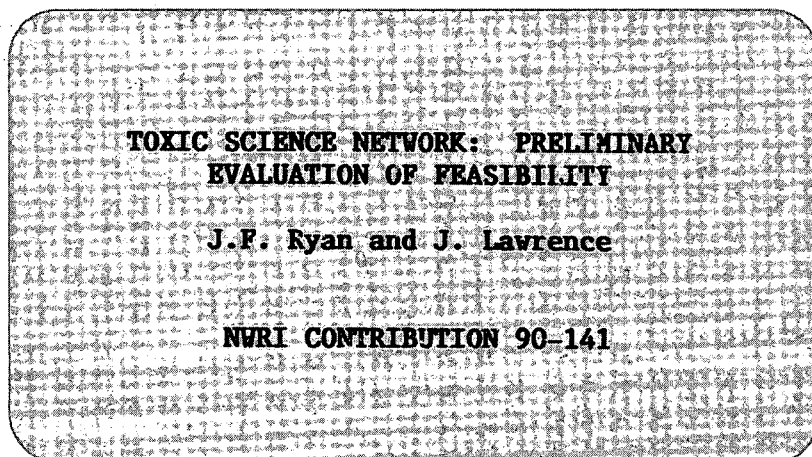


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**TOXIC SCIENCE NETWORK:
PRELIMINARY EVALUATION OF
FEASIBILITY**

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EXECUTIVE SUMMARY

The proceedings of the CEPA Science Forum, hosted by NWRI, February 21st to 23rd, 1989, recommended the creation of a national science stakeholders network, in order to help provide the research and scientific information required for the implementation of CEPA. This assessment was undertaken to explore the feasibility of implementing this recommendation.

A preliminary concept for a Toxic Science Network has been formulated based on an analysis of the deliberations of the CEPA Science Forum. Results suggest that the creation of such a network, based on the "best available expertise" from across Canada, is feasible. However, the Network's successful development and effectiveness will be dependent upon (1) clearly defining the research and information needs of C&P toxic science, through a comprehensive science plan; (2) establishing a properly funded and well defined secretariat to provide administrative and financial support; and (3) providing adequate financial and other incentives for stakeholders, particularly universities.

Discussions with a sampling of experts and representatives, from federal and provincial government, university, industry, non-government organizations and others were encouraging and revealed potential areas of interest and cooperation within a science network concept.

There is an abundance of information on Canadian expertise in environmental science and technology and chemical toxicology. A bibliography of these information sources is attached and could be the basis for the preparation of a Directory of Canadian Expertise, relevant to C&P's toxic science needs.

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RÉSUMÉ À L'INTENTION DE L'ADMINISTRATION

Dans le compte rendu du forum scientifique sur la LCPE tenu à l'INRE du 21 au 23 février 1989, on recommandait la création d'un réseau national de partenaires scientifiques afin d'aider à effectuer la recherche et à recueillir l'information nécessaires à l'application de la LCPE. La présente évaluation visait à déterminer s'il était faisable de suivre cette recommandation.

On avait exprimé l'idée d'un réseau de toxicologie en se basant sur une analyse des délibérations du forum scientifique sur la LCPE. D'après les résultats de l'évaluation, il serait possible de créer un tel réseau, basé sur la "meilleure expertise disponible" au Canada. Toutefois, le bon développement et l'efficacité d'un tel réseau dépendra des facteurs suivants : 1) définition claire des besoins en ce qui concerne la recherche et les informations nécessaires relatives à la toxicologie C et P, grâce à un plan scientifique détaillé; 2) établissement d'un secrétariat dont le rôle sera bien défini et qui disposera de fonds suffisants; et 3) compensations financières et autres mesures incitatives adéquates pour les partenaires, particulièrement pour les universités.

Les discussions avec certains experts et représentants des gouvernements fédéraux et provinciaux des universités, de l'industrie, d'organismes non gouvernementaux et autres ont été encourageantes et elles ont permis de mettre en évidence des secteurs d'intérêt et de collaboration qui pourraient s'inscrire dans le cadre d'un réseau scientifique.

Il existe beaucoup d'information sur l'expertise canadienne dans le domaine des sciences et technologies environnementales et de la toxicologie chimique. On a joint une liste de ces sources d'information. Cette liste pourrait servir de base à la préparation d'un répertoire de l'expertise canadienne pertinente en ce qui concerne la toxicologie C et P.

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ABSTRACT

A preliminary evaluation was undertaken of the feasibility of establishing a C&P toxic substances science network to help address the science requirements of CEPA. A concept for a Toxic Science Network has been developed from an analysis of the proceedings of the CEPA Science Forum and from discussions with representatives from government, university, industry and non-government organizations. The results suggest that a multi-disciplinary science network based on the "best available expertise" in Canada is feasible provided that the science needs are well defined, adequate funding is made available and an appropriate administrative mechanism is established. A listing of the various directories and inventories that could be useful for identifying relevant Canadian scientific expertise and research capability is appended.

RÉSUMÉ

Le présent document fournit un cadre de travail pour l'acquisition ordonnée et systématique d'information pouvant conduire à des prises de décision éclairées en ce qui concerne l'évaluation et la limitation des effets néfastes des substances toxiques. Cette information servira à établir les exigences scientifiques, à court terme et à long terme, de la LCPE. En appendice, on trouvera une liste préliminaire établie grâce à la participation des gestionnaires des programmes C et P liés en partie aux substances toxiques, des directeurs des groupes de travail chargés de l'évaluation et de ceux qui interviendront dans le choix des options de contrôle après l'évaluation.

TABLE OF CONTENTS

	<u>PAGE</u>
EXECUTIVE SUMMARY	i
ABSTRACT	iii
BACKGROUND	1
STUDY DESIGN	2
RESULTS	2
(i) Analysis of Forum Proceedings	2
(ii) Sources of Information on Canadian Scientific Expertise	3
(iii) Interviews	4
DISCUSSION	5
(i) Nature and Scope of the Network	5
(ii) Organizational and Fiscal Aspects	6
CONCLUSION	8
APPENDICES	9
Appendix A - Sources of Information on Canadian Expertise	9
Appendix B - Organizations Contacted	14

BACKGROUND

The National Water Research Institute (NWRI) hosted a Science Forum, February 21st to 23rd, 1989, to address the science needs of the Canadian Environmental Protection Act (CEPA). One of the specific objectives of the Forum was to examine the research and information needed to complete the assessments of substances on the CEPA Priority Substances List (PSL). The overall conclusion of the two day meeting was that although expertise to address the science requirements of the PSL does exist in Canada, the mechanism for bringing it together is not yet available, and therefore the first science challenge of CEPA is largely organizational.

The implementation of CEPA depends to a large degree on the establishment of a solid scientific foundation. One of the major recommendations of the Science Forum was that the CEPA management framework and implementation plan should include an explicit five year science plan that is integrated with, but implemented separately from, the other elements of CEPA (assessment, control and regulation). Recommended elements of such a science plan included designation of a single federal responsibility centre for CEPA science and the creation of a national CEPA science stakeholders network.

After two days of discussion at the Forum, involving experts from across Canada, representing governments, industry, universities, non-government organizations (NGOs) and others, one key question remained in doubt, and that was whether those responsible for CEPA could develop and draw together a national network of scientific stakeholders from the Canadian research community at large in order to meet the research and scientific information needs of the act.

The present study was undertaken to provide guidance to the Environment Canada Toxic Substances Coordinating Committee on the feasibility

of developing a national toxic substances science network. For the purposes of this study the name of the network will be abbreviated to "Toxic Science Network".

STUDY DESIGN

In order to scope out the feasibility of establishing a Toxic Science Network, it was necessary to address the following:

- (i) the size, scope, role and function of the Network;
- (ii) the availability of information on Canadian scientific expertise in the required fields of environmental sciences and related disciplines;
- (iii) the potential for cooperation from the various sectors in establishing a Toxic Science Network.

To address these issues, an analysis of the Proceedings of the Forum was undertaken; sources of information on Canadian scientific expertise and research capability relevant to the implementation of CEPA were explored; and experts and/or representatives from federal and provincial governments, university, industry and NGOs were interviewed.

RESULTS

(i) Analysis of Forum Proceedings

The Science Forum saw the proposed Network as a multi-disciplinary grouping of scientific stakeholders from the Canadian research community. It was recommended that this national Network should be comprised of the "best available expertise" from federal government departments and agencies, provincial ministries, universities, industry and NGOs.

The purpose and primary role of the Network would be to assist the Federal Government in meeting the research and scientific information needs of CEPA, which cover both environmental and health aspects. In essence this means assisting with the credible implementation of CEPA by helping to fulfill the science needs of the assessment, regulation, monitoring, inspection and enforcement activities of the Act. The scope of the science requirements for CEPA is very broad, ranging from environmental fate and toxicology to new testing procedures and protocols, to innovative pollution control and treatment technologies.

The ecosystem framework of CEPA requires a truly multidisciplinary network that includes, particularly for the control aspects of the Act, the social sciences as well as the biological/life sciences and the physical/earth sciences. The Network should focus on activities that are unique and especially important to Canada, such as the presence, transformation, effects and control of (toxic) substances in the Canadian environment.

The Science Forum recommended that, once the Network is established, it should take on secondary roles such as providing support to the National and Provincial Environment and Economy Roundtables, and acting in an advisory capacity for the State of the Environment (SOE) reporting and other related federal and provincial programs. However, this could detract from the primary role of the Network and therefore is not recommended at this time.

(ii) Sources of Information on Canadian Scientific Expertise

The Science Forum recommended publishing a directory of Canadian expertise to facilitate the rapid establishment of a Network. Appendix A provides a listing of the various directories and inventories that could be used for identifying Canadian scientific expertise relevant to the various components of CEPA. The sources are useful not only for identifying

individual specialists and experts in the relevant scientific fields, but also for providing information on universities and university affiliated research centres or institutes which have research capability in the appropriate areas of environmental science and toxicology.

Although there is an abundance of information on the scientific expertise and research capability within government and university sectors, information on the chemical industry's scientific expertise and research capability does not appear to be as well documented. Such information may be pursued through associations such as the Canadian Chemical Producers Association (CCPA), through organizations such as the Institute of Chemical Science and Technology (ICST) or through the Chemicals and Investments Directorate of Industry Science and Technology Canada (ISTC).

(iii) Interviews

Representatives from government, university, NGOs and the chemical industry, were contacted to discuss the concept of a national science stakeholders network and to obtain information on Canadian scientific expertise. Individuals from the organizations listed in Appendix B were contacted.

The degree of interest and cooperation encountered during this phase of the study was encouraging. The concept of the Network was generally well received and many of those contacted appeared genuinely interested in the creation of such a network, offering suggestions and assistance. The interviews were productive in terms of identifying sources of information on Canadian scientific expertise and research capability, as well as in obtaining feedback on the establishment of the Network.

It should be noted that several areas of cooperation have in fact already been established for certain aspects of CEPA Science. Environment Canada and Health & Welfare Canada, have already established important

collaborative links with the Ontario Ministry of the Environment (MOE) and the Canadian chemical industry. MOE is sharing information on the development of the ministry's data base and screening system for the assessment of 180 chemical substances that fall under the province's Municipal-Industrial Strategy for Abatement (MISA) program. The Canadian Chemical Producers Association (CCPA) is establishing shadow task groups to complement the federal governments task groups which are responsible for the assessment of the substances on the PSL. Also, the Canadian chemical industry, through CCPA, is setting up an information network of chemical producers which will be expanded in the future to include chemical users. CCPA hopes to make the unpublished international data of the industry accessible through the cooperation of the American, European and Japanese chemical industries.

DISCUSSION

(i) Nature and Scope of the Network

In developing a Toxic Science Network, it is important to recognize that such a network cannot be all things to all people and cannot be comprised of all stakeholders. As part of the implementation framework, a multi-year science plan should be prepared which clearly defines the toxic science needs of C&P. With an established science plan the scope of the Network can be sharply focused. Consequently, the preparation of the Science Plan should receive high priority to facilitate the creation of the Network.

The guiding principle in developing a Toxic Science Network should be to create a network of the best expertise wherever that expertise resides in Canada. This would further assist in limiting the size of the Network to a manageable dimension and result in a more effective network. However, to determine the "best expertise" in the various fields of environmental science and technology will require difficult, subjective and judgemental decisions which can only be made by appropriate peer groups.

To create a climate to succeed and to reduce the likelihood of challenges to government decisions with respect to the assessment and regulation of CEPA priority substances, it would be prudent to selectively include representatives of Canadian environmental groups and associations of the Canadian chemical industry (producers and users). Canadian environmental groups currently number about 1800 strong. Many have little science expertise per se and have evolved as single-issue citizen groups with a local or regional focus. However, the groups that should be included in the Network are the well established, highly visible groups, that have a broad national focus, such as Pollution Probe, Friends of the Earth, etc. These groups could provide a social science aspect to the Network, that is necessary for a truly multi-disciplinary approach. Likewise, associations representing the chemical industry should be included as part of the Network. The results of the assessments and subsequent regulations arising from the Act will be of fundamental importance to the chemical industry. In addition to providing the specialized expertise of their members, participation of associations such as CCPA, will create an atmosphere of openness and help secure the cooperation and collaboration of the industrial sector.

(ii) Organizational and Fiscal Aspects

For the Network to operate effectively, an organizational framework and infrastructure are essential in order to establish clear lines of responsibility and accountability, and to provide the necessary administrative support. The Science Forum suggested that a "CEPA Science Responsibility Centre" be established within an existing federal government research establishment. Should the Responsibility Centre envisaged by the Forum not materialize, the Network should be administered through a separate secretariat which has links to C&P research institutes.

Regardless of whether or not the secretariat is associated with a research institute, it would serve primarily as a facilitator and its function

would be one of liaising and coordinating. Essentially, the secretariat would provide a mechanism for matching the toxic science needs of C&P to the "best available expertise" in Canada, through liaison with scientists/experts and Environment Canada managers.

Most important of all, the development and maintenance of a Toxic Science Network will be dependent upon adequate funding being available. The cost of administering the Network is difficult to assess without detailed information on its size and the operational demands that will be placed upon it. For the sake of manageability, it is recommended that the size of the Network at any one time be limited to a maximum of 250 experts. A rough estimate of the resources required to administer the Network would be 4 PY with an annual cost of about \$200K for salaries and benefits, \$200K for O&M and \$100K for Capital.

Enlisting the participation of experts from other government departments and agencies should present little difficulty because of national interest. Likewise mobilizing provincial expertise should be feasible because of parallel interests and commonalty of purpose. For the chemical industry, participation in the Network should present an opportunity to enhance their image as responsible corporate citizens working together with government and others in the best interest of Canadians. There is however, a more pragmatic reason for industry's active involvement. Industry has a stake in the outcome of the assessment of CEPA priority substances because regulations resulting from the assessments will directly impact their businesses. University researchers, however, will need to be very strongly encouraged to address the long-term research needs of CEPA. The major incentive for university participation will be the provision of adequate funding for research. Therefore, it is imperative that a toxic science research fund in the order of \$4 million annually be established for this purpose and that it be supplemented by matching funding from NSERC (Natural Sciences and Engineering Research Council).

CONCLUSION

In conclusion, it would appear that the creation of a national multi-disciplinary science network to help address the toxic science needs of C&P is feasible, provided that:

- 1) the science needs are well defined in a detailed science plan;
- 2) the network is kept reasonably small (a maximum of 250 experts/specialists);
- 3) a well-defined secretariat or administrative infrastructure is established and;
- 4) adequate new resources are made available to fund toxics related research projects as well as to cover the cost of the development and operation of the network.

APPENDIX A

SOURCES OF INFORMATION ON CANADIAN EXPERTISE

I INFORMATION ON INDIVIDUAL SPECIALISTS

(i) Directories

Canadian Directory of Aquatic Toxicologist and Related Specialists. Compiled and edited by P.G. Wells. First Edition. Ottawa, Ontario, Environmental Protection Services, Environment Canada, 1985. Series No. EPS 5/AT/1. 143p. [To be updated in 1990].

Canadian Sources of Environmental Information, 1988. Edited by Agatha Bystram. Ottawa, Ontario, Document and Library Services, Environment Canada, 1988. 335p. [To be updated in 1990].

Directory of Marine and Freshwater Scientists in Canada, 1989. Ottawa, Ontario, Communications Directorate, Department of Fisheries and Oceans, 1989. Canadian Special Publication of Fisheries and Aquatic Sciences 104, Catalogue No. Fs 41-31/104. 253p.

International Directory of Acid Deposition Researchers, 1985-86. Compiled by Steven F. Vozzo. Saint Paul, Minnesota. The Acid Rain Foundation, Inc., 1986. 177p.

1988 Directory, American Society of Limnology and Oceanography. Glouster Point, Virginia, American Society of Limnology and Oceanography, 1988. 102p.

Province of Ontario Great Lakes Directory, 1987. Buffalo, New York, Great Lakes Program, State University of New York at Buffalo, 1987. 48p.

The Directory of North American Fisheries and Aquatic Scientists. Edited by Beth D. McAleer. Second Edition. Bethesda, Maryland, American Fisheries Society, 1987. 363p.

(ii) Supplementary Sources

Canadian Environmental Protection Act Priority Substances Science Forum: A Forum Report. Edited by Jane Waterson. Ottawa, Ontario, Rawson Academy of Aquatic Science, 1989. 137p. [List of Participants].

An Inventory of Environmental Research Projects Compiled by CCME (Canadian Council of Ministers of Environment) Research Advisory Committee. [Database information available from Mr. C. Banwell, National Data Coordinator, phone (819) 994-2152].

Directory of Federally Supported Research in Universities, 1984-1985. Thirteenth Edition. Volume 1, 2, & 3. Ottawa, Ontario, Canada Institute for Scientific and Technical Information (CISTI), National Research Council of Canada, 1986. [Updated information available online through CAN/OLE (Canadian On-Line Enquiry) System].

Environmental Assessment in Canada: Directory of University Teaching and Research, 1985-1986. Compiled and edited by Ann Simpson. Ottawa, Ontario, Federal Environmental Assessment Review Office, 1986. [To be updated in 1989].

Inventory of Canadian Agri-Food Research (ICAR). [Database information available from Cameron Laing, Agriculture Canada, phone (613) 995-7084].

Inventory of Research and Development Projects, 1988. Toronto, Ontario, Ontario Ministry of the Environment, Research and Technology Branch, Environmental Research Program, 1988. 334p.

National Workshop on the Status of Toxicology in Canada, Proceedings. Ottawa, Ontario, Science Council of Canada, 1985. Catalogue No. SS24-21/1985. 34p. [List of Participants].

Sixteenth Annual Aquatic Toxicity Workshop, 1989. [Mailing list available from Dr. Art Niimi, Continuity Chairman of Workshop, phone (416) 336-4868].

The Knowledge Source Index. Ottawa, Ontario, Canada Institute for Scientific and Technical Information (CISTI), National Research Council of Canada. [Database information available from Reference Department of CISTI, phone (613) 993-2013].

II

INFORMATION ON ORGANIZATIONS

Canadian Almanac & Directory, 1989. Edited by Susan Bracken. Toronto, Ontario, Copp Clark Pitman Ltd.

Canadian Chemical Register, 1986/87. Volume 2. Ottawa, Ontario, Chemicals Directorate, Department of Regional Industrial Expansion [now called Industry Science & Technology Canada], 1987. 161p.

Consulting Engineers, Canada. Fourteenth Edition. Volumes 1 & 2. Ottawa, Ontario, Association of Consulting Engineers of Canada, 1986.

Directory of Associations in Canada, 1987. Edited by Brian Land. Eighth Edition. Toronto, Ontario, Micromedia Limited, 1987. 654p.

Directory of Federal Government Science & Technological Establishments, 1987. Ottawa, Ontario, Statistics Canada, 1987. Catalogue No. 88206E. 148p.

Directory of Industrial Research and Development Facilities in Canada, 1986. Ottawa, Ontario, Statistics Canada, 1986. Catalogue No. 88205E. 163p. [or equivalent, produced by Industry Science and Technology Canada].

Environmental Industry Associations. Project leader, William Glenn. Final Report. Don Mills, Ontario, Corpus Information Services, 1987. 25p. [study undertaken for Environment Canada, Contract No. KA-171-7-1286].

International Research Centres Directory, 1988-89. Edited by Darren L. Smith. Fourth Edition. Volume 1. Detroit, Michigan, Gale Research Company, 1988. 758p.

Life Sciences Organizations and Agencies Directory. Edited by Brigitte T. Darnay and Margaret Labash Young. First Edition. Detroit, Michigan, Gale Research Company, 1988. 864p.

1987 Corpus Almanac and Canadian Sourcebook. Edited by Gordon Sova. Twenty-second Edition. Volume 1. Don Mills, Ontario, Corpus Information Services, 1987.

Research Centres Directory, 1988. Edited by Peter D. Dresser. Twelveth Edition. Volume 1. Detroit, Michigan, Gale Research Company, 1988. 828p.

Scientific and Technical Organizations and Agencies Directory. Edited by Margaret Labash Young. Second Edition. Volumes 1 & 2. Detroit, Michigan, Gale Research Company, 1987. 1670p.

Scientific and Technical Societies of Canada, 1986. Ottawa, Ontario, Canada Institute for Scientific and Technical Information (CISTI), National Research Council, 1986. NRC No. 26601.

The Canadian Chemical Industry: A Corpus Survey. Edited by Mary Mancini. Don Mills, Ontario, Corpus Information Services, 1986. 178p.

The Great Lakes Directory of the Natural Resource Agencies and Organizations, 1984/85. Edited by Paula Ripley. Chicago, Illinois, the Centre for the Great Lakes, 1984 212p.

The World of Learning, 1988. Thirty-eighth edition. London, England, Europa Publications Limited, 1987. 1929p.

APPENDIX B

ORGANIZATIONS CONTACTED

Federal Government Departments and Agencies

- Environment Canada
- Fisheries & Oceans Canada
- Industry Science & Technology Canada
- Statistics Canada
- The National Research Council
- The Science Council of Canada

Provincial Government Ministries

- Ontario Ministry of the Environment
- Ontario Ministry of Industry Trade & Technology

Non-Government Organizations

- Rawson Academy of Aquatic Science
- Canadian Institute for Advanced Research
- The Institute of Chemical Science and Technology
- Canadian Environmental Law Association
- Canadian Environmental Network
- Friends of the Earth
- Pollution Probe

University

- University of Toronto (Institute for Environmental Studies)

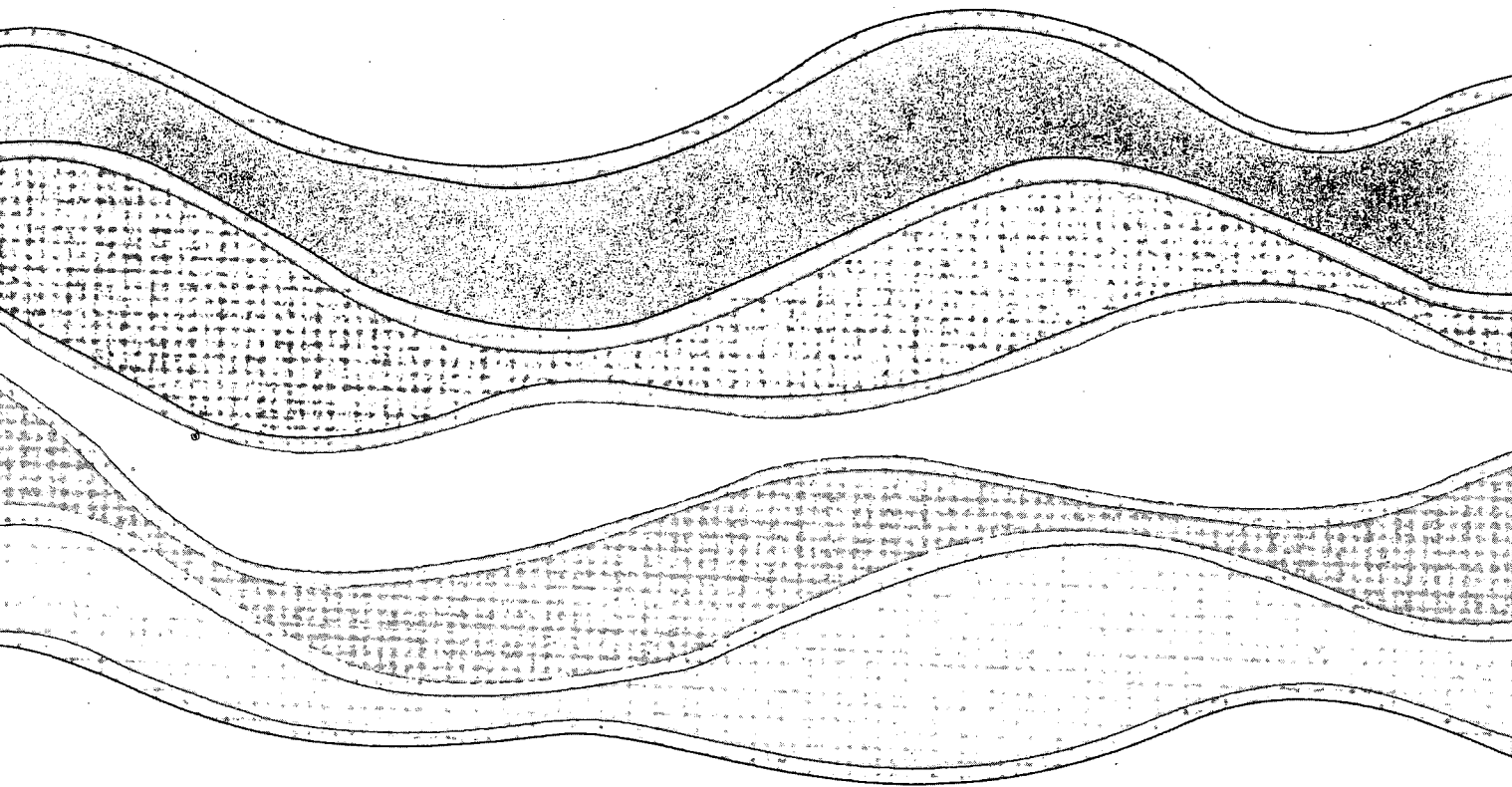
Industry

- Canadian Chemical Producers Association
- Rockcliffe Research and Technology Inc.

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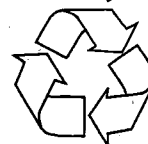


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