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April 28, 1997

Mr. Brian Torrie
Voisey's Bay Panel Secretariat
Canadian Environmental Assessment Agency
13th Floor, Fontaine Building
200 Sacre-Coeur Boulevard
Hull, Quebec K1A 0H3

Dear Mr. Torrie:

**RE: Draft EIS Guidelines for the Voisey's Bay Mine/Mill Project
EAS 95-154**

Staff of Environment Canada have reviewed the "Draft Environmental Impact Statement (EIS) Guidelines for the Review of the Voisey's Bay Mine/Mill Project" within the context of the departmental mandate, which is provided in Appendix 1. The following comments are offered for your consideration:

Section 2.0 - The EIS as a Basis for Public Review

The criteria used to define the cumulative effects of the project (c.f. Sections 2.0, 7.4, 8.4 & 10.0) have not been used uniformly in the draft guidelines. For example, in Section 2.0 (e), reference is made to "the short and long-term cumulative effects of the Project in combination with other projects or activities that *have been or will be carried out*". Section 7.4 refers to an assessment of cumulative effects where the proponent "*shall discuss the potential for further development at the Voisey's Bay site*" where the discussion includes "*such possibilities as development of new ore deposits, whether by the Proponent or other parties, increasing the capacity of on-site facilities and infrastructure and any modifications to the proposed transportation systems*". Section 8.4 states that the EIS shall assess the "*long and short-term cumulative effects of the project when combined with past, existing and potential future development identified by the Proponent*". Lastly, the proposed approaches for monitoring in



Section 10.0 (e), request a description for "monitoring the *cumulative effects of the Project and future development of the Voisey's Bay area*".

In order to be consistent, the same definition of cumulative environmental effect should be used throughout the draft guidelines, as described in the "Memorandum of Understanding on Environmental Assessment of the Proposed Voisey's Bay Mining Development" (i.e. the additive and interactive effects of an undertaking in combination with other projects or activities that have been or will be carried out).

With regard to the phrase "projects or activities that have been or will be carried out", the guidance document entitled "Assessing Cumulative Environmental Effects and Socio-Economic Effects" (Appendix V in Environment Canada's Canadian Environmental Assessment Act Handbook), interprets this to mean *imminent projects or activities occurring over a certain period of time and distance*. It is therefore recommended that when evaluating cumulative effects of the mine/mill project, only those projects and activities that are imminent at the time of the assessment be considered. In our opinion, speculation about potential activities or projects in the distant future will be of limited value to this assessment.

Section 3.4 - Application of the Precautionary Principle

Environment Canada supports application of the precautionary principle as fundamental to the concept of sustainable development. The precautionary principle is incorporated into a number of federal government policies including: "Pollution Prevention - A Federal Strategy For Action", "Toxic Substances Management Policy", and the "Canadian Biodiversity Strategy". We would strongly encourage the proponent to adopt this principle in the development of the mine/mill project by erring on the side of caution whenever a serious threat is posed to the quality of the environment.

Section 3.5 - Full Consideration of Aboriginal Knowledge

A useful guide in the consideration of aboriginal knowledge in environmental assessments is the draft document prepared by the Centre for Traditional Knowledge entitled "The Participation of Indigenous Peoples and Their Knowledge in Environmental Assessment and Development Planning" (1996). These guidelines define traditional knowledge and describe: a useful step-by-step approach to assist indigenous people in participating in the environmental assessments of projects that have impacts on the environment and therefore their way of life; and a framework within which the managers of environmental assessment and development planning projects can operate, to ensure the appropriate inclusion of indigenous peoples and their traditional knowledge.

Section 5.2 - Regulatory Environment

In addition to identifying applicable regulatory approvals and permits, the proponent should address its commitment to involvement in voluntary compliance programs, and to achieving the goals of government agreements, policies, guidelines and codes of practice.

In our opinion, speculation on possible changes in the regulatory environment over the life of the project will be of limited value to the assessment. The proponent, should however, be aware of proposed changes to regulations concerning mining that are likely to be enacted in the near future (i.e. imminent) and to consider the implications of these changes on the proposed development. For example, the Metal Mining Liquid Effluent Regulations (MMLER) are currently under review. A multistakeholder group responsible for the "Assessment of the Aquatic Effects of Mining in Canada" (AQUAMIN) has prepared and submitted a report to the Minister of the Environment, which contains recommendations for changes to the MMLER. These recommendations will be considered in modifying the MMLER. As these changes are likely to occur in the near future, the proponent will be in a position to evaluate the implications for the mine/mill operations.

Section 5.3 - The Proponent

In describing the relevant experience of the parent company over the last 10 years, consideration should also be given to its international mining operations, together with the applicable standards in the countries in question.

With regard to subsection (a), it should be noted that although all non-compliance actions in Canada may not have been significant, the relative frequency and similarity of the incidents would also be important.

Section 6.1 - Spatial Boundaries

The port and shipping routes noted in Section 7.1.2 (f & g), should be incorporated in the spatial boundary of the project. The boundaries should also encompass the geographic extent of ecosystem components and environmentally sensitive areas (i.e. habitat) that support migratory birds, species at risk (e.g. species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered, threatened and vulnerable, as well as species with provincial or regional designations), indicator species (e.g. eagles), and other species of concern (e.g. concentrations of migrating birds, bird colonies).

When considering cumulative effects, the principal criterion should always be the expected extent of the project's effects. The effects of other projects and activities can be used as secondary criteria for defining geographic boundaries.

Section 7.0 - Project Description

Subsection (e), which considers the effects of the environment on the project design, should be expanded to include: the potential impacts of various meteorological and hydrological conditions (e.g. precipitation, evaporation, wind, temperature, ice, waves, surface and ground water flows) on the project (e.g. effect of ice on marine transportation); the sensitivity of the project to variations in these conditions including extreme events (e.g. potential impact of probable maximum precipitation on integrity of a tailings pond); and the potential implications of climate change and related effects on the operation, decommissioning or abandonment of the project (e.g. precipitation and evaporation in relation to long-term water balance for a decommissioned tailings pond).

Section 7.1.1 - Construction Phase

The proponent should consider how areas of discontinuous permafrost, high ice content soils, thaw sensitive slopes and areas of unstable ground will affect the construction of infrastructure (e.g. roads, airstrip, diversion ditches, collection ponds, dams). Hydraulic conductivity and stability evaluations for soils underlying dam structures, waste rock, diversion ditches and treatment ponds should be carried out.

This section should also describe how explosives will be used and managed, and how the proponent will ensure that acid-generating materials are not used in the construction of the required infrastructure (e.g. roads and airstrip).

Section 7.1.2 - Operation Phase

Subsection (a), concerning mining operations, should include the use and management of explosives (e.g. ammonium nitrate fuel oil mixtures-ANFO) in blasting operations, and the subsequent release of nitrates. Information on acid rock drainage (ARD) sampling and analysis should be provided as part of an environmental management plan (see Section 7.2).

Subsection (b), describing milling operations, should also consider the interaction of chemicals added with those present in the ore and concentrate themselves, and the possibility of creating new compounds requiring treatment. With respect to tailings disposal installations, information should be provided on the designs and types of dams to be constructed, together with the materials to be used in their construction.

Subsection (c), should include site drainage and seepage, together with effluents, and should describe: sources, characteristics and estimated quantities of contaminants (e.g. metals, suspended solids, ammonia, milling reagents, thiosalts, de-icing agents, oil and grease, and dust suppressants) released to receiving waters.

With respect to air emissions, subsection (c) should include descriptions of: sources, characteristics and estimated quantities of contaminants (e.g. oxides of nitrogen, carbon dioxide, suspended particulate matter, metals and metal compounds) emitted to the atmosphere.

Subsection (d), concerning water diversion and drainage operations and structures, should be expanded to address the following issues: groundwater and surface water regimes, and the management of mine water; plans to divert water away from the open pit and tailings impoundment to minimize the amount of water requiring treatment; potential effects on the water supply (e.g. drawdown) from the drilling of wells; potential effects on the flow of water in affected streams resulting from diversion activities, including seasonal effects; and engineering criteria (e.g. 1:100 year precipitation event, runoff coefficients) for dams, spillways and ditches.

Subsection (e)(i), describing liquid waste treatment facilities, should discuss how the sludges resulting from the treatment of minewater, runoff, and effluents from the tailings impoundment and waste rock disposal pond will be managed. The management of ethylene glycol as a de-icing agent should also be discussed. Subsection (e)(ii), concerning storage and deposition facilities, should include descriptions of storage and preparation facilities for ANFO explosives.

Provisions for ongoing rehabilitation of the site throughout the life of the project should be described in subsection (i).

Section 7.2 - Management Plans

The proponent should be required to describe how adverse environmental effects will be avoided through siting, scheduling and pollution prevention measures that have been incorporated into the planning of this project.

As part of a waste management plan in subsection (a), the proponent should describe plans for handling ARD. Methods proposed to sample and analyze waste rock, together with techniques to predict and model ARD potential should be explained. In addition, the criteria used to distinguish ARD-generating material from non-ARD-generating material should be defined.

A water supply and management plan identified in subsection (c), should contain provisions to conserve and recycle water wherever possible.

A plan to control air emissions, specified in subsection (e), should consider the control of dusting from mining operations (e.g. open pit, roads, storage sites), as well as those from the mill itself.

An emergency response and contingency plan in case of spills, as identified in subsection (i), should also address spills along the shipping route, and should include the following elements: a hazardous material spill risk assessment (e.g. identification of sites most likely to be affected such as fuel storage areas); spill prevention measures incorporated into the design of the facility (e.g. berms, safety valves); spill response procedures; identification of spill response personnel; training for response personnel; and a resource and environmental sensitivity spill protection strategy (e.g. identification of resources at risk in the environment).

Section 8.1 - Physical Environment: Baseline Data and Impacts

With regard to subsection (f), the impact of the release of effluents, site drainage and seepage from mining and milling operations should be described by considering: predicted changes to the quality of receiving waters with reference to baseline conditions, relevant trends in the state of the environment, Section 36 of the Fisheries Act, the Metal Mining Liquid Effluent Regulations (MMLER) and the Canadian Water Quality Guidelines (as they pertain to the protection of aquatic life); and predicted changes to groundwater quality with reference to baseline conditions and relevant trends in the state of the environment.

The proponent should discuss the impacts of air emissions on ambient air quality (subsection h) with reference to: baseline conditions; relevant trends in the state of the environment and, as applicable, the "National Ambient Air Quality Objectives for Air Contaminants" published under Part I of the *Canadian Environmental Protection Act*; and the probability of malfunctions of pollution control/prevention equipment. The contribution of estimated greenhouse gas emissions to total provincial greenhouse gas emissions and total industry greenhouse emissions nationwide should also be described.

Section 8.2 - Biological Environment: Baseline Data and Impacts

Environment Canada supports an ecosystem-based approach to resource and environmental management as described in the Environment Canada publication entitled "The Ecosystem Approach: Getting Beyond the Rhetoric" (1996) and the Canadian Council of Ministers of the Environment (CCME) document "A Framework for Developing Ecosystem Health Goals, Objectives, and Indicators: Tools for Ecosystem-Based Management" (1996). An ecosystem can be defined

as an assemblage of biological communities, including human beings, interacting with one another, and with the environment (comprised of air, land, and water) in which they live. An ecosystem approach is a geographically comprehensive approach to environmental planning and management that recognizes the interrelated nature of environmental media and that humans are a key component of ecological systems; it places equal emphasis on concerns related to environment, the economy and the community. Information describing the ecosystem approach is provided in Appendix 2.

When considering interactions of biological components with the physical environment, the proponent should concentrate on valued ecosystem components (VEC's) such as those species identified by COSEWIC as being at risk (endangered, threatened and vulnerable) as well as those species with provincial or regional designations. Examples of species at risk that should be considered as VEC's are the endangered Harlequin Duck and Peregrine Falcon. Other candidates for study as VEC's include indicator species (e.g. caribou and top-level predators such as eagles), other species of concern (e.g. concentrations of migratory birds, seabird and seaduck colonies, and raptors), sensitive and critical wildlife habitat, wetlands, and protected areas or proposed protected areas.

Specific effects of the project on biological components of the environment that should be addressed include the following: impacts on migratory birds, species at risk (e.g. Harlequin Duck) and wetlands, resulting from changes to hydrological conditions caused by stream diversions and water withdrawals from proposed wells near Reid Brook; impacts of effluents, site drainage and seepage on migratory birds and species at risk (e.g. Harlequin Duck) with reference to baseline conditions and relevant trends in the state of the environment; impacts of air emissions on migratory birds and species at risk, and related habitats; disturbances to migratory birds, species at risk and indicator species due to air traffic associated with the mine/mill; potential loss and fragmentation of habitats with reference to baseline conditions and relevant trends in the state of the environment; and the potential loss of wetland functions.

When evaluating the impacts of contaminants on wildlife, consideration should be given to assessing the impacts of planned, as well as accidental and unplanned events, on terrestrial, marine and freshwater environments using a risk assessment approach. A terrestrial risk assessment should consider receptor species such as a long-lived herbivore and a top-level predator. Risks assessed should include wildlife exposure to contaminants in dust accumulating on vegetation surrounding the site. Impacts of contaminants on biodiversity should also be addressed.

Marine risk assessment should include top-level predators of both mollusk- and fish-based food chains as receptor species. Risks assessed should include those

resulting from accidental losses of ore concentrate and petroleum hydrocarbons on marine habitat around the port, in addition to those from chemicals and oil spills associated with shipping on the endangered Peregrine Falcon. Impacts of contaminants on biodiversity should also be addressed.

Freshwater risk assessment should include a top-level predator and the endangered Harlequin Duck. Risks assessed should include wildlife exposure to contaminants from the tailings impoundment. Impacts of contaminants on biodiversity should also be addressed.

Section 8.3 - Socio-Economic Environment: Baseline Data and Impacts

The proponent should identify criteria for determining the significance of socio-economic effects. Relevant criteria include: the probability of the event occurring; the number of people affected; the duration of the impacts; the value of benefits and costs to impacted groups; the extent to which the impacts are reversible or mitigable; the likelihood of causing subsequent impacts; the uncertainty of possible effects; and the presence or absence of controversy over the issue.

Section 10.0 - Monitoring Programs

The results of the ecological risk assessment for wildlife should be used by the proponent in planning which indicator species/VEC's will be selected for study in the environmental effects monitoring program. This will serve to protect species at risk, migratory birds, species of concern and biodiversity in terrestrial, marine and freshwater environments.

The proponent should describe the reporting mechanisms that will be used to comply with the MMLER. For example, the location of the laboratory (i.e. either on- or off-site), its accreditation and the quality assurance/quality control methods should be specified. In the event that the laboratory is off-site necessitating the shipment of samples, the proponent should indicate how corrective actions in response to a violation can be made, if the results are not available until after the violation has occurred.

DETAILED COMMENTS

Section 2.0 - The EIS as a Basis for Public Review

Subsection (f)- add "...plans for **pollution prevention**, mitigation...."

Section 4.2 - Presentation of the EIS

In the second sentence of the last paragraph, the word scientific should be added as follows: "...requires the use of **scientific and** technical language, a glossary defining **scientific and** technical words and acronyms shall be included."

It would be useful if the maps presented by the Proponent identified the project boundary area, as well as sites that were sampled as part of the baseline study programs.

Section 5.3 - The Proponent

Subsection (b)- add- "**time to respond, follow-up actions and strategies to prevent re-occurrences**"

Section 6.2 - Temporal Boundaries

Consideration should be given to substituting the term close-out in place of abandonment.

Section 7.1.2 - Operation Phase

Subsection (b)(iii)- add "...stability of tailings, **dam/liner designs, dam management plan, anticipated dam raises, ...**"

Subsection (b)(iv)- add "...handling, **including minimization**".

Subsection (f)- add "...shipping, **transfer and storage, dust control measures,...**"

Section 7.2 - Management Plans

Subsection (a)- add "**pollution prevention, waste management...**"

Subsection (b)- modify as follows "a plan to **minimize, control** and mitigate any contaminants such as metals, **suspended solids** ... including any **acid rock drainage...**"


Section 9.1 - Mitigation

Second paragraph- Modify as follows "Proposed mitigation measures shall be described by phase (**design, construction...**)"

Add in between subsection (a) and (b)- "procedures that would be used to eliminate, reduce or control adverse environmental effects."

I trust these comments will be of use to the Panel members. If there are any questions, please submit them in writing to me and I will provide a response as soon as possible.

Yours truly,



Ian McCracken
Environmental Assessment Section
Pollution Prevention Division

IMcC/bmp

Attachments

cc I. Travers
G. McLean
B. Milko
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EA Section
R. Parker
R. Albright
J. Bamwoya
J. MacLellan
R. St. Pierre (S. Porter, C. Baker, S. Beauchamp, B. Beattie)
J. Gibb (D. Ambler, G. Howell, K. Doe)
R. Gautreau (B. Turner, S. Gilliland, D. Amirault, N. Burgess, A. Smith)
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W. Ernst (L. Rutherford, A. MacKinnon)
P. Hennigar (D. Cooper, M. Fingas, P. Lambert)
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APPENDIX 1

Mandate, Roles and Responsibilities of Environment Canada

The Department of the Environment was created in June 1971 following proclamation of the Government Organization Act in 1970. The Department of the Environment Act (1970) provides Environment Canada with general responsibility for environmental management and protection of the natural environment as described below:

Department of the Environment Act

The *Department of the Environment Act* (1970) established the federal Department of the Environment (Environment Canada) and delegated responsibility to the Minister for:

- the preservation and enhancement of the quality of the natural environment, including water, air and soil quality;
- renewable resources, including migratory birds and other non-domestic flora and fauna;
- water;
- meteorology;
- the enforcement of regulations made by the International Joint Commission regarding the management of transboundary waters between Canada and the U.S.;
- and the coordination of federal policies and programs as they relate to the preservation and enhancement of the quality of the natural environment.

Environment Canada is also responsible for administering the following principle Acts, Policies and Agreements:

Fisheries Act

Environment Canada administers sections 36-42 of the *Fisheries Act* (1970) on behalf of the Department of Fisheries and Oceans. Section 36 prohibits the deposit of a deleterious substance into waters frequented by fish. Sections 37-42

provide authority to the Minister to request information from a proponent, make orders and conduct enforcement actions.

Pursuant to the *Fisheries Act*, are the *Metal Mining Liquid Effluent Regulations* (MMLER) (1977), which are also administered by Environment Canada. The MMLER are applicable to every new, reopened or expanded metal mine, except gold mines. The regulations provide limits for specific parameters in effluents (arsenic, copper, lead, nickel, zinc, total suspended matter, radium 226, pH) and define the frequency of sampling and analysis, and reporting.

Canadian Environmental Protection Act

The *Canadian Environmental Protection Act* (CEPA) (1988) is comprised of six separate sections. Part I authorizes the Minister to collect data, conduct research, and formulate objectives, guidelines and codes of practice to protect the quality of the environment. Provisions for the management and regulation of toxic substances described in Part II is based on a life cycle approach, from the development and manufacturing of toxic substances, through to ultimate disposal. Key requirements of the Act deal with the assessment of new and existing substances to determine if they are "toxic" as defined under the Act. Part III contains provisions for controlling nutrients in cleaning agents and water conditioners to prevent eutrophication of natural waters. Measures to protect the quality of the environment at federal facilities are described in Part IV. Part V authorizes the Minister to make regulations for the control of international air pollution. Provisions for the management and regulation of ocean disposal activities are identified in Part VI.

There are many regulations under the Act, most of which relate to the management of individual toxic substances. A revised CEPA has been tabled in the House of Commons.

Canada Water Act

The *Canada Water Act* (1970) provides for federal-provincial arrangements to facilitate the formulation, coordination and implementation of policies and programs relating to areas of water resource management such as the conduct of research and surveys in areas of water quantity and quality. The *Canada Water Act* also enables Environment Canada to support implementation of the Federal Water Policy (1987) and Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines (1987).

Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MCBA) (1917, amended 1994) and its regulations (*Migratory Bird Regulations*, *Migratory Bird Sanctuary Regulations*) contain provisions to protect migratory birds, nests and eggs. Article I of the Act constitutes a summary of the birds protected under the MCBA while Occasional Paper Number 1 (1991), prepared by the Canadian Wildlife Service (CWS), provides a detailed list of species protected by the Act. The *Migratory Bird Regulations* prescribe conditions governing: hunting; the sale, purchase or shipment of migratory birds, eggs and nests; the introduction of foreign species; and the issuance of permits for specific purposes. It also prohibits the deposition of oil, oil wastes or other substance harmful to migratory birds in any waters or any area frequented by migratory birds.

The *Migratory Bird Sanctuary Regulations* forbid: the hunting of migratory birds; the disturbance or destruction of their nests; or the possession of nests, eggs, skins, carcasses or live migratory birds within a designated migratory bird sanctuary without a permit.

Canada Wildlife Act

The *Canada Wildlife Act* (1994) provides for the establishment of National Wildlife Areas and protected marine areas, and contains provisions to undertake wildlife research, conservation and interpretation programs. The Minister may also carry out these programs through agreements with provinces, municipalities, organizations or individuals. The Act also allows for measures to be taken to protect any species of wildlife in danger of extinction. This provision led to the establishment of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1977, which is a standing committee responsible for coordinating national wildlife conservation efforts. It is made up of representatives from federal, provincial, and territorial governments and national and non-government organizations.

The associated *Wildlife Area Regulations* prohibit hunting, fishing, and other specified activities in designated wildlife areas without a permit, and identifies the locations of these areas across Canada.

Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act

The *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* (pending) protects certain species of animals and plants listed in an appendix to the Convention to Regulate the International Trade in

Endangered Species of Flora and Fauna (CITES) by prohibiting the trade of these plants and animals, or any part or derivative of these plants and animals, without a permit.

Canadian Endangered Species Protection Act (proposed)

The *Canadian Endangered Species Protection Act* contains provisions to prevent wildlife species (migratory birds, marine mammals, fish and other aquatic species, species ranging across international boundaries and all species on federal lands) inhabiting all federal lands and the oceans out to the 200 mile limit, from becoming extinct or lost from the wild, and to secure their recovery. Specifically, the killing, harming, harassing, capturing or taking an individual of a threatened or endangered species is prohibited, as is the possession, collection, buying, selling or trading of these species. Destruction of their residences is also prohibited. Environment Canada is responsible for administering the Act, as well as for migratory birds and other wildlife species on federal lands, and for cross-border species.

Other Acts Administered by Environment Canada:

(A) In Whole

1. Game Export Act
2. International River Improvements Act | Regulations
3. Canadian Environment Week Act
4. Lac Seul Conservation Act
5. Lake of the Woods Control Board Act
6. National Wildlife Week Act
7. National Round Table on the Environment and the Economy Act | Regulations
8. Weather Modification Information Act | Regulations

(B) In Part

1. Arctic Waters Pollution Prevention Act | Regulations
2. Export and Import Permits Act | Regulations
3. Fisheries Act | Regulations
4. James Bay and Northern Quebec Native Claims Settlement Act
5. Pest Control Products Act | Regulations
6. Resources and Technical Surveys Act
7. Transportation of Dangerous Goods Act, 1992 | Regulations

(C) Assistance to other Departments

1. Aeronautics Act | Regulations
2. Agricultural and Rural Development Act (dormant)
3. Canada Shipping Act | Regulations
4. Energy Supplies Emergency Act
5. Hazardous Products Act | Regulations
6. Health of Animals Act | Regulations
7. International Boundary Waters Treaty Act
8. Motor Vehicle Safety Act | Regulations
9. National Energy Board Act | Regulations
10. National Housing Act | Regulations
11. Territorial Lands Act | Regulations

(D) Major Legislation of General Application

1. Access to Information Act | Regulations
2. Federal Real Property Act | Regulations
3. Financial Administration Act | Regulations
4. Privacy Act | Regulations
5. Criminal Code | Regulations

POLICIES**Sustainable Development Strategy**

Sustainable development provides a framework for the integration of environmental policies and development strategies. It recognizes that economic development is essential to satisfy human needs and improve our standard of living, but that development must be based on the efficient and environmentally responsible use of all of society's scarce resources, which includes our natural, human, and economic resources.

Environment Canada's draft sustainable development policy is based on the following principles:

Equity: The costs and benefits of human activity, both current and intergenerational, should be distributed fairly between people.

Cooperation: The global nature of environmental concerns calls for the widest possible cooperation, in accordance with common but differentiated responsibilities and capability.

Environment-economy integration: Environmental and economic signals should point the same way. Trade and environmental policies should be mutually supportive.

Ecosystem approach: Policies, programs, and operations are designed in consideration of the unique and fundamental characteristics of individual ecosystems and in recognition of the interdependence of social, economic and environmental systems.

Precautionary principle: When there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.

Polluter pays: The polluter should, in principle, bear the cost of pollution.

Pollution prevention: The use of processes, practices, materials, products, or energy that avoid or minimize the creation of pollutants or wastes and reduce the overall risk to human health or the environment.

Environmental assessment: Social, economic and environmental factors should be systematically considered during policy, program and project development and decision-making.

Science and technology foundation: A sound scientific understanding of our environment provides the key to meeting the challenges facing Canada and will be crucial to delivering on the sustainable development agenda. Canadians should research, develop, test and implement technologies essential to further environmental quality, human health and economic growth.

Government leadership by example: Environment Canada will openly share its knowledge of environmental management and promote the use of sustainable development principles.

Continuous improvement: To continue to improve policies, programs and performance, taking into account technical developments, scientific understanding, client needs and community expectations.

Pollution Prevention - A Federal Strategy for Action

The federal government defines pollution prevention as: the use of processes, practices, materials, products or energy that avoid or minimize the creation of pollutants and waste, and reduce overall risk to human health or the environment. Key elements of this policy advocate that: pollution prevention should be considered at the earliest possible point in the development of any

concepts, plans, policies, products, projects or processes; pollution prevention planning should be a continuing process, incorporating opportunities for improvement on an ongoing basis, such as new scientific and technological developments; and that prevention should apply to the entire life-cycle of a product, from resource extraction to final disposal (i.e. from cradle to grave).

Toxic Substances Management Policy

This policy, developed by Environment Canada in 1995, provides a framework for making science-based decisions on the effective management of toxic substances that are of concern because they are or may be used and released into the environment. Environment Canada provides technical and scientific advice to other federal departments and overall coordination in applying the policy. Toxic substances either conform to or are equivalent to "toxic" as defined in Section 11 of the CEPA. The policy has two key management objectives:

- virtual elimination from the environment of substances that are found to be persistent, bioaccumulative, toxic and which result primarily from human activity (Track 1 substances); and
- life-cycle management of other toxic substances and substances of concern (but which do not meet all of the criteria for Track 1 substances) to prevent or minimize their release into the environment (Track 2 substances).

Pollution prevention strategies will be used to prevent the measurable release of a Track 1 substance from domestic sources. However, in the event that a Track 1 substance is already in the environment, remediation activities may be undertaken to clean up the site in question. Monitoring of Track 1 substances will also be carried out to ensure that the objective of virtual elimination is being met and to assess the need for further action. Naturally occurring substances, elements or radionuclides are not considered as candidates for Track 1 substances.

Risk assessment and risk management approaches will be used to identify Track 2 substances and management options. Risk assessment estimates the degree and likelihood of adverse effects resulting from exposure to a substance in the environment. Risk management is a process of selecting and implementing management actions on assessed risk, while taking into account a wide range of legal, economic and social factors. Although pollution prevention and remediation strategies may be used to achieve the objective for Track 2 substances, pollution prevention is the preferred approach as it is more cost effective. Elements and naturally occurring substances that are used or released as a result of human activity may be targeted under Track 2 for reduction to background levels.

A Wildlife Policy for Canada

A Wildlife Policy for Canada was adopted by the Wildlife Ministers Council of Canada in 1990. The goals of this Policy are to (1) maintain and restore ecological processes (e.g., the supply of food and habitat for all species); (2) maintain and restore the diversity of ecosystems, species diversity and genetic variability within species; (3) ensure the sustainability of all uses of wildlife. This Policy provides a framework for policies and programs related to wildlife issues.

Canadian Biodiversity Strategy

The government of Canada, with support from provincial and territorial governments, ratified the United Nations Convention on Biological Diversity in 1992. To meet our obligations under the Convention and to enhance the coordination of national efforts aimed at the conservation of biodiversity and the sustainable use of biological resources, the Canadian Biodiversity Strategy was developed in 1995. The Strategy has five main goals:

- to conserve biodiversity and use biological resources in a sustainable manner;
- to improve Canada's understanding of ecosystems and increase Canada's resource management capability;
- to promote greater public understanding of the need to conserve biodiversity and use biological resources in a sustainable manner;
- to maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources; and
- to work with other countries to conserve biodiversity, use biological resources in a sustainable manner and share equitably the benefits that arise from the utilization of genetic resources.

There are two key strategies that must be considered in preventing further loss to biodiversity: 1) promoting the sustainable use of natural resources; and 2) taking actions to conserve species, habitat and ecosystems. Environment Canada has specific responsibilities and programs related to biodiversity, including the management and conservation of migratory birds and, in cooperation with the provinces and territories, other wildlife, habitat and ecosystems of national and international concern, including endangered species.

Federal Policy on Wetland Conservation

The goals of the Federal Policy on Wetland Conservation (1991) include: maintaining the functions and values of wetlands; ensuring no net loss of wetland functions on all federal lands and waters; enhancing and rehabilitating wetlands in areas prone to degradation and loss; recognizing wetland functions in resource planning and management with regard to federal programs, policies and activities; securing significant wetlands; and recognizing and utilizing sustainable management practices to conserve wetlands. To achieve these goals, the federal government will adopt several strategies to: promote public awareness and understanding of wetland resources; develop a sound scientific basis and exemplary practices to support the conservation and sustainable use of wetlands; promote wetland conservation in federally protected areas and internationally; and continue to participate in cooperative activities and agreements with provinces, territories and non-government agencies to advance wetland conservation.

The Federal Policy on Wetland Conservation - Implementation Guide for Federal Land Managers

The Implementation Guide for Federal Land Managers (1996) provides guidance to federal land managers on managing wetlands, developing plans for wetland conservation, forming partnerships, and integrating the policy into the environmental assessment process.

AGREEMENTS

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) (1986) between Canada and the United States Plan allows for the creation of partnerships (e.g. Eastern Habitat Joint Ventures), plans, programs and projects in which federal, provincial, territorial and state government agencies, private conservation organizations and individuals participate. CWS protects and enhances wetland habitat for waterfowl under the Plan.

Federal-Provincial Migratory Bird Management Agreements

CWS administers agreements with provinces to establish guiding principles for conserving the provinces' waterfowl: Canada-Newfoundland Waterfowl Management Plan (1990), Canada-Nova Scotia Waterfowl Management Plan (1990), Canada-New Brunswick Waterfowl Management Plan (1990), Canada-

Prince Edward Island Waterfowl Management Plan (1990) under the authority of MBCA and NAWMP; Newfoundland and Labrador Habitat Protection Plan for Migratory Birds (1987), under the authority of CWA.

APPENDIX 2

The Ecosystem Approach

An ecosystem-based approach to environmental planning and management is based on four principles:

1. Identification and assessment of the issues, and compilation of the existing ecosystem knowledge (e.g. gathering information on: ecosystem structure and function, habitat, wildlife, aquatic and/or terrestrial communities; traditional ecological knowledge; abiotic components of the geographic area in question; and socio-economic activities).
2. Development and articulation of ecosystem health goals and objectives by key stakeholders based on the compiled knowledge base (Ecosystem health goals are broad narrative statements that describe the desired state of an ecosystem. Ecosystem health objectives are more specific, defining a series of desired characteristics for components of the ecosystem. Attainment of the objectives is required for the goals to be achieved.)
3. Selection or development of ecosystem health indicators by key stakeholders such that the indicators: specifically address objectives or answer questions related to the objectives; are selected as a comprehensive suite to minimize the chances of misinterpreting the information that they provide; and are chosen based on a set of criteria acceptable to all decision-makers (e.g. biologically and socially relevant, sensitive, widely applicable to different stressors and sites, measurable using standard procedures, cost-effective, available descriptive data, etc.)
4. Conduct of targeted research and monitoring where the compiled information is insufficient to adequately support the suite of indicators identified as necessary to address the articulated objectives.

Ecosystem integrity and ecosystem health are terms used to describe desired states of the ecosystem. Ecosystem integrity describes ecosystems possessing a high level of biodiversity (e.g. species composition and relative frequencies), appropriate types and levels of biological processes (e.g. nutrient cycles, energy flows) and adequate habitat for species present. A useful document to consult in assessing biodiversity is entitled "A Guide on Biodiversity and Environmental Assessment" (1996) released by the Canadian Environmental Assessment Agency and the Biodiversity Convention Office. The general principles for conserving biodiversity include the following: minimizing the impact on biological diversity; no "net loss" of the ecosystem, species population or genetic diversity; application of the precautionary principle; no effect on the sustainable use of

biological resources; maintenance of adequate areas for wild flora and fauna; use of indicator or valued ecosystem components (VEC's) to focus the assessment; and mitigation measures for maintenance of biological diversity.

Ecosystem health includes the concepts of ecosystem integrity together with social, economic and political considerations. A healthy ecosystem is one in which the environment is viable, livable and sustainable; the economy is equitable, sustainable and adequately prosperous; and the community is livable, equitable and convivial (CCME 1996). An effective method for measuring ecosystem health is through the use of ecosystem health indicators. They can indicate the state of, trends in and factors that affect ecosystem health. An indicator species is a plant or animal that indicates by its presence in a given area, the existence of certain environmental conditions. Specific examples of indicators could include the presence/absence of a species, presence of contaminants in avian eggs, composition of invertebrate communities, or areas of wetlands present. Indicators are particularly useful if they have associated quantitative endpoints or targets, including scientifically-based chemical and ecological endpoints (e.g. attainment of a chemical water quality guideline or re-establishment of an endangered species).