)
RAISON	Regional Analysis by Intelligent Systems ON computers
Ramamor	<i>Red piloto de Monitoreo Atmosférico del Estado de Morelos</i> (Atmospheric Monitoring Program of the State of Morelos)
Redda	Atmospheric Deposition Network
RNM	National Monitoring Network
SSA	<i>Secretaría del Salud</i> (Ministry of Health)
Semarnat	<i>Secretaría de Medio Ambiente y Recursos Naturales</i> (Secretariat Environment and Natural Resources)
Sagarpa	<i>Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación</i> (Secretariat of Agriculture, Stockbreeding, Rural Development, Fisheries and Food)
SEMA	<i>Sistema Estatal de Monitoreo Ambiental del Gobierno del Estado de Puebla</i> (Atmospheric Monitoring Network of Puebla)
Simat	<i>Sistema de Monitoreo Atmosférico</i> (Atmospheric Monitoring System for the City of Mexico)
Sinaica	<i>Sistema Nacional de Información de la Calidad del Aire</i> (National Air Quality Information System)
UNEP	United Nations Environment Program

A. SURVEILLANCE AND MONITORING ACTIVITIES IN MEXICO

In Mexico, routine national monitoring programs of persistent, bioaccumulative, and toxic substances (PBTS) are not apparent, or are only sporadic and chemical-specific at best. Consequently there is little organized information regarding formal inventories or assessments about exposure and risk to these chronic toxicants.

1. AIR QUALITY

1.1. *Investigación sobre Calidad del Aire*

There are, in the main urban areas and some localities in Mexico, 28 in total, air quality monitoring networks that provide information on criteria pollutants (Pb, CO, SO₂, NO₂, O₃, and PM₁₀) and meteorological parameters. The main data are centralized by the National Institute of Ecology (INE) and distributed as biannual publications. See:

<http://www.ine.gob.mx/dgicur/cal aire/indicadores.html>,

http://www.ine.gob.mx/dgicur/cal aire/descargas/tercer_almanaque_cal aire_2007_v4.pdf.

1.2. *Sistema Nacional de Información de la Calidad del Aire*

Currently, INE's *Sistema Nacional de Información de la Calidad del Aire* (National Air Quality Information System—Sinaica, <<http://sinaica.ine.gob.mx/>>) allows the public to access air quality raw data of 22 localities with air quality monitoring systems, in circa real time and data of two particulate matter networks, located in Torreón and the Tula-Tepeji region. None of these monitoring programs incorporates routine measurements of PBTS.

Activities on measurement and assessment of PBTS in environmental matrices are carried out through case studies financed by different institutions of the Mexican government, Mexico's Oil Company (PEMEX), Conagua, state governments, National Science and Technology Council (Conacyt), private companies and some international agencies (Commission for Environmental Cooperation of North America (CEC), Pan American Health Organization (PAHO), United Nations Environment Program (UNEP), and the World Bank, as well as universities and centers for research and technological development.

Research capacity for PBTS in Mexico is concentrated in 25 centers that include universities and institutions with the technical capacity and infrastructure to analyze different media and compounds. Mexico currently lacks adequate infrastructure to routinely analyze dioxins and furans; only Cenam, the National Centre for Metrology, has the required equipment.

Among the main substances reported in the research studies on air, water and sediments, the following are the most important:

- polychlorinated biphenyls,
- polycyclic aromatic hydrocarbons (PAH),
- heavy metals, and
- organochlorine pesticides.

1.3. PROGRAMA NACIONAL DE MONITOREO ATMOSFÉRICO (*National Atmospheric Monitoring Program*) (PNMA)

The first official air quality monitoring network began its operation in the late 1960s, in Mexico City. At present, Mexico's is consolidating this effort with the *Programa Nacional de Monitoreo Atmosférico* (PNMA) 2003–2008, whose principal objective is to “*Establish an atmospheric monitoring program to guarantee adequate diagnostic and surveillance of air quality at the national level; to generate information that is real, valid, and comparable among the different sites and air quality networks in the Country which would serve as a foundation for the design and establishment of environmental policy for the protection of the health of the population and the well-being of ecosystems.*”

This program is divided in three different stages with specific objectives which, upon implementation, will serve as basis for a subsequent monitoring program.

The first stage was the analysis and development of tools, where PNMA's main task was to produce a diagnosis of the current state of the air quality monitoring networks throughout the country, and of the laws, institutions, and financial mechanisms that support them. Also, this stage focused on the development of tools and/or procedures to guide air quality monitoring practices at the national level, in order to guarantee quality systems and the comparability of data.

The second stage is the establishment of strategies for identifying the sites where it is a priority to implement air quality monitoring programs. These strategies include the identification criteria, the launch of awareness and information campaigns, and the implementation of the various states' monitoring plans.

Finally, the third stage, where the tools and strategies are applied, is to:

- monitor air quality in priority sites;
- obtain the homologation of monitoring practices;
- establish quality control and quality assurance programs which validate the data generated by these air monitoring systems; and
- set up national surveillance programs through audits.

This third stage would help create a proposal for a second national atmospheric program that would include countrywide multi-pollutant and toxic pollutants' monitoring networks in areas where the existence of these pollutants is suspected.

At present, the PNMA includes 62 localities with air quality monitoring equipment; 55 have operational equipment but only 28 automatically monitor locations in major metropolitan areas. Air quality is monitored using automatic, manual, and mixed methods. Six criteria contaminants, SO₂, NO₂, PM, Pb, CO, and O₃, are continually monitored in the metropolitan areas. However, PM_{2.5} is measured continuously by only two monitoring networks; Mexico City and Monterrey. Lead (Pb), hydrogen sulfide (H₂S), heavy metals, sulfates, nitrates, and other pollutants are monitored mainly in Mexico City by the Redda (Atmospheric Deposition Network) and in few localities focused on case studies.

http://www.imacmexico.org/ev_es.php?ID=1276_208&ID2=DO_TOPIC

<http://sinaica.ine.gob.mx/>

http://www.ine.gob.mx/dgicur/calair/descargas/tercer_almanaque_calair_2007_v4.pdf

<http://www.ine.gob.mx/dgicur/calair/indicadores.html>

1.3.1. Sistema de Monitoreo Atmosférico de la Ciudad de México (Simat) (Atmospheric Monitoring System City of Mexico)

<http://www.sma.df.gob.mx/simat/>

1.3.2. Red de Depósito Atmosférico (Redda) (Atmospheric Deposition Network)

<http://www.sma.df.gob.mx/simat/pnredda2.htm>

1.3.3. Red Automática de Monitoreo Atmosférico (Distrito Federal) (Automatic Atmospheric Monitoring Network, Mexico City)

<http://www.sma.df.gob.mx/simat/pnredda2.htm>

1.3.4. Zona Metropolitana de Guadalajara (ZMG) (Metropolitan Area of Guadalajara)

<http://semades.jalisco.gob.mx/06/imeca.htm>

1.3.5. Sistema Integral de Monitoreo Ambiental de Monterrey (SIMA) (Integrated Environmental Monitoring System of Monterrey)

http://www.nl.gob.mx/?P=med_amb_mej_amb_sima

<http://www.nl.gob.mx/?P=sima>

1.3.6. Red Automática de Monitoreo Atmosférico de la Zona Metropolitana de Toluca (Air Quality Monitoring Network for the Metropolitan Area of Toluca)

<http://www.edomex.gob.mx/calidaddelaire/contaminantes-del-dia>

1.3.7. Red de Monitoreo de la Calidad del Aire de Ciudad Juárez (Air Quality Monitoring Network of Ciudad Juarez)

http://www.tceq.state.tx.us/cgi-bin/compliance/monops/site_photo.pl?cams=661

1.3.8. B.C. Red de Monitoreo de la Calidad del Aire de Rosarito, Tecate, Tijuana y Mexicali (Baja California) (Air Quality Monitoring Network of Tijuana and Mexicali)

<http://aire.bajacalifornia.gob.mx/index.cfm>
<http://www.arb.ca.gov/aqd/netrpt/netrpt.htm>

1.3.9. REMA Red Automática de Monitoreo Atmosférico de Puebla (Atmospheric Monitoring Network of Puebla)

<http://www.remapuebla.gob.mx/calidaddelaire.php>

1.3.10. Redes de Monitoreo del Estado de Guanajuato : Celaya, Irapuato, León, Salamanca y Silao.

<http://www.guanajuato.com.mx/ecologia/calidadaire/>

1.3.11. Programa de Monitoreo Atmosférico del Estado de Morelos (RAMAMOR)

http://www.ceamamorelos.gob.mx/secciones/ambiente/monitoreo_atmosferico.html

2. WATER QUALITY / AQUATIC

2.1. Red Nacional de Monitoreo (RNM)

The Mexican National Water Commission, the *Comisión Nacional del Agua* (Conagua), has the duty to enforce Mexico's national waters act, the *Ley de Aguas Nacionales* (LAN). To comply with it, Conagua has put in place an infrastructure to monitor the nation's water cycle and has in progress a wide program for the modernization of water resources management. Responsibilities of Conagua are, amongst others, to prepare and update the National Water Program and to foster the development of water supply, sewage and wastewater treatment systems. Conagua has implemented the RNM, a nationwide surveillance monitoring program. In 2004, the RNM included 964 monitoring stations. The existing program infrastructure and logistics may provide an excellent basis for including priority PBTS in the RNM by amplifying the list of parameters.

<http://www.conagua.gob.mx/conagua/Espaniol/TmpContenido.aspx?id=24002a7d-7cf5-4153-adeb-6e36ce1dff13|SISTEMA NACIONAL DE INFORMACIÓN DEL AGUA|10|0|0|0>

2.2. Investigación sobre Sustancias Químicas y Riesgos Ecotoxicológicos

There are also ongoing non-PBTS programs, such as the monitoring carried out by the Mexican National Water Commission (Conagua) since the 1970s, where surface and groundwater quality is being monitored in Mexican hydrological basins. The main objective of this program is to measure physical, chemical and bacteriological parameters, to define regulations and treatment systems for wastewater discharges and sources for water supply. Much of this information is captured in a database available in RAISON (Canadian software adopted by Conagua).

<http://www.nwri.ca/software/brochure-e.html>

The research projects that have been developed in these centers (INE and Conagua) are classified in five different areas:

- ecotoxicology,
- health effects,
- risk evaluation and environmental impact,
- monitoring and modeling, and
- treatment technologies.

At least 19 studies were reported in the area of monitoring and modeling. More information can be obtained in the following site:

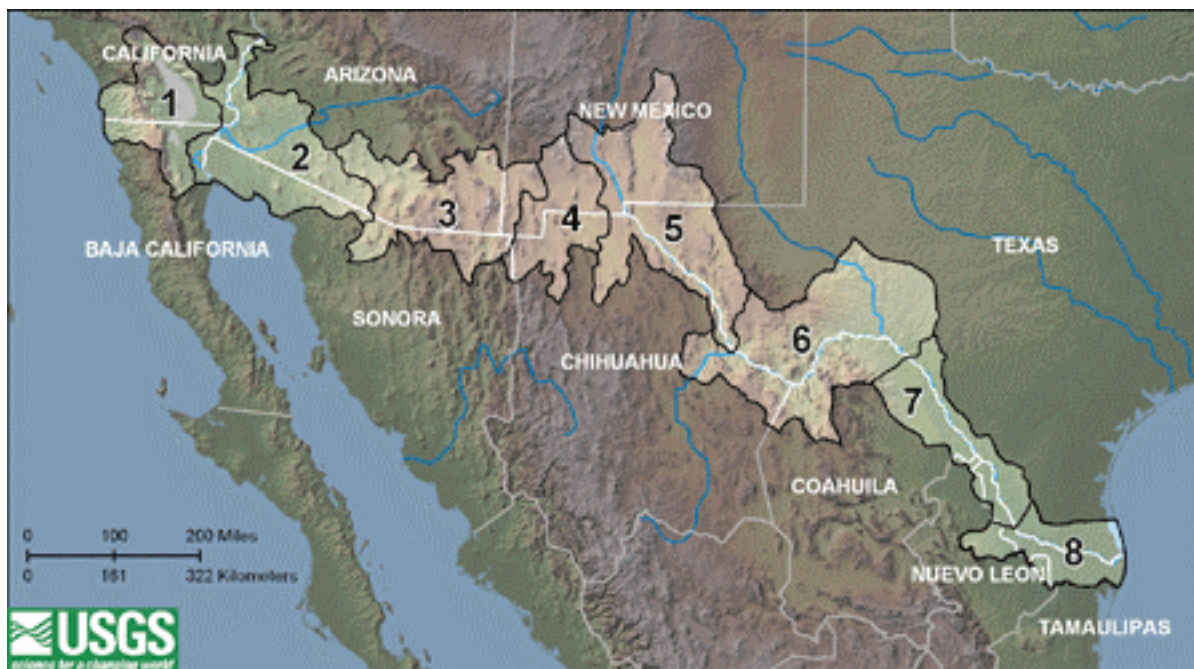
http://www.ine.gob.mx/dgicur/sqre/sqre_estudios.html

3. US – MEXICO BORDER ENVIRONMENTAL HEALTH INITIATIVE

Since 2006 the project tries to encompass the entire US-Mexico border region, an area over 157,000 square miles (some 407,000 square kilometers) and home of more than 12 million people. Efforts will establish a border-wide base map on the Internet Map Service (IMS) using a medium-resolution, basic geospatial framework, including satellite imagery, land use and land cover, major transportation networks and digital elevation models with the locations of the major population centers over all eight study sub-areas. This will provide the platform upon which to subsequently overlay more comprehensive datasets and facilitate scientific analysis of environmental issues that affect the regional population.

The Lower Rio Grande Valley, subarea 8, was the pilot project area for the initial effort and now contains the most comprehensive datasets. For the remaining sub-areas in Texas and the adjoining Mexican States of Chihuahua, Coahuila, and Nuevo León (subareas 5, 6, and 7), we will add specific, local-level datasets such as high-resolution aerial photos, hydrography, demographics, geology, transportation, potential sources of contaminants, and contaminants in

biota. This work builds on the seamless methodology developed to integrate datasets compiled in FY 2005 for subarea 8 in the Lower Rio Grande Valley. This website and the IMS will be updated frequently as new data become available. The project will continue to seek opportunities for integration with existing and future programs both within and outside the USGS.



In 2005, the Border Environmental Health Initiative team developed an OGC-compliant (Open Geospatial Consortium (OGC) compliant services to provide an interactive mapping system), binational Internet Map Service (IMS) with satellite imagery, orthoimagery and integrated geology, hydrology, transportation, geographical names, potential sources of contaminants, demographic data for population density, Nexrad daily weather, and boundary datasets for sub-area 8, the pilot study area. [Fact sheets](#) addressing the utility, analysis capabilities, and dataset availability associated with the IMS were published in Spanish and English.

The project website <<http://borderhealth.cr.usgs.gov>> was created to provide background project information, white papers describing methodology for binational dataset integration, links to publications and references, and spreadsheets with health and Colonias statistics. Additionally, through the website, an online static map and data table library was established to provide an alternate method of accessing information served on the IMS. Project development efforts and outreach activities focused on US and Mexican federal agencies, such as EPA, Semarnat, PEMEX, Department of Homeland Security, INSP, INEGI, and the National Geospatial-Intelligence Agency.

4. AGENCIES AND RESPONSIBILITIES IN MEXICO

4.1. *Sediment Research and Monitoring Programs*

In Mexico, sediment-monitoring networks are not established; therefore, the responsibility for monitoring sediment quality in Mexico is not well defined. Considering the tasks of different ministries it is probable that Semarnat, through Conagua, should be responsible for future sediment monitoring programs.

4.2. *Hazardous Waste and Contaminated Soil in Mexico*

In Mexico soil and waste monitoring networks are not established. The responsibility for managing hazardous waste and contaminated soil belongs to the *Dirección General de Gestión Integral de Materiales y Actividades Riesgosas* (DGGIMAR) of Semarnat.

Besides administrative responsibilities, DGGIMAR works with the Mexican federal environmental attorney, the *Procuraduría Federal de Protección al Ambiente* (Profepa), and is involved in risk assessment, restoration and remediation projects, related to contaminated sites, hazardous waste and accidental spills of dangerous materials. Although no national contaminated soils monitoring programs are established on a sustainable basis, several studies, from the Federal government and academia's can provide useful information.

4.3. *Research and Monitoring Programs related to PBTS in Biota, Fish and Wildlife*

The *Secretaría de Medio Ambiente y Recursos Naturales* (Semarnat) is in charge of protecting and managing the environment, wildlife and natural resources. Related activities are divided among the federal, state and municipal level. Semarnat is in charge of activities of relevance to the nation, including highly hazardous activities. The responsibility of monitoring PBTS in wildlife may belong to Semarnat as well as to the state and municipal governments.

http://www.mexicanlaws.com/Semarnat/semarnat_lgeepa.htm

4.4. *Food Research and Monitoring Programs*

In Mexico, the *Secretaría de Salud* (SSA) is in charge of supervision of food quality and is authorized to carry out studies that are considered necessary to guarantee public health (SSA 2006). The NOM-117-SSA1-1994 describes the analytical methods for determination of cadmium, lead, and mercury in food and water for human consumption (SSA 1995).

According to the *Ley Federal de Sanidad Animal* (Sagarpa 2004) and the *Ley Federal de Sanidad Vegetal* (Sagarpa 1994b), the supervision of agricultural activities is under the responsibility of the *Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación* (Sagarpa). This ministry is authorized to undertake the studies necessary to prevent the pollution of agricultural and livestock resources.

4.5. Human Biomonitoring Programs

The *Secretaría de Salud* is in charge of supervising public health in Mexico. This responsibility includes cases of exposure and intoxication with PBTS. Nevertheless, the SSA only infrequently carries out monitoring programs in some cases in specific subgroups of the population.

<http://www.salud.gob.mx/>

4.6. Water Research and Monitoring Programs

The responsibility for monitoring the national water bodies such as rivers, lakes, reservoirs, groundwater and the marine environment belongs to Conagua, which is part of Semarnat.

**UNITED STATES: NATIONAL, REGIONAL MONITORING
INITIATIVES AND DATA SOURCES**

GLOSSARY OF ACRONYMS, UNITED STATES

AirMoN	Atmospheric Integrated Research Monitoring Network
AIRS	Aeromatic Information Retrieval System
AMAP	Arctic Monitoring and Assessment Program
CASTNet	Clean Air Status and Trends Network
CDDs	Chlorinated dibenzo-p-dioxins
CDFs	Chlorinated dibenzofurans
CEC	Commission for Environmental Cooperation
CENR	Committee on Environmental and Natural Resources
CTEPP	Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants
EIMS	Environmental Information Management System
EMAP	Environmental Monitoring and Assessment Program
ERAMS	Environmental Radiation Ambient Monitoring System
FDA	Food and Drug Administration
FSIS	Food Safety Inspection Service
HAPs	Hazardous Air Pollutants
HCB	Hexachlorobenzene
IADN	Integrated Atmospheric Deposition Network
IMPROVE	Interagency Monitoring of Protected Visual Environments
MDN	Mercury Deposition Network
NADP	National Atmospheric Deposition Program
NATA	National Air Toxics Assessment
NAWQA	National Water Quality Assessment Program
NCOD	National Drinking Water Contaminant Occurrence Database
NDAMN	National Dioxin Air Monitoring Network
NLFWA	National Listing of Fish and Wildlife Advisories
NHANES	National Health and Nutrition Examination Survey
NHATS	National Human Adipose Tissue Survey
NRP	National Residue Program
NTN	National Trends Network
PAHs	Polycyclic aromatic hydrocarbons
PBTS	Persistent, bioaccumulative and toxic substances
PCBs	Polychlorinated biphenyls
PCS	Permit Compliance System
PDP	Pesticide Data Program
PM	Particulate matter
STORET	Storage and Retrieval Database
TRI	Toxics Release Inventory
USDA	US Department of Agriculture

A. INDEX OF RELATED SURVEILLANCE, MONITORING INITIATIVES AND ACTIVITIES

1. AIR QUALITY: AMBIENT AIR AND AIR DEPOSITION MONITORING

Both ambient air monitoring networks and air deposition networks provide information on PBTs that are emitted into the air. In addition to providing information on ambient concentrations and deposition rates, when combined with information from emission inventories and air dispersion models, data from air monitoring networks can provide information about the fate, transport, receptors and transformation of PBTs.

With respect to PBTs, the primary contribution of currently established ambient air monitoring networks in the United States is the measurement of metal PBTs, such as mercury, cadmium, and lead. The reason for this is that most ambient air monitoring networks do not measure organic PBTs due to the high costs of monitoring and analysis and the lack of monitoring methods.

Air deposition monitoring programs provide information on the wet and dry deposition of chemicals. Current national monitoring information on the air deposition of PBTs is mainly limited to mercury.

1.1. National Atmospheric Deposition Program/National Trends Network (NADP/NTN)

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a nationwide network of precipitation monitoring sites to collect accurate and precise weekly data on the chemistry of precipitation for monitoring of geographical and temporal long-term trends. Samples are analyzed for hydrogen, sulfate, nitrate, ammonium, chloride, and base cations such as calcium, magnesium, potassium, and sodium. The network is a cooperative effort between many different groups, including the US Geological Survey, eight federal agencies (e.g., US Department of Agriculture, EPA), state and local agencies (e.g., state agricultural experiment stations), universities, and private industries.

<http://nadp.sws.uiuc.edu/sites/ntnmap.asp?>

1.2. National Atmospheric Deposition Program/Mercury Deposition Network (NADP/MDN)

The Mercury Deposition Network (MDN), which is part of the NADP, currently has over 50 sites. The MDN was formed in 1995 to collect weekly precipitation samples that are analyzed for total mercury in order to develop a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition. The data will be used to develop information on spatial and seasonal trends in mercury deposited to surface waters, forested watersheds, and other sensitive receptors. Methylmercury may also be monitored if desired by a site sponsor.

<http://nadp.sws.uiuc.edu/mdn/>

1.3. *CASTNet*

The Clean Air Status and Trends Network (CASTNet) has been operating since 1987 and provides atmospheric data on acid rain, tropospheric (ground-level) ozone, and other forms of atmospheric pollution (e.g., fine particulates). The network is cooperatively funded and operated by EPA and the National Park Service and is comprised of approximately 80 monitoring stations across the eastern and western United States. CASTNet data are publicly available at

<http://www.epa.gov/castnet/>.

1.4. *AirMoN*

The Atmospheric Integrated Research Monitoring Network (AirMoN) is an array of stations designed to provide a research-based foundation for the routine operations of the US deposition monitoring networks. A subprogram is specifically designed to detect the benefits of emissions controls mandated by the Clean Air Act Amendments of 1990, and to quantify these benefits in terms of deposition to sensitive areas. AIRMoN combines two previously existing, deposition research networks: the Department of Energy's MAP3S precipitation chemistry network, which started in 1976, and the CORE/satellite Dry Deposition Inferential Method network. AIRMoN-wet currently consists of 10 monitoring sites collecting data daily on the chemistry of precipitation. Thirteen dry deposition sites are currently in operation across the US AIRMoN-dry data are publicly available at

http://www.arl.noaa.gov/research/projects/airmon_data.html.

1.5. *NADP-Atmospheric Mercury Initiative*

The initiative seeks to measure event-based mercury wet deposition, air concentrations of mercury in its gaseous and particulate forms, and meteorological and land-cover variables needed for estimating dry deposition fluxes. The goals are:

- facilitate the calculation of wet, dry, and total deposition;
- provide data for evaluating predictive and diagnostic models and for assessing source-receptor relationships; and
- build a data set for analyzing spatial and temporal trends.

The initiative proposes a national network of monitoring stations with a broad range of classifications, including: rural, suburban, and urban; near-source/high-emission; sensitive ecosystem; and regionally representative. Stations would follow standard operational procedures, based on methods developed from US EPA and other research efforts. Data would be quality-assured and accessible online from the NADP Web page.

<http://nadpweb.sws.uiuc.edu/amn/>

1.6. *PM_{2.5} Speciation Network*

The PM_{2.5} Speciation Network is currently being established by EPA to:

- determine the annual and seasonal spatial characterization of aerosols,
- analyze air quality trends and track the progress of control programs, and
- develop emission control strategies.

A total of 54 national trend sites are currently in operation, collecting 24-hour integrated samples every three days; up to 250 supplemental sites should be incorporated within the next two years. Monitored PBTs include cadmium, lead, and mercury.

<http://www.epa.gov/ttn/chief/eiip/pm25inventory/index.html>

1.7. *IMPROVE*

The Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring program was established in 1985 to aid the creation of federal and state implementation plans for the protection of visibility in Class I areas (156 national parks and wilderness areas). Led by the US EPA and the National Park Service, 145 monitoring sites are operated in the continental US by federal, state, tribal, and local governmental agencies. Where possible, aerosol (PM₁₀ and PM_{2.5}), optical, and scene monitoring are conducted at each site. Additional monitoring sites are operated in 17 countries around the world.

<http://www.epa.gov/ttn/amtic/visinfo.html>

1.8. *Air Toxics Monitoring Network*

EPA's Air Toxics Program was developed to characterize, prioritize, and equitably address the impact of hazardous air pollutants (HAPs) on public health and the environment. An expanded monitoring network for ambient air concentrations of HAPs was developed, building on existing national and state/local monitoring platforms. One objective of the network was to reflect "community-oriented" (i.e., neighborhood scale) monitoring locations.

In February 2006, EPA released the [results of its national-scale assessment](#) of 1999 [air toxics](#) emissions. The purpose of the national-scale assessment is to identify and prioritize air toxics, emission source types and locations that are of greatest potential risk to the population. EPA uses the results of these assessments in many ways, including:

- working with communities in designing their own local-scale assessments,
- setting priorities for improving data in emissions inventories, and
- helping direct priorities for expanding and improving the network of air toxics monitoring.

The national-scale assessment includes [177 air pollutants](#) [a subset of the air toxics on the Clean Air Act's list of 187 air toxics plus [diesel particulate matter](#) (diesel PM)]. The assessment includes four steps that focus on the year 1999:

- compiling a national emissions inventory of air toxics emissions from outdoor sources,

- estimating ambient concentrations of air toxics across the United States,
- estimating population exposures across the United States, and
- characterizing potential public health risk from inhaling air toxics, including both cancerous and noncancerous effects.

The data are from 1999 since emissions inventories from that year are the most complete and up-to-date available. Working with the states, the EPA updates air toxics emissions inventories every three years. The next national-scale assessment will focus on the 2002 emissions inventory that was completed in December 2005.

As part of EPA's National Air Toxics Assessment activities, the agency conducted a [national-scale assessment for the year 1996](#) of 33 air pollutants (a subset of 32 air toxics on the Clean Air Act's list of 188 air toxics plus diesel particulate matter (diesel PM).

<http://www.epa.gov/ttn/atw/nata/index.html>

<http://www.epa.gov/ttn/atw/nata1999/>

1.9. Satellite Sensor Technology

Satellite images can be used in conjunction with ground-based measurements to provide information about the sources and direction of visible pollutants. While satellites currently cannot monitor PBTs directly, satellite imagery can be used to indicate the long-range transport of PBTs or to direct the collection of ground-based data in real-time. The capability to observe the Earth's surface and atmosphere with satellites is rapidly expanding, making it possible to integrate satellite images with ground-based data sets to provide useful information. Several notable projects that have used integrated data sets include:

- 1) The US EPA, in partnership with the United Nations Environment Programme GRID Center in Sioux Falls, developed a methodology to integrate data sets for analyzing environmental issues.
- 2) Washington University (St Louis) provided integrated data of major dust and smoke events on the Internet.
- 3) NOAA/NSF's recent ACE-Asia program, using ground-based aircraft flying over the Pacific and satellite monitors, monitored aerosols coming from Asia.

<http://www.epa.gov/emap/html/pubs/docs/groupdocs/landecol/assess/LandscapeChange.pdf>

<http://www.epa.gov/ttnamti1/files/ambient/super/pmstlo.pdf>

<http://www.epa.gov/ttnamti1/files/ambient/pm25/cenr/nonrout051506.doc>

2. WATER / ECOSYSTEM QUALITY

Water quality and ecosystem monitoring programs measure the level of PBTs in water, sediment, or aquatic biota. In addition to providing this information, these monitoring programs can provide information about the potential human exposure to PBTs via pathways other than inhalation.

2.1. NOAA's National Status and Trends Program--Mussel Watch Project

In 1984, the National Oceanic and Atmospheric Administration (NOAA) initiated a National Status and Trends (NS&T) Program to determine the current status of, and detect changes in, the environmental quality of our Nation's estuarine and coastal waters. Since 1986, NS&T's Mussel Watch Project has monitored chemical contaminants in sediments and bivalve mollusks (e.g., mussels and oysters). Presently, bivalves are collected every other year and sediments about every fifth year in a network of over 250 US coastal and estuarine sites. Sites are selected to be representative of large coastal areas and to avoid small-scale patches of contamination, or "hot spots." For this reason, data collected from the Mussel Watch Project can be used to compare contaminant concentrations across space and time to determine which coastal regions are at greatest risk in terms of environmental quality. Bivalve and sediment samples are analyzed for 24 PAHs; 18 PCB congeners; DDT and its breakdown products DDD and DDE; 16 other chlorinated pesticides; tributyltins; 3 major elements; and 11 trace elements. Analyses for 17 dioxin and furan congeners have been conducted since 1995.

The NS&T Program includes several projects in addition to the Mussel Watch Project. These are:

- the Benthic Surveillance Project (1984 through 1993),
- the Quality Assurance Project,
- Historic Trends,
- the Sediment Coring Project,
- the Specimen Banking Project,
- Sediment Toxicity Surveys,
- Biomarkers,
- Environmental Indices, and
- Regional assessment and topical reports.

Information on all NS&T projects can be accessed from the NS&T home page at

<http://specialprojects.nos.noaa.gov/> and at

http://pubs.usgs.gov/ds/2006/182/source_metadata/NOAAMusselWatch/NOAAMusselWatch.html.

2.2. National Water Quality Assessment Program

The National Water Quality Assessment (NAWQA) Program, administered by the US Geological Survey, focuses on water quality in more than 50 major river basins and aquifer systems of the United States, monitoring and sampling water, sediments, and fish. The program is divided into 59 study areas, and samples are analyzed for a variety of organic and inorganic constituents, including mercury, lead, PCBs, PAHs, and pesticides. Intensive assessment activities in each of the study units are conducted on a rotational rather than a continuous basis, with about one-third of the study units being studied intensively at any given time.

<http://water.usgs.gov/nawqa/>

2.3. National Sediment Quality Survey Database

EPA's Office of Water (OW) and Office of Science and Technology (OST) developed the National Sediment Quality Survey Database in response to the Water Resources Development Act of 1992, which directed EPA to prepare a report to Congress on the environmental health of sediments in the nation's waterways. The first such report, entitled *The Incidence and Severity of Sediment Contamination in Surface Waters of the United States*, was issued in 1998 and updated in 2001. More than 4.6 million analytical observations from more than 50,000 stations throughout the US for the years 1980 through 1999 are compiled in the pre-publication database. The database includes measurements of PCBs and mercury in sediments and aquatic tissues. Most of the data were compiled from non-random monitoring programs that focus on areas where contamination is known or suspected to occur, and thus may not be representative of sediment quality nationally. The database is publicly available from the Office of Science and Technology.

<http://www.epa.gov/waterscience/cs/library/nsidbase.html>

2.4. Environmental Monitoring and Assessment Program (EMAP)

The Environmental Monitoring and Assessment Program (EMAP) is a research program initiated by EPA in 1988 with the goal of monitoring the condition of the nation's ecological resources in order to evaluate the cumulative success of current policies and programs and to identify emerging problems before they become widespread or irreversible. Currently, approximately 1000 primary research sites are sampled each year in conjunction with the States and EPA Regions. These sites are divided among estuaries around the US and streams of the states, within the conterminous United States, in EPA Regions 8, 9, and 10. Sediment samples and fish and shellfish tissue are analyzed for mercury, PCBs, PAHs, HCB, chlorinated pesticides, and other analytes.

<http://www.epa.gov/emap/>

2.5. US Long-Term Ecological Research (LTER) Network

The US Long-Term Ecological Research (LTER) network was established in 1980 by the National Science Foundation. The objectives of LTER are to facilitate and conduct ecological research by understanding ecological phenomena over long temporal and large spatial scales, creating a legacy of well-designed and documented long-term experiments and observations for future generations, conducting major synthetic and theoretical efforts, and providing information for the identification and solution of ecological problems. The network includes 24 sites in the United States (including two in Alaska), Puerto Rico, and Antarctica. The only PBT currently measured is lead, but the network offers the opportunity to use sites for both long- and short-term projects, appropriate to individual sites, a group of sites, or the network as a whole.

International Long-Term Ecological Research (ILTER) is a 'network of networks'. It is a global network of research sites located in a wide array of ecosystems worldwide that can help understand environmental change across the globe. ILTER has a focus on long-term, site-based research. Most ILTER members are national or regional networks of scientists engaged in long-

term, site-based ecological and socioeconomic research. Together they are responsible for creating and maintaining a large number of unique long-term datasets.

ILTER can contribute to solving international ecological and socio-economic problems through question and problem-driven research, and has the unique ability to design collaborative, site-based projects, compare data from a global network of sites and detect global trends. ILTER members also have expertise in the collection, management and analysis of long-term environmental data.

<http://www.lternet.edu/>

2.6. Clean Water Action Plan (CWAP): Coastal Research and Monitoring Strategy

The Coastal Research and Monitoring Strategy was announced in September 2000 by the US Department of Agriculture, the National Oceanic and Atmospheric Administration, the US Department of the Interior, and the US Environmental Protection Agency. This work was identified in the Clean Water Action Plan, as part of a renewed effort by the federal agencies, in partnership with states and tribes to restore and protect the Nation's estuarine and coastal areas. The focus of the strategy is on the ecosystems of the nation's coastal waters, bays, estuaries, beaches, wetlands, and Great Lakes. While the number of sites and frequency of sampling have yet to be determined, the strategy recommends expanding and coordinating existing programs to monitor the status and trends in environmental conditions, including measurement of toxics such as hazardous air pollutants (HAPs).

<http://water.usgs.gov/owq/cleanwater/coastalresearch/index.html>

2.7. National Water Quality Monitoring Network

The purpose of the National Water Quality Monitoring Network is to provide a national forum for coordination of consistent and scientifically defensible methods and strategies to improve water quality monitoring, assessment and reporting. Promote partnerships to foster collaboration, advance the science, and improve management within all elements of the water quality monitoring community.

<http://acwi.gov/monitoring/network/index.html>

2.8. USGS Toxic Substances Hydrology Program

The US Geological Survey (USGS) Toxic Substances Hydrology (Toxics) Program was initiated in 1982 to provide objective and reliable scientific information needed to develop policies and practices that help avoid exposure to toxic substances, mitigate environmental deterioration from contaminants, provide cost-effective cleanup and waste-disposal strategies, and reduce future risk of contamination.

The Toxics Program conducts intensive field investigations of subsurface point-source contamination, of watershed- and regional- scale contamination, and pursues methods development and other fundamental research. Toxics Program investigations cover a wide range of scales, from intense point sources, such as leaks or discharges from industrial facilities, to

multiple, closely spaced releases, such as domestic septic systems, to relatively uniform releases that occur over broad areas with similar land-use practices, such as agricultural and residential land uses.

<http://toxics.usgs.gov/investigations>

2.9. *WATERS Network*

The WATERS Network is a joint collaboration between the hydrologic science and environmental engineering research communities and is funded by the National Science Foundation (NSF) Engineering and Geosciences Directorates. The WATERS Network will be an integrated, real-time, distributed observing system that seeks to address deficiencies in the current scientific understanding of the dynamics and spatial variability of water processes. This will be done by developing a collaborative, scientific exploration and engineering analysis network using NSF Major Research Equipment and Facilities Construction funding.

Once complete, the WATERS Network will transform scientific understanding of how water quantity, quality, and related earth system processes are affected by natural and human-induced changes to the environment. It will accomplish this by enabling multi-scale, dynamic, predictive modeling for water, sediment, and water quality by measuring or estimating fundamental properties such as the flux, hydrologic flow paths, residence times, and chemical/biological reaction rates and include such capabilities as near-real-time assimilation of data, prediction extrapolation to the national scale and feedback to adjust community models and observatory design and function.

<http://www.watersnet.org/>

2.10. *National Water Quality Monitoring Council (NWQMC)*

Provide a national forum for coordination of consistent and scientifically defensible methods and strategies to improve water quality monitoring, assessment and reporting. Promote partnerships to foster collaboration, advance the science, and improve management within all elements of the water quality monitoring community.

Council membership includes federal agencies (Department of Interior, US EPA, NOAA, USGS), industry, academia, states, tribes, local and other groups.

<http://acwi.gov/monitoring/>

3. FOOD / FISH AND WILDLIFE QUALITY

Food monitoring and fish and wildlife survey programs provide essential information about the levels of PBTs in foods consumed by the human population. This information provides an estimate of dietary exposure and when high concentrations are found, allows actions to be taken or consumption advisories to be issued to limit exposure.

3.1. National Study of Chemical Residues in Fish (or National Fish Tissue Study)

The National Fish Tissue Study is a priority activity being sponsored under EPA's PBT Chemical Program (<http://www.epa.gov/pbt/>) that will provide information on over 100 PBT chemicals in fish, including mercury, dioxins, and PCBs. The study objective is to estimate the national distribution of the mean levels of selected PBT chemical residues in fish tissue from lakes and reservoirs of the continental United States. The lakes and reservoirs to be sampled were selected according to a probability design that is stratified into six lake size categories. Sampling will be conducted for four years at a total of 500 locations or about 125 lakes and reservoirs annually. Planning for the study began in 1998, and full implementation of fish sampling and tissue analysis has been conducted from 2000 through 2003. A final report was released in 2005. A previous National Study of Chemical Residues in Fish was conducted during 1986–1989, measuring dioxins/furans, PCBs, and other PBTs in fish tissue from 400 sites in the United States.

<http://www.epa.gov/waterscience/fish/study/>

3.2. National Listing of Fish and Wildlife Advisories

The Office of Water's National Listing of Fish and Wildlife Advisories (NLFWA) provides consumption advisories for the general population, including sensitive or susceptible subpopulations, which inform the public of high concentrations of chemical contaminants in local fish and wildlife suitable for consumption. Information is provided to EPA by the states, tribes, territories and Canada. The NLFWA contains fish and wildlife advisories for mercury, dioxins, PCBs, and other PBTs. The NLFWA can also be used to provide trends of PBT levels in animal tissues throughout the nation.

<http://www.epa.gov/waterscience/fish/>

<http://map1.epa.gov/html/federaladv.html>

<http://gcmd.gsfc.nasa.gov/KeywordSearch/Metadata.do?Portal=GCMD&KeywordPath=&NumericId=15999&MetadataView=Brief&MetadataType=0&lbnode=gcmd3a>

3.3. National Cow Milk Survey for PBTs / Environmental Radiation Ambient Monitoring System (ERAMS)

A National Milk Survey on PBTs was undertaken in 1996–1997 to assess the national prevalence and concentrations of polychlorinated dibenzo-p-dioxins (CDDs), polychlorinated dibenzofurans (CDFs), and dioxin-like polychlorinated biphenyls (dioxin-like PCBs) in the general pasteurized milk supply of the United States. The study utilized the EPA Environmental Radiation Ambient Monitoring System (ERAMS) for collecting milk samples.

ERAMS is a national network of monitoring stations that regularly collect air, water, precipitation, and milk samples for analysis of radioactivity. ERAMS has 51 milk sampling stations in 41 US states, and Panama and Puerto Rico. A total of 48 samples, 12 for each of 4 quarters of a year, were collected and analyzed. The second National Milk Survey was undertaken in a two phase period: July 2000 and in January 2001

<http://oaspub.epa.gov/eims/eimsapi.dispdetail?deid=22425>

<http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=22425>

3.4. US Food and Drug Administration's Pesticide Residue Monitoring Program

The US FDA routinely samples individual lots of domestically produced and imported foods and analyzes them for pesticide residues to enforce the tolerances set by EPA. Domestic samples are collected on an ongoing basis as close as possible to the point of production in the distribution system; import samples are collected at the point of entry into US commerce. Emphasis is on the raw agricultural product, which is analyzed as the unwashed, whole (unpeeled), raw commodity. Processed foods are also included. If illegal residues (above EPA tolerance or no tolerance for that particular food/pesticide combination) are found in domestic samples, the FDA can invoke various sanctions, such as a seizure or injunction. For imports, shipments may be stopped at the port of entry when illegal residues are found. "Detention without physical examination" (previously called automatic detention) may be invoked for imports based on the finding of one violative shipment if there is reason to believe that the same situation will exist in future lots during the same shipping season for a specific shipper, grower, geographic area, or country. 366 pesticides are detectable by the methods currently used in this testing program, including the Level 1 PBTSs: aldrin, chlordane, DDT and metabolites, dieldrin, mirex, toxaphene, and HCB.

<http://www.cfsan.fda.gov/~dms/pesrpts.html>

3.5. US Department of Agriculture's Pesticide Data Program (PDP)

The Pesticide Data Program (PDP) was implemented by USDA in May 1991 to collect data on pesticide residues in foods. PDP data are used by EPA to review the safety of existing tolerances (maximum residue limits) and to refine estimates of dietary exposure as part of the pesticide reregistration process under the Food Quality Protection Act. PDP data are also used by the government and agricultural community to examine residue issues which may affect agricultural practices and US trade. The routine program includes sampling of fresh and processed fruit and vegetables, oats, and corn syrup. The normal monthly sampling rate is 62 samples per commodity. For seasonal commodities such as cantaloupes, sampling rates are adjusted to reflect market availability, and sample collection is limited to the season when the commodity is available. In 1999, the routine PDP collected and analyzed a total of 9,125 samples consisting of 8,637 fruit and vegetable, 332 oat, and 156 corn syrup samples. Samples originated from 35 states and 21 foreign countries. Approximately 79 percent of all samples were domestic, 20 percent were imported (including samples of mixed national origin), and less than one percent were of unknown origin. Commodities are tested for various insecticides, herbicides, fungicides, and growth regulators. PBTS assessed under the PDP include DDT and metabolites, aldrin, dieldrin, chlordane, and HCB. In addition, studies designed to provide data for acute (short-term) exposure assessments (e.g., an apple and pear study on azinphos methyl and chlorpyrifos) are also conducted under the PDP.

<http://www.ams.usda.gov/science/pdp/index.htm>

http://www.epa.gov/pesticides/science/models_db.htm

3.6. USDA's Food Safety Inspection Service (FSIS) National Residue Program (NRP)

Under the authority of the Federal Meat Inspection Act, the Poultry Products Inspection Act, and the Egg Products Inspection Act, USDA's National Residue Program (NRP) routinely inspects all meat, poultry, and egg products sold in interstate commerce and reinspects imported products, to ensure that they meet US food safety standards. It includes testing for approved and unapproved pharmaceutical drugs and pesticides known or suspected to be present in food animals in the US and in countries exporting products to the US. It also includes any other xenobiotic or naturally occurring compounds that may appear in meat, poultry and egg products and that may pose a potential human health hazard. PBTs tested for in the general monitoring and enforcement samples at this time include: aldrin, dieldrin, chlordane, DDT and metabolites, mirex, HCB, and PCBs.

http://www.fsis.usda.gov/Science/2005_Blue_Book/index.asp

4. HUMAN EXPOSURE STUDIES

Human exposure studies can provide valuable information about human body burdens of PBTs. These studies are best utilized when supplemented by knowledge of sources, pathways, concentration, duration, and location of exposure. This knowledge can be used to relate sources and pathways of PBTs to human body burden levels.

4.1. National Health and Nutrition Examination Surveys (NHANES)

The National Health and Nutrition Examination Survey (NHANES), conducted by the Centers for Disease Control and Prevention's (CDC's) National Center for Health Statistics, traces the health and nutritional status of US civilians through interviews and direct physical examinations. The first survey, NHANES I (1971–1975), did not monitor for any environmental chemicals. Later surveys, including NHANES II (1976–1980) and Hispanic HANES (1982–1984), collected data on chemicals by measuring lead and organochlorine pesticides; NHANES III (1988–1994) measured lead, cadmium and selenium. In the 1999–2000 NHANES, 116 chemicals were monitored; and the 2003–2004 and 2005–2006 surveys monitored about 250 chemicals.

<http://www.cdc.gov/nchs/nhanes.htm>

4.2. National Human Adipose Tissue Survey (NHATS)

The National Human Adipose Tissue Survey (NHATS), conducted by the US Environmental Protection Agency, collected and analyzed human adipose tissue to estimate the prevalence and baseline levels of toxic chemicals in the US population and selected subpopulations. Adipose tissue was collected annually over a twenty-year period beginning in 1970 from cadavers and surgical patients within randomly-selected Metropolitan Statistical Areas in the nine US Census divisions of the 48 contiguous states. NHATS data provide information on the baseline levels and trends of toxic chemicals, including PCBs, dioxins/furans, HCB, PAHs, and several pesticides.

However, the list of target chemicals was expanded over the years and not all chemicals were measured in all years. NHATS data are publicly available upon request from EPA.

<http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=55204>

4.3. Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP)

Young children are hypothesized to have greater exposures, as well as greater sensitivities, to persistent organic pollutants than older children or adults. The National Exposure Research Laboratory of EPA's Office of Research and Development (ORD) conducted a three-year pilot study to investigate the exposures and risks to young children from these pollutants. The pilot study involved 257 preschool children (between 18 months and 5 years of age) in homes and day care centers in North Carolina and Ohio. Pollutants were measured in food and beverages consumed by the children, indoor and outdoor air, urine and hand-wipe samples from each child and adult caregiver, and samples of dust and play area soil. Field collection of samples in North Carolina occurred between July 2000 and March 2001. The samples were analyzed for many persistent pollutants, including several PCB congeners, aldrin/dieldrin, benzo(a)pyrene, chlordane, DDT/DDE, and PAHs. The data were entered into the Human Exposure Database System (HEDS—see 6.1 below) and used to characterize children's exposure, understand pathways, and refine exposure models for environmental contaminants.

<http://www.epa.gov/heasd/ctep/index.htm>

<http://www.epa.gov/heds/index.htm>

4.4. National Children Cohort Study

The National Children's Study will examine the effects of environmental influences on the health and development of more than 100,000 children across the United States, following them from before birth until age 21. The goal of the Study is to improve the health and well being of America's children.

The Study will take a number of health factors into account, including:

- Natural and man-made environmental factors
- Biological and chemical factors
- Physical factors
- Social factors
- Behavioral influences
- Genetics
- Cultural and family influences
- Geographic locations

Researchers will analyze how these elements interact with each other and what helpful and/or harmful effects they might have on children's health and development. By studying children through their different phases of growth and development, researchers will be better able to understand the role of these factors on health and disease. Findings from the Study will be made available continuously as the Study progresses.

http://www.nationalchildrensstudy.gov/about/stayinginformed/publications/Pages/international_brochure_101906.pdf
http://www.nichd.nih.gov/health/topics/national_children_study.cfm

5. REGIONAL INITIATIVES

5.1. Lake Michigan Mass Balance Project

EPA's Great Lakes National Program is conducting a Lake Michigan Mass Balance study to:

- identify relative loading rates of critical pollutants from major media,
- establish baselines,
- predict the environmental benefits of load reduction scenarios, and
- improve understanding of key environmental processes governing contaminant cycling and availability.

The project analyzes chemicals of environmental significance in Lake Michigan and throughout the Great Lakes, focusing on PCBs, trans-nonachlor, atrazine, and mercury, but including dioxins/furans, HCB, PAHs, OCS, aldrin, dieldrin, DDT, and other PBTs. The mass balance approach integrates environmental monitoring, load estimation, and research efforts within a modeling framework to understand the movement of chemicals among water, air, sediment, and the food web so that effective management strategies can be designed. Results of the Lake Michigan Mass Balance project are housed in the Great Lakes Environmental Monitoring Database (GLENDa) and are available on the Internet.

<http://www.epa.gov/glnpo/lmmb/>

5.2. Great Lakes Binational Toxics Strategy

The purpose of this binational strategy (the Strategy) is to set forth a collaborative process by which Environment Canada (EC) and the United States Environmental Protection Agency (USEPA), in consultation with other federal departments and agencies, Great Lakes states, the Province of Ontario, Tribes, and First Nations, will work in cooperation with their public and private partners toward the goal of virtual elimination of persistent toxic substances resulting from human activity, particularly those which bioaccumulate, from the Great Lakes Basin, so as to protect and ensure the health and integrity of the Great Lakes ecosystem. In cases where this Strategy addresses a naturally-occurring substance, it is the anthropogenic sources of pollution that, when warranted, will be targeted for reduction through a life-cycle management approach so as to achieve naturally-occurring levels. An underlying tenet of this Strategy is that the

governments cannot by their actions alone achieve the goal of virtual elimination. This Strategy challenges all sectors of society to participate and cooperate to ensure success. The goal of virtual elimination will be achieved through a variety of programs and actions, but the primary emphasis of this Strategy will be on pollution prevention. This Strategy reaffirms the two countries' commitment to the sound management of chemicals, as stated in *Agenda 21: A Global Action Plan for the 21st Century* and adopted at the 1992 United Nations Conference on Environment and Development. The Strategy will also be guided by the principles articulated by the International Joint Commission's (IJC) Virtual Elimination Task Force (VETF) in the *Seventh Biennial Report on Great Lakes Quality*. This Strategy has been developed under the auspices of the Binational Executive Committee (BEC), which is charged with coordinating the implementation of the binational aspects of the 1987 GLWQA. The BEC is co-chaired by EC and USEPA, and includes members of the Great Lakes states, the Province of Ontario, and other federal departments and agencies in Canada and the United States (U.S.).

<http://www.epa.gov/glnpo/p2/bns.html>

5.3. Great Lakes Fish Monitoring Program (GLFMP)

Since 1970, the Great Lakes Fish Monitoring Program (GLFMP) consists of two separate programs, the Open Lakes Trend Monitoring Program and the Sport Fish Fillet Monitoring Program. The Open Lake Trend Monitoring Program was designed to examine the health of fish and fish-consuming wildlife through trend analysis of whole body lake trout and walleye while the Sport Fish Fillet Monitoring Program was designed to monitor potential human exposure to contaminants through consumption of popular sport fish species through analysis of chinook and coho salmon and rainbow trout fillets. Contaminants, such as PCBs, toxaphene, chlordanes, nonachlors, and other organochlorine compounds are routinely monitored in GLFMP. Emerging contaminants, such as PBDEs were recently added to the list of contaminants to be analyzed and new chemicals are continuously being considered. The GLFMP also maintains an archive of fish tissue collected over the course of the program.

<http://www.epa.gov/glnpo/monitoring/fish/index.html>

5.4. Great Lakes Human Health Effects Research Program

The program was designed to characterize exposure to chemical contaminants in one or more of the Great Lakes, and to prevent short- and long-term adverse health effects from them.

<http://www.atsdr.cdc.gov/grtlakes/program-goals.html>

5.5. Regional Monitoring Program for Water Quality in the San Francisco Estuary

The Regional Monitoring Program for Trace Substances in the San Francisco Estuary (RMP) is the primary source of information used to evaluate chemical contamination in the Bay. The RMP is an innovative collaborative effort among SFEI, the Regional Water Quality Control Board, and the regulated discharger community. In the RMP, financial resources (\$3 million per year in 2007) from the discharger community are pooled and applied in a strategic, comprehensive manner toward understanding contaminant impacts on beneficial uses of the Bay. The RMP determines spatial patterns and long-term trends through sampling of water, sediment, bivalves,

and fish; effects on sensitive organisms; chemical loading to the Bay; and seeks to synthesize RMP data with data from other sources to provide the most complete assessment possible of chemical contamination in the Bay.

<http://www.sfei.org/index.html>

5.6. Integrated Atmospheric Deposition Network (IADN) – Air and precipitation monitoring in the Great Lakes

The Integrated Atmospheric Deposition Network (IADN) is a system of monitoring stations created under the Canada-US Great Lakes Water Quality Agreement (see also 6.3 in Canada section) and delivered jointly by Environment Canada and the US EPA. Its purpose is to identify and track airborne toxic substances and their sources and to define trends in atmospheric deposition to the lakes. The stations yield data on wet and dry deposition, and gas exchange of pesticides, metals, combustion products and industrial chemicals. The Integrated Atmospheric Deposition Network (IADN) determines the atmospheric loadings of toxic substances to the Great Lakes system and defines temporal (1990 to present) and spatial trends. With one master station on each of the five Great Lakes and 10 additional satellite stations, IADN currently monitors the atmospheric deposition of PAHs (including benzo[a]pyrene), PCBs, Level 1 pesticides, and HCB, among other toxic chemicals (including chemicals of emerging concern). The goals of IADN are not only to determine atmospheric loadings and trends of priority toxic chemicals to the Great Lakes, and to acquire air and precipitation measurements, but also to help determine sources of the toxic chemicals monitored.

<http://www.epa.gov/glnpo/monitoring/air2/index.html>

5.7. California Surface Water Ambient Monitoring Program

The Surface Water Ambient Monitoring Program (SWAMP) is a state-wide monitoring effort designed to assess the conditions of surface waters throughout the state of California. The program is administered by the State Water Board. Responsibility for implementation of monitoring activities resides with the nine Regional Water Quality Control Boards that have jurisdiction over their specific geographical areas of the state. Monitoring is conducted in SWAMP through the Department of Fish and Game and US Geological Survey master contracts and local Regional Boards monitoring contracts.

SWAMP also hopes to capture monitoring information collected under other State and Regional Board Programs such as the State's TMDL (Total Maximum Daily Load), Nonpoint Source, and Watershed Project Support programs. SWAMP does not conduct effluent or discharge monitoring, which is covered under National Pollutant Discharge Elimination System permits and Waste Discharge Requirements.

- [US Environmental Protection Agency Approved SWAMP Comprehensive Monitoring & Assessment Strategy](#)
- [SWAMP Data Available through the California Environmental Data Exchange Network \(CEDEN\)](#)

- [Review the SWAMP Quality Assurance Project Plan \(QAPP\)](http://www.waterboards.ca.gov/water_issues/programs/swamp/)
http://www.waterboards.ca.gov/water_issues/programs/swamp/ and
http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/newsletter/monitor2007spring.pdf
- [SWAMP QAPP Template](#)
- [How to be Comparable with SWAMP QAPP](#)
- [How to be Comparable with the SWAMP Database](#)
- [Funding Opportunities](#)
- [SWAMP Included Programs](#)

The following surface water monitoring programs were included as part of SWAMP: State Mussel Watch, Toxic Substance Monitoring Program, Toxicity Testing Program
http://www.waterboards.ca.gov/water_issues/programs/swamp/programs.shtml

and Coastal Fish Contamination Program.

[http://mercury.ornl.gov/metadata/nbii/html/ceic/gis.ca.gov_catalog_ceic_export_online_CoastalFishContaminationPrgStationInform\(21084\).html](http://mercury.ornl.gov/metadata/nbii/html/ceic/gis.ca.gov_catalog_ceic_export_online_CoastalFishContaminationPrgStationInform(21084).html)

The Citizen Monitoring Program is also being increasingly coordinated with SWAMP. Visit this group's website for example QAPP's for citizen monitoring and Clean Water Team (CWT) technical information: <http://www.waterboards.ca.gov/nps/volunteer.html>, particularly for field efforts (see CWT Resource Materials & Related Websites).

<http://www.swrcb.ca.gov/swamp/>

5.8. Carlsbad Environmental Monitoring and Research Center

The Carlsbad Environmental Monitoring and Research Center is part of the College of Engineering, New Mexico State University, and is located in Carlsbad, New Mexico. The Center serves as a source of expertise for federal, state and private sponsors, providing environmental research, analytical services, technology development, information dissemination and citizen education in five major program areas: radiochemistry, inorganic trace element chemistry, *in vivo* radiobioassay, field sampling, and computer modeling. A major core project at the Center is a long-term program of environmental monitoring in the vicinity of the US Department of Energy Waste Isolation Pilot Plant (WIPP), the first US waste repository for radioactive waste from nuclear weapons development. The WIPP is located near Carlsbad, New Mexico, and approximately 140 miles from the US/Mexico border. The Center currently is conducting other research projects with funding from the National Science Foundation, the US Department of Agriculture, the Environmental Protection Agency, and the US Department of Interior Bureau of Reclamation. The Center also provides various specialized analytical services through contracts with state agencies and private businesses. Current Border Environment Projects and Activities include:

5.8.1. Independent Environmental Monitoring at the Waste Isolation Pilot Plant (WIPP)

The WIPP Environmental Monitoring (EM) project is a long-term study conducted in the region of the US Department of Energy (DOE) WIPP, which is located approximately 140 miles from the US-Mexico border. The WIPP is the first US repository for radioactive waste from nuclear weapons development. The Center's WIPP EM project includes sampling and analyses of air, soil, drinking water, lake water, sediment, vegetation, and the local resident human population, and the results of the studies are made available directly to the public without prior review or approval of the DOE. All data and reports generated for the WIPP EM are posted on the Center's website (www.cemrc.org); information from the project is also contained in annual reports and semi-annual newsletters distributed to regional libraries and other recipients. Data collection for the project began in 1996 and will continue throughout the operational lifetime of the WIPP (approximately 35 years). The project is funded by a grant from the DOE.

5.8.2. Paso el Norte Air Research Project

The Center is a cooperative investigator with scientists at several other universities in this study, which is funded by the Environmental Protection Agency through the Southwest Center for Environmental Research and Policy. The study focuses on characterization of the chemical composition of air particulates and surface soil source materials in the El Paso/Juárez airshed.

5.8.3. Brantley Reservoir Water Quality Monitoring Program

This study is funded by the US Department of Interior Bureau of Reclamation, and is in the third year, with at least three additional years planned. The study involves weekly sampling of selected water quality parameters (such as salinity, pH, dissolved oxygen, temperature) at Brantley Lake, a manmade reservoir on the Pecos River, approximately 12 miles north of Carlsbad, New Mexico. The study is relevant to the border region because the Pecos River flows into the Rio Grande in Texas, and thus directly influences Rio Grande water quality. All data are provided directly to the Bureau of Reclamation and are not released to the public without prior approval from the Bureau.

http://www.borderecoweb.sdsu.edu/bew/drct_pgs/c/cemrc.html

5.9. EPA's National Human Exposure Assessment Survey (NHEXAS)

NHEXAS was developed by EPA's Office of Research and Development (ORD) early in the 1990s to provide critical information about multipathway, multimedia population exposure distribution to chemical classes, and to test the feasibility of conducting a national survey to provide estimates on the status of human exposure to potentially high-risk chemicals. NHEXAS was also designed to measure "total exposure" (i.e., the levels of chemicals that participants take in through the air they breathe; the food, drinking water, and other beverages they consume; and from soil and dust around their homes). As designed, NHEXAS has three phases, including: 1) development and validation of methods; 2) collection of nationally representative exposure data; and 3) study of selected subpopulations. EPA conducted NHEXAS phase I (pilot) surveys in Arizona, Maryland, and EPA Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin). The Region 5 survey also included a Children's Pesticide Exposure Study. EPA has

completed most of the fieldwork for the NHEXAS phase I surveys and is currently analyzing the results. Based on the first study results, EPA finalized the scope and methods for NHEXAS phases (1993).

<http://www.epa.gov/heads/edrb/nhexas.htm>

5.10. *Arctic Monitoring and Assessment Program (AMAP)*

In 1991, the Arctic Council, whose member countries include Canada, Denmark/Greenland, Finland, Iceland, Norway, Russia, Sweden, United States, established the Arctic Monitoring and Assessment Program (AMAP). The purpose of AMAP is to monitor the levels and assess the effects of anthropogenic pollutants in all compartments of the Arctic environment (atmospheric, terrestrial, freshwater and marine environments, and human populations). Currently, most Level 1 PBTs, as well as other analytes, are included in the monitoring program. Although the US is an AMAP member country and participates in the AMAP Working Group, data collection on human body burdens is currently still in the planning phase in US territories.

<http://www.amap.no/>

5.11. *Alaska Maternal and Umbilical Cord Blood Monitoring Project*

The Environmental Protection Agency (EPA) provided \$50,000 in funding to the Alaska Native Tribal Health Consortium (ANTHC) for this project, and the following project collaborators were providing in-kind contributions: CDC's Arctic Investigations Program, National Center for Environmental Health, Alaska Native Health Board, North Slope Borough, Arctic Slope Native Association, Yukon Kuskokwim Health Corporation, and the Institute for Circumpolar Health Studies (ICHS).

The goal of this study was to provide surveillance to prenatal mothers and their children during the first year of life for contaminant levels, diet, reproductive success, and immune system strength. This project also helped to establish a locally based system to engage community members in the regular assessment of environmental health concerns.

The Maternal and Umbilical Cord Blood Monitoring Study had a one-year funding cycle, with the expectation that other federal sources would be secured to provide this service for more mothers throughout the Alaskan Arctic as well as state-wide.

<http://www.ichs.uaa.alaska.edu/projects/maternal.htm>

B. INDEX OF DATA SOURCES: DATABASES AND EMISSIONS INVENTORIES

Databases do not monitor environmental releases of PBTs, but they are useful for collecting, storing, and maintaining monitoring data in a useful and easily accessible manner. Databases can be used to integrate data from multiple monitoring programs into one central repository. A few examples of databases are described below.

1. DATABASES

1.1. *Human Exposure Database System (HEDS)*

HEDS is an Internet-based system to house and distribute human-exposure-related data, such as questionnaire responses, activity and diet diaries, and chemical measurements, from studies conducted by EPA's National Exposure Research Laboratory (NERL) and other exposure researchers. HEDS was designed to work with the Office of Research and Development's Environmental Information Management System (EIMS), using links to EIMS to provide metadata (e.g., short summaries for each study and its data sets) and searching capabilities. The validated study data in HEDS will be from peer reviewed study designs that include acceptable data quality assurance. Study documents, such as quality assurance plans and sample collection and analysis procedures, are also provided along with the data. By interfacing HEDS with EIMS, an abstract for each data set and document is made available with links to the original document or data set. A data dictionary and code table are provided with each data set to show what information is provided in the data set and to explain the numeric codes. The data are provided in text and database formats which can be used by most commercial software packages. These features provide the data to the scientific community in an easy- to-use format with enough information to evaluate the quality and potential uses of the data. HEDS currently contains data from the three National Human Exposure Assessment Survey (NHEXAS) pilot studies that were conducted in EPA Region 5, Maryland, and Arizona.

<http://www.epa.gov/heds/index.htm>

1.2. *Permit Compliance System (PCS)*

The Permit Compliance System (PCS) is a database of information on facilities regulated by National Pollutant Discharge Elimination System (NPDES) permits. PCS was developed to facilitate tracking the permit, compliance, and enforcement status of permitted facilities. Information is submitted by permittees, EPA regional offices, and state staff. The database contains information on when a permit was issued and when it expires, how much a facility is permitted to discharge and actual monitoring data of facility discharges. PCS data include information on many parameters, including all of the Level 1 and most of the Level 2 PBTs.

http://www.epa.gov/enviro/html/pcs/pcs_overview.html

1.3. *Storage and Retrieval (STORET) Database*

EPA's Office of Water maintains a STORage and RETrival (STORET) database of information, dating back to 1965, on surface and ground water quality in the United States. Data are entered and maintained by federal, state and local agencies, Indian tribes, volunteer groups, academics, and others. These entities may enter data collected from projects, surveys, and monitoring programs that they conduct. Data on field monitoring activities in STORET include water, air, or sediment sample collection, biological specimen catch/trap events, or any measurements or observations obtained at a site.

<http://www.epa.gov/storet/dbtop.html>

1.4. Aerometric Information Retrieval System (AIRS) Database

EPA's Aerometric Information Retrieval System (AIRS) is a computer-based repository of information on air pollution in the United States and various World Health Organization (WHO) member countries. The database is maintained by the US Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (OAQPS). States provide OAQPS with annual summaries of monitoring results from State and Local Air Monitoring Stations (SLAMS). Detailed quarterly and annual monitoring results from National Air Monitoring Stations (NAMS) are also submitted to OAQPS. Results from other monitoring sites (e.g., industrial, tribal, other non-EPA) are also included in AIRS. AIRS data pertain to the criteria pollutants carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, particulate matter, and lead. Information is available for specific industrial plants and their components (stacks, points, and segments) regarding operating permit application and renewals, and chemicals released into the air. AIRS is used by states to prepare State Implementation Plans, to track the compliance status of point sources with various regulatory programs, and to report air emissions estimates for pollutants regulated under the Clean Air Act.

http://oaspub.epa.gov/eims/xmlreport.display?deid=2771&z_chk=6354&format=print

1.5. Air Toxics Data Archive

The Air Toxics Data Archive combines state/local data from air toxics monitoring programs with similar data from AIRS into a comprehensive database archive of ambient air toxics measurements. The data are current to 2000 and the archive is updated periodically. The archive was created in support of EPA's National Air Toxics Assessment within the Air Toxics Program of OAQPS. The database is a first step in improving the air toxics information infrastructure to provide a foundation for characterizing the extent of air toxics problems, assess program effectiveness, and provide a basis for future efforts.

<http://vista.cira.colostate.edu/atda/>

1.6. National Contaminant Occurrence Database (NCOD)

The National Contaminant Occurrence Database (NCOD), developed by EPA to satisfy the regulatory requirements of the Safe Drinking Water Act, contains occurrence data provided by Public Water Systems and other sources (like the US Geological Survey National Water Information System) on physical, chemical, microbial, and radiological contaminants in public water systems. NCOD contains data (back to 1983) on regulated contaminants with health-based drinking water maximum contaminant levels and on unregulated contaminants required to be monitored by public water systems; however, not all states/territories, or public water systems within states/territories, have reported these data. NCOD also contains ambient water quality data from USGS for river basins from 1991 to 1998.

<http://www.epa.gov/safewater/data/ncod/index.html>

1.7. Superfund Site Information

Superfund is the name given to the environmental program established to address abandoned hazardous waste sites. It is also the name of the fund established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended ([CERCLA statute](#), [CERCLA overview](#)). This law was enacted in the wake of the discovery of toxic waste dumps such as [Love Canal](#) and [Times Beach](#) in the 1970s. It allows the EPA to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for EPA-led cleanups.

<http://www.epa.gov/superfund/index.htm>

1.8. Pesticide Compliance Monitoring

EPA's Compliance Monitoring program assures compliance by the regulated community with environmental laws and regulations through inspections, field monitoring, and other investigations. EPA provides [compliance monitoring information](#) by programs, as well as on inspections, and self-evaluation tools.

Individuals applying pesticides must do so in a manner not only consistent with federal laws, but also with state laws and regulations that may differ from state to state. In general, states have primary authority for compliance monitoring and enforcing against use of pesticides in violation of the labeling requirements. Additionally, the agency with primary responsibility for pesticides differs from state to state. Usually, the responsible agency is a state's department of agriculture, but it may be a state environmental agency or other agency.

<http://www.epa.gov/pesticides/enforcement/monitoring.htm>

1.9. EPA GeoData Gateway (GDG)

The GDG is EPA's central geospatial metadata access point. It stores metadata about geospatial assets maintained by Geospatial Data Stewards across the Agency.

Specifically, the GDG was developed to:

- Provide EPA staff with a single access point to EPA's geospatial assets from various EPA Program and Regional Offices; and
- Meet legislative and regulatory mandates and Agency requirements for geospatial metadata compliance, sharing, and management.

As the central location for distributed geospatial resources, the GDG helps support external federal initiatives, such as Geospatial One-Stop. The Geospatial One-Stop (GOS) is a geoportal that provides public access to geospatial information as part of a United States e-government initiative.

Information (in the form of geospatial metadata) is contributed to the GDG catalog from EPA Regions, Programs and Labs. Each metadata record describes an EPA geospatial asset and provides information that enables one to locate and view each registered item or service within the GDG. In many cases, one will be able to link to the resource described directly from the metadata record. In some cases, one will need to contact the resource owner using the contact

information provided in the metadata.

Each EPA office designates a GDG Steward (see ‘How to Participate’ for more information) who establishes the GDG publishing process for their organization. One of the key publishing methods is called ‘harvesting.’ Harvesting allows distributed EPA offices to contribute geospatial metadata to the GDG central catalog using an automated, scheduled process. GDG Stewards who choose to contribute to the GDG using harvesting only need to maintain records locally, and information stored in the GDG catalog is synchronized with the local files on a scheduled basis (e.g., weekly, bi-weekly, monthly).

<http://datagateway.nrcs.usda.gov/>

1.10. *NASA’s Global Change Master Directory (GCMD)*

The goal of the directory is to enable users to locate and obtain access to earth science data sets and services relevant to global change and earth science research. The GCMD database holds more than 20,000 descriptions of earth science data sets and services covering all aspects of earth and environmental sciences. One can use the search box or select from the available keywords to search for data and services. NASA encourages participation in writing and maintaining the database information; authoring tools are available for assistance. In addition, subscription services are available to notify one of new entries. The Committee on Earth Observation Satellites (CEOS) International Directory Network (IDN) Interoperability Forum is available to discuss content and database issues.

<http://gcmd.nasa.gov/Aboutus/sitemap.html>

1.11. *NOAA National Environmental Satellite, Data and Information Service (NESDIS)*

National Oceanographic and Atmospheric Administration's (NOAA) National Coastal Data Development Center (NCDDC) is dedicated to supporting ecosystem management by providing access to the Nation's coastal and ocean data resources.

NCDDC fulfills this mission by bringing together diverse coastal data from a variety of sources and creating ways for users to access data via the Internet. In order to make coastal data more accessible, NCDDC maintains a searchable metadata catalog of coastal data, develops gateways to data repositories, and uses technology that allows users to receive data in specific formats for their needs.

To enhance their mission, NCDDC forms partnerships across NOAA and with agencies in federal, state and local government, academic institutions, and nongovernmental organizations that collect or provide coastal data and information. By maintaining these partnerships, NCDDC is able to know what partner data collections are available and produce dynamic end-to-end data and information products.

http://portal.ncddc.noaa.gov/portal/jsp/search_options.jsp

2. EMISSIONS INVENTORIES

Emissions inventories provide information about the sources of PBTS and their relative contributions to total releases, as well as trends in PBTS releases. Releases of mercury, dioxins, and PCBs to all media are reported in national inventories. Air emissions of several Level 1 and Level 2 PBTs are estimated in a regional inventory for the Great Lakes states. For more information: http://binational.net/bns/strategy_en.pdf.

2.1. *National Emissions Inventory*

Formerly known as the National Toxics Inventory, the National Emissions Inventory (NEI) is prepared by EPA's Emissions Inventory and Analysis Group every three years. The NEI is a national database of outdoor air emissions information developed with input from numerous State and local air agencies, from tribes, and from industry. This database contains information on stationary, area, and mobile sources for criteria air pollutants and their precursors, as well as the 188 hazardous air pollutants (HAPs) listed in the CAA. The database includes estimates of annual emissions, by source, of air pollutants in each area of the country, on an annual basis for all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. Emissions estimates for individual point or major sources (facilities), as well as county-level estimates for area, mobile and other sources, are available currently for years 1990 and 1996 through 2002 for criteria pollutants, and for years 1999 and 2002 for HAPs. For more information, see <http://www.epa.gov/ttn/chief/net/index.html>.

The NEI is also used to develop the National Air Toxics Assessment (NATA) conducted every three years. NATA investigates human health impacts from outdoor air, chronic exposures, assuming they remain constant throughout a person's lifetime. NATA uses a large subset of the 188 HAPs for analysis and the assessment includes both cancer and noncancer impacts from air inhalation. <http://www.epa.gov/ttn/atw/nata1999/nsata99.html>.

2.2. *Toxics Release Inventory*

EPA's Toxics Release Inventory (TRI) contains basic facility information and chemical reports on more than 650 toxic chemicals that are being used, manufactured, treated, transported, or released into the environment, including all chemicals regulated under Section 313 of the Emergency Response and Community Right-to-Know Act. Manufacturing facilities as described in SIC codes 20-39 and utilities (e.g., SIC codes 4911, 4931, 4939) that have ten or more employees and that meet reporting thresholds (manufacture or process 25,000 pounds or otherwise use 10,000 pounds of a listed chemical) are required to report their releases annually. TRI includes releases to air, water, land, and underground injection, chemicals stored on-site, and off-site transfers. In 2000, an amendment to lower the TRI reporting threshold for a number of high risk PBTs became effective. The reporting threshold for PCBs, HCB, OCS, toxaphene, mercury, and polycyclic aromatic hydrocarbon compounds was lowered to 10 pounds per year. The reporting threshold for dioxins and dioxin-like compounds was set at 0.1 gram. Data collected under the new requirements were to be made available in 2002.

<http://epa.gov/tri/>

2.3. Great Lakes Regional Toxic Air Emissions Inventory

The Great Lakes Regional Toxic Air Emissions Inventory is an ongoing initiative to provide regional data on source and emission levels of toxic contaminants from the best available data for point, area and mobile sources in the Great Lakes Basin (including the states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin, in addition to the Canadian province of Ontario). Inventories have been produced for 1996, 1997, 1998, 1999, 2001, 2002 and the 2005 (to be released in 2008). The latest inventories have included emissions for roughly 200 compounds from more than 2000 types of sources throughout the region.

<http://www.glc.org/air/>

Global Atmospheric Passive Sampling (GAPS) Network for Latin America and Caribbean (GRULAC)

The first year results (January–December 2005) from the Global Atmospheric Passive Sampling (GAPS) Network provided baselines of air concentrations for persistent organic pollutants (POPs) at nine sampling sites in the Latin America and Caribbean (GRULAC) region. In many cases, these data represent the first measurements of POPs in this region and will be useful for assessing temporal and spatial trends and regional and global transport of POPs in air.

The GAPS Network has been active at eleven sites in the GRULAC region since 2005.

Table 1. Information on sampling locations in the GRULAC region (PO = polar; BA = background; RU = rural; AG = agricultural and UR = urban)

Site ID	Location	Country	Site Type	Latitude	Longitude	Elevation (m a.s.l.)
GR01	La Palma	Cuba	BA	22°45'N	83°32'W	47
GR02	Veracruz	Mexico	RU	19°12'N	96°08'W	
GR03	Tapanti NP	Costa Rica	BA	09°42'N	83°52'W	2830
GR04	Arauca	Colombia	RU	7°01'N	70°45'W	100-120
GR05	Huayna Potosí 5200 m a.s.l., La Paz	Bolivia	BA	16°16'S	68°08'W	5192
GR06	Chungara Lake	Chile	BA	18°13'S	69°10'W	4320
GR07	Indaiatuba (near Campinas)	Brazil	BA	23°09'S	47°10'W	624
GR08	Bahia Blanca	Argentina	AG	38°45' S	62°15'W	
GR09	Coyhaique	Chile	BA	45°35'S	72°02' W	
GR10	Tláhuac	Mexico	UR	19°14'N	99°00' W	2260
GR11	St. Peter and St. Paul Rocks	Brazil	BA	00°56'N	29°22'W	

CONCLUSION

It is apparent that there are many and very valuable monitoring initiatives ongoing in North America. This report is an attempt to provide interested governments, academics, nongovernmental organizations, indigenous peoples and the general public with an information source that can potentially be useful for making decisions related to the state of the environment and human health in North America.

The descriptions provided above are not intended to be inclusive of every significant monitoring program within the national boundaries of the NAFTA countries. This initial attempt at cataloguing the multitude of available programs, networks and facilities is intended to be a starting point for a continuing inventory of programs. It will be up to the three NAFTA Parties whether they continue this work on their own, or under the auspices of another agency such as the Commission for Environmental Cooperation of North America.

The Secretariat of the CEC and, in particular, the staff of the Sound Management of Chemicals Program wish to express their appreciation for the patience and diligence of the many responders who have helped to make this report as comprehensive as possible.