

## **Concept Description: Promotion of a Sustainable Regional Approach to Monitoring and Assessment of Toxic Chemicals**

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### **Objective:**

The objective of this work is to develop and implement a North American sustainable regional approach to environmental and human exposure to environmental chemicals monitoring, including biomonitoring.

### **Rationale:**

To effectively reduce risks associated with chemical exposures, decision makers need to understand not only the concentration of toxic chemicals of concern in both the environment and in humans, but also how these levels are changing over time and across North America. Collection, assimilation and assessment of data from monitoring is an important tool to be used in the decision making process, particularly in efforts to understand the location and concentration of chemicals in the environment, to identify and prevent potential problems, to evaluate the effectiveness of chemicals management strategies, and to set priorities for chemicals management. A well conceived and sustainable regional monitoring program can benefit North America in all these areas.

A cooperative, sustainable regional approach to monitoring is essential to address risks associated with short and long range transport of chemicals via atmospheric currents and water courses, and to monitor toxic chemicals throughout their life cycles. Developing and implementing a North American monitoring network will enable decision makers to identify areas of risk on a regional scale. In addition, a regional approach to monitoring will help decision-makers link the effects of environmental policies and chemicals management between national jurisdictions. Short-term monitoring initiatives can provide limited focused information while a sustainable long-term regional approach to monitoring can be designed to provide more robust information about long-term trends in the levels of substances and to allow detection of changes.

The SMOC initiative of the CEC is well suited to support a sustainable regional approach to monitoring. Through the North American Regional Action Plan (NARAP) on Environmental Monitoring and Assessment (EM&A) and the EM&A Standing Committee that leads this work, cooperative monitoring efforts spanning the three countries are being developed and implemented. The EM&A Standing Committee brings together preeminent environmental monitoring and human bio-monitoring experts and policy leaders in North America. These individuals bring their knowledge, experience, and network connections to the table to discuss the needs and capacities for monitoring in the three countries.

Information gained from a regionally integrated monitoring and biomonitoring effort will strengthen the Parties' knowledge base regarding toxic chemicals in humans and ecosystems in North America. Besides providing information directly related to the assessment of risks, this information could also be beneficial for further development of the CEC's North American Atlas Project and for the work on State of the Environment reporting. Mapping of the information has

the potential to provide for decision makers a visual representation of the levels of environmental contaminants in North America and can illuminate trends over time or trends across the continent and more specifically, across sensitive ecosystems

**Key components of the work:**

In developing this sustainable approach to monitoring and bio-monitoring on a North American scale, it is essential to consider elements such as infrastructure sustainability, interagency integration, national priorities, national capacity, stakeholder priorities, trilateral priorities, and how such work links to the ongoing work of the CEC in its various mandates.

A critical element of a regional monitoring program is long-term sustainability. A long-term program is necessary to detect baseline levels, establish long-term trends, and alert authorities to changes in either increasing or decreasing levels of toxic substances. As such, the monitoring initiative must benefit from a policy commitment in such a way that the monitoring sites and analytical infrastructure remain a priority for the long-term. Sustainability of a regional monitoring program requires commitments from the various levels of governments of the three countries to support the full range of activities making up the regional approach, from sample collection to data analysis and results dissemination. In order to be successful, any proposal for this work should focus on ensuring the long term sustainability of the initiative.

One way to contribute to the sustainability of a regional monitoring approach is to integrate the ongoing and planned work of relevant government departments in the three countries as well as with other pertinent sectors such as academia, industry, and stakeholders. Government departments involved with chemical monitoring, such as trade, the environment, natural resources, agriculture, fisheries and health – which can vary from country to country depending on their domestic authority – should all be invited to become involved in the development and implementation of the approach. Realizing a sustainable regional approach will necessitate cooperation between such departments in all three countries. To maximize the effectiveness of the work, monitoring efforts that are already underway in industry and academic institutions should also be considered; these institutions should be invited to integrate their ongoing or future work into the regional monitoring effort. In the short term, SMOC will keep in mind the monitoring that is underway in the three countries, particularly information exchange and cooperation across the North American countries, and to include this monitoring in developing a regional monitoring and bio-monitoring program.

Key to the sustainability of the regional monitoring approach is the degree to which it meets national monitoring priorities and addresses international obligations. The information generated must be useful and relevant on a variety of critical faculties: to national decision makers; at the continental/regional scale; and on the global scale, for example, by providing information on chemicals included in international treaties such as the Stockholm Convention as well as providing new information on substances of emerging concern.

In addition to the actual monitoring and data analysis, it will be important to undertake an appropriate assessment of mechanisms focused on information dissemination and use. Governments need to be prepared to respond openly and transparently to a host of scenarios

resulting from the data generated. Credible and scientifically valid interpretations of data collected and analyzed need to be presented in a manner that establishes public confidence and conveys a mechanism for risk minimization if and where required. This will include communications materials explaining the results and their implications in formats accessible to a variety of audiences in all three countries.

A sustainable regional monitoring program will likely take the form of a network of monitoring sites. Current analytical chemistry protocols – including standardized and validated methods and normalized quality assurance programs – are key to producing data that is compatible and comparable. This will require significant advance planning by technical experts to ensure that the results can be harmonized to create a regional picture.

This monitoring work should also support the ongoing work of the CEC. When applicable, work should be linked to the objectives of the CEC’s North American Regional Action Plans (NARAPs). Monitoring and bio-monitoring may also be linked to work under the CEC’s Pollutant Release and Transfer Registry (PRTR) program. In addition, data from monitoring and bio-monitoring could be incorporated into the CEC’s North American Environmental Atlas and State of the Environment reports.

#### Stakeholder Involvement

The monitoring work should also be developed with the participation of stakeholders – from Non-Governmental Organizations (NGOs), indigenous and local communities, industry, and academia – from all three countries in order to ensure that stakeholder needs and priorities are addressed as well. Stakeholder support and participation in the regional monitoring work will contribute to its long-term sustainability.

#### Leveraging Funding

The sustainability of this initiative will require funding commitments to lay the groundwork for regional monitoring in all three countries. To this end, the CEC will continue its support to Mexico in its efforts to seek multi-year funding from appropriate International Funding Institutions (IFI) for development of a national monitoring network. These funds will help Mexico to strengthen national capacity and build the necessary program and agency infrastructure to ensure long-term, sustained monitoring efforts. With monitoring and biomonitoring, Mexico can strengthen its contributions to a regional monitoring network, and ensure a sustainable regional approach to monitoring and assessment of toxic chemicals.

### **Examples of future projects**

#### SMOC Working Group and EM&A Standing Committee

Information Road Map: The SMOC WG has identified as a key activity the development of an “Information Road Map” in order to strengthen the CEC’s information base from which trilateral decisions can be made regarding chemicals and contaminants on air, land and water. The Road Map will support priority identification, establishment of baselines, coordinated actions, and measurements of success. The project will allow for development of comparable North American information on chemicals of mutual concern. A regional human monitoring

information could be based on current or proposed domestic programs; for example, the National Health and Nutrition Examination Survey (NHANES) is one of the U.S. components on health monitoring; Health Canada is considering implementation of a health monitoring program in Canada; and Mexico's program will address their needs, but also will have common elements with the U.S. and Canadian programs. The common elements of the three programs could be used to develop the regional health monitoring information.

Availability of HPV data: The SMOC WG also identified outreach to the public to use the HPV data available on chemicals as a possible activity to complement the Information Road Map. Currently, under OECD auspices, Canada, the U.S., the European Union and Japan are developing a Global High Production Volume Portal to allow international access to chemicals toxicity and environmental fate information. The project could include education and training on how to access and use the information to all interested stakeholders, training on how to use the information to undertake science-based risk assessments, and training on how to use the information to generate risk management options. These activities could be designed as a regional effort to address chemicals of mutual concern; or as capacity building activities to assist each country to address specific domestic priorities.

### Stakeholders

Development of a sustainable approach to monitoring and biomonitoring in North American will not only depend upon the support of the governments, but also the support of North American stakeholders and other levels of government. The EM&A SC will work to identify collaboration opportunities with these potential participants and engage them through active dialogue.

The CEC will be looking for support from stakeholders to identify possible actions such as:

1. creating a linked network between the three countries through which researchers can periodically interact to share the results of their research and develop research programs that will lead to comparable data;
2. information dissemination;
3. participating in decisions or projects related to monitoring in high risk populations;
4. sharing ongoing research and sponsoring some of the work; and
5. providing technical assistance to undertake monitoring activities and to assess such information.

### **Linkages to work in other international fora/under other international agreements:**

Actions supporting sound management of chemicals should include work to be carried out in the CEC context, and encourage linkages through bilateral, trilateral, or multilateral initiatives of the three countries outside of the CEC (including through UNEP and OECD), and through domestic actions. The CEC recognizes that although it is an ideal forum through which the three Parties can collaborate on chemical issues of mutual concern, it is not designed, nor does it have the resources to encompass work on all chemical issues in North America. For example, the use of HPV data will support on-going efforts under the OECD to make the chemicals data available internationally.

## **Annex: Past CEC Activities and Planned CEC Activities to support the Promotion of a Sustainable Regional Approach to Monitoring and Assessment of Toxic Chemicals.**

### **CEC's Work through the EM&A Initiative**

The CEC's EM&A Initiative has helped to lay the groundwork for a regional approach to monitoring and bio-monitoring. The key projects are described below.

#### **Compilation and Assessment of Monitoring Data and Capacity:**

- **Analysis of Persistent, Bioaccumulative and Toxic Substances (PBTS) information in Mexico:** The CEC, through the EM&A, has initiated a pilot study to summarize and assess PBTS information from "gray literature" in Mexico. The information will be assessed and, where appropriate, indicate baseline or historical information for Mexico.
- **Assessment of Mexican monitoring networks and laboratory capacity:** The CEC has initiated a study to identify existing monitoring sites and laboratories in Mexico that are involved in collecting and analyzing PBTS. This study will summarize key information about the sites and laboratories, such as their institutional affiliation, funding, the substances which they are equipped to analyze, the media in which they can analyze these substances, and their involvement in QA programs, in order to assess their ability to participate in the developing national program.
- **Identification of index and satellite monitoring sites:** Initial tasks underway for a North American monitoring network include the identification and designation of "Index Sites" and "Satellite Sites" for the monitoring and assessment of persistent toxic substances in North America. Index Sites are the primary long-term multimedia sampling sites within the network. These sites, which will promote and facilitate the systematic collection of ambient background data and information on the concentrations, fluxes and effects of persistent toxic substances in the environment. Satellite Sites are also long-term monitoring sites and will be coordinated with Index Sites so that data is comparable, but these sites may be influenced by extenuating conditions such as proximity to urban populations, impacted by industrial emissions or located to monitor the impacts of agricultural activities. In the United States and Canada, these sites are generally extensions of existing networks; in Mexico, an integrated sustainable monitoring network is being considered as described below. The EM&A Standing Committee has elaborated the criteria for these sites and begun a consideration of potential sites. It is proposed that work to be undertaken in 2007, as described below, will result in the selection of both Index and Satellite sites.

#### **Promotion of Sustainable Monitoring and Assessment Infrastructure in Mexico:**

- **Development of PRONAME:** The CEC Secretariat and environmental monitoring experts from all three North American countries are working with officials in Mexico to upgrade monitoring and assessment capacity to better inform environmental and human health decision-making. Planning for Mexico's "Programa Nacional de Monitoreo y Evaluación Ambiental" (PRONAME), a proposal to develop a sustainable large-scale, long-term

environmental monitoring and human bio-monitoring program is underway. PRONAME will serve as the Mexican contribution to a North American monitoring network.

Studies of monitoring and analysis capacity in Mexico as well as the compilation of baseline monitoring data available from Mexico are laying the groundwork for PRONAME. Assistance to Mexico for a monitoring program is being provided through conference calls and workshops of tri-national environmental and bio-monitoring experts. Through PRONAME, long-term monitoring sites in Mexico will be utilized and, if not available, they will be established. These sites will form part of an Integrated North American Monitoring Network. As the majority of the experts involved in this effort focus on environmental monitoring – in media such as air, precipitation, sediments, water, and biota – the PRONAME is likely to focus more on environmental monitoring initially. Although PRONAME will include bio-monitoring and be strongly linked to human health, a full national approach to a human health bio-monitoring program may need separate considerations.

A workshop of science experts is being planned for early 2007. This workshop will include environmental monitoring and human bio-monitoring experts from all three North American countries. The workshop will identify Mexico's priorities and needs for developing a national monitoring program. The sessions will focus on: selecting monitoring sites; selecting media and substances to monitor; infrastructure and capacity needs; developing standards and protocols for sampling, analysis and data management; and facilitating inter-agency collaboration. The output will be a preliminary plan for Mexico's national monitoring program that will be reviewed by science and policy experts and considered for a funding application to appropriate international funding institutions.

- Inter-laboratory quality assurance (QA) study and workshop: This study was conducted by Environment Canada with the support of the CEC and the US EPA. Common Reference Standards and sample extracts with known contaminant concentrations were distributed to participating laboratories (8 in Mexico, 4 in Canada, and 4 in the United States) in order to evaluate and compare the analytical precision, accuracy and comparability of the North American laboratories that are active in POPs studies and build QA capacity in Mexico. As part of the QA exercise, a workshop is planned for early 2007: to exchange information regarding valid methodologies for sampling and analysis, to discuss future inter-lab studies, and to formulate some Quality Assurance guidelines for future tri-national monitoring activities.

#### Capacity Building through Tri-National Monitoring Programs:

- Maternal blood bio-monitoring: Undertaken with the support of the Canada POPs Fund, administered by the World Bank, this project included sampling of 240 first-time mothers at 10 sites in Mexico and mothers at 5 sites in Canada and 2 new sites in the United States, with the inclusion of existing comparable data from the US' National Health and Nutrition Examination Survey (NHANES). Using multiple laboratories and comparable and compatible sampling and analysis protocols to ensure consistency across the three countries, samples are being analyzed for PCBs, pesticides, toxic metals and dioxins and furans. Through the collection of samples in a consistent and comparable manner and through

standard analytical techniques and accepted quality assurance and quality control methodologies, this initiative is intended to provide a preliminary baseline that can be used to determine priorities for, and track progress in, management of these toxic substances both domestically and on a North American scale. A tri-national summary report is planned for 2007.

- Mercury air monitoring: 1) Wet Deposition: For two years, (2004-2006), the Mexican Institute for Water Technology (IMTA) operated mercury wet deposition monitors at two sites in Mexico as part of a pilot project sponsored by the CEC and integrated into the Mercury Deposition Network. For these two years, samples were shipped to Frontier Geosciences Laboratories in Seattle, WA, USA, and with their in-kind contribution of analysis of all of the samples, data was generated and is available for use by modelers across North America. These stations met the criteria to be part of the Mercury Deposition Network (MDN) of the United States and Canada. A lack of support led to the closure of the Mexican sites at the end of the two year period. 2) Total Gaseous Mercury: Several local gaseous mercury monitoring campaigns were conducted in the City of Zacatecas at brick furnaces, mining zones and two plants of secondary mercury recovery; Mexico City Metropolitan Area; as well as in Puerto Angel, Oaxaca and Huejutla, Hidalgo, the two sites selected for mercury wet deposition monitoring. Municipal solid waste (MSW) disposal sites were also studied.
- Biota monitoring: A pilot project to analyze mercury levels in more than 200 fish tissue samples from Mexico was undertaken in 2006. This project was undertaken at Canada's National Wildlife Research Centre in Ottawa and supported by the CEC's SMOC program. This exercise has provided Mexico's national lab (CENICA) with the opportunity to build analytical capacity to prepare and analyze fish tissue samples in a manner consistent with Canadian analytical protocols. The data from this study should be comparable to similar data from Canada and the US.
- Sediment core sampling: With CEC support, sediment cores were extracted from two remote lakes in different regions of Mexico in 2005, in order to reconstruct historical background concentrations and trends in deposition of dioxins and furans. Changes in laboratory availability have led to a delay in the dioxins and furans analysis, but the sediment cores remain in storage, and the CEC is working to facilitate their analysis in 2007.
- Soil and vegetation sampling: The city of Zacatecas sits in the center of a well known mining region located at the transition of the eastern flank of the southern Sierra Madre Occidental province. The CEC, working with Mexican officials, implemented a pilot study to investigate levels of toxic metals, including mercury, lead and cadmium in local soils and vegetation to investigate possible contamination by runoff from the leftover tailings of many years of mining.

### **Projects identified for priority action**

The priority projects that could contribute to a sustainable regional approach to monitoring and bio-monitoring are summarized below. These projects are identified in the CEC's Operational Plan for 2007-2009.

### Compilation and Assessment of Monitoring Data and Capacity:

- Grey literature study in Mexico: This undertaking will compile academic studies and other sources of information, focusing on “gray literature” such as doctoral theses and unpublished studies found in Mexican universities, and focusing on priority toxic substances. This project will build on a pilot “gray literature” study undertaken in 2005 and 2006 that focused specifically on research conducted in and around Mexico City. The information will provide an improved baseline understanding of PBTS levels in Mexico.
- Compilation of information about ongoing monitoring activities in each country: The EM&A Standing Committee will coordinate a project to assess existing efforts related to monitoring of NARAP substances as well as other PBTS monitored in the same networks, across North America. The compilation of information on current monitoring activities will also result in recommendations for all three countries about monitoring.
- Further development and implementation of an integrated tri-national monitoring network: A key activity will be to identify North American index sites from which data will be collected and harmonized. The program will recognize and incorporate compatible monitoring and assessment efforts in the countries to provide a common “knowledge base related to contaminants” for the North American region.

### Promotion of Sustainable Monitoring and Assessment Infrastructure in Mexico:

- Policy leaders’ workshop to identify national priorities: Following on the 2007 science experts workshop, North American monitoring and assessment experts will meet with Mexican policy leaders to inform on the national PRONAME initiative, secure support for and commitment to long-term environmental monitoring and human bio-monitoring and assessment infrastructure in Mexico. The workshop will result in secure commitments from Mexican leaders from multiple departments for long-term support for a national monitoring program. These outputs will be included in the proposal for the Mexican environmental monitoring and human bio-monitoring program, PRONAME, presented to an International Funding Institution.
- Finalization and submission of an application to an International Funding Institution: A proposal for a Mexican environmental monitoring and human bio-monitoring program will be presented to an International Funding Institution. The proposal will be based on outcomes of the 2007 science experts and the policy leaders workshops, both of which will include Mexicans from multiple agencies, and monitoring experts from the U.S. and Canada.
- Fortification of intergovernmental links: The SMOC WG is working to increase the involvement in its work of multiple Ministries (Secretariats) in the Mexican government. In addition to the various departments within SEMARNAT, such as INE and CENICA, the participation of the Mexican Secretariat of Health (Salud) and its associated departments, such as INSP and COFEPRIS, are essential to a successful long-term monitoring program.



- Fortification of stakeholder-government links: Through its ongoing outreach to stakeholders and inclusion of stakeholders in planning sessions, the SMOC WG is working to ensure that the regional monitoring approach addresses stakeholder priorities and involves stakeholder in an appropriate manner. A multi-stakeholder workshop is planned for 2007 to further engage stakeholders in this monitoring effort.
- Continued support to quality assurance studies: Analytical facilities will be involved in round-robin testing and verifications to promote quality assurance and quality control while enhancing accuracy and precision of data.

#### Capacity Building through Tri-National Monitoring Programs:

- Dioxins and furan air monitoring: In 2007, Mexico will begin operation of its ambient air monitoring network for dioxins and dioxin-like compounds. This network, which includes six pre-established monitoring sites, will parallel the operational structure of the United States National Dioxin Air Monitoring Network (NDAMN). Field operators for the monitoring sites were trained in 2006, and the US EPA has committed to do the laboratory analysis of the samples for two years. The Parties will work to integrate Mexican data with the US' data generated by the National Dioxin Air Monitoring Network (NDAMN) during its operation from 1998 to 2005, Canada's National Air Pollution Surveillance Network (NAPS) data and Integrated Atmospheric Deposition Network (IADN) data to produce a North American Air Monitoring Network database for dioxins and dioxin-like compounds.
- Biota monitoring: These projects will provide information to all three North American countries about the levels of selected PBTS in various biota. These projects will result in new data for Mexico that is comparable to data from the US and Canada, thereby improving the understanding of levels of PBTS across the region and increased information for decision-making in Mexico. It is proposed that seed money from the CEC will be used to augment established monitoring of biota such as bi-valves and gull eggs, with resources and data contributions leveraged from other organizations and agencies. While generating new information, the projects will help to build capacity in Mexico by introducing new monitoring and analysis techniques.
- Application of a sequential chemical speciation in contaminated sites in Mexico: During 2007-2008, Mexico will initiate a project to identify the available fraction of mercury (methyl-mercury and other species) in contaminated sites through the use of a sequential chemical speciation methodology. In this study, soil and sediment samples will be taken in 10 selected contaminated sites in Mexico, particularly in sites where important mining activity takes places.