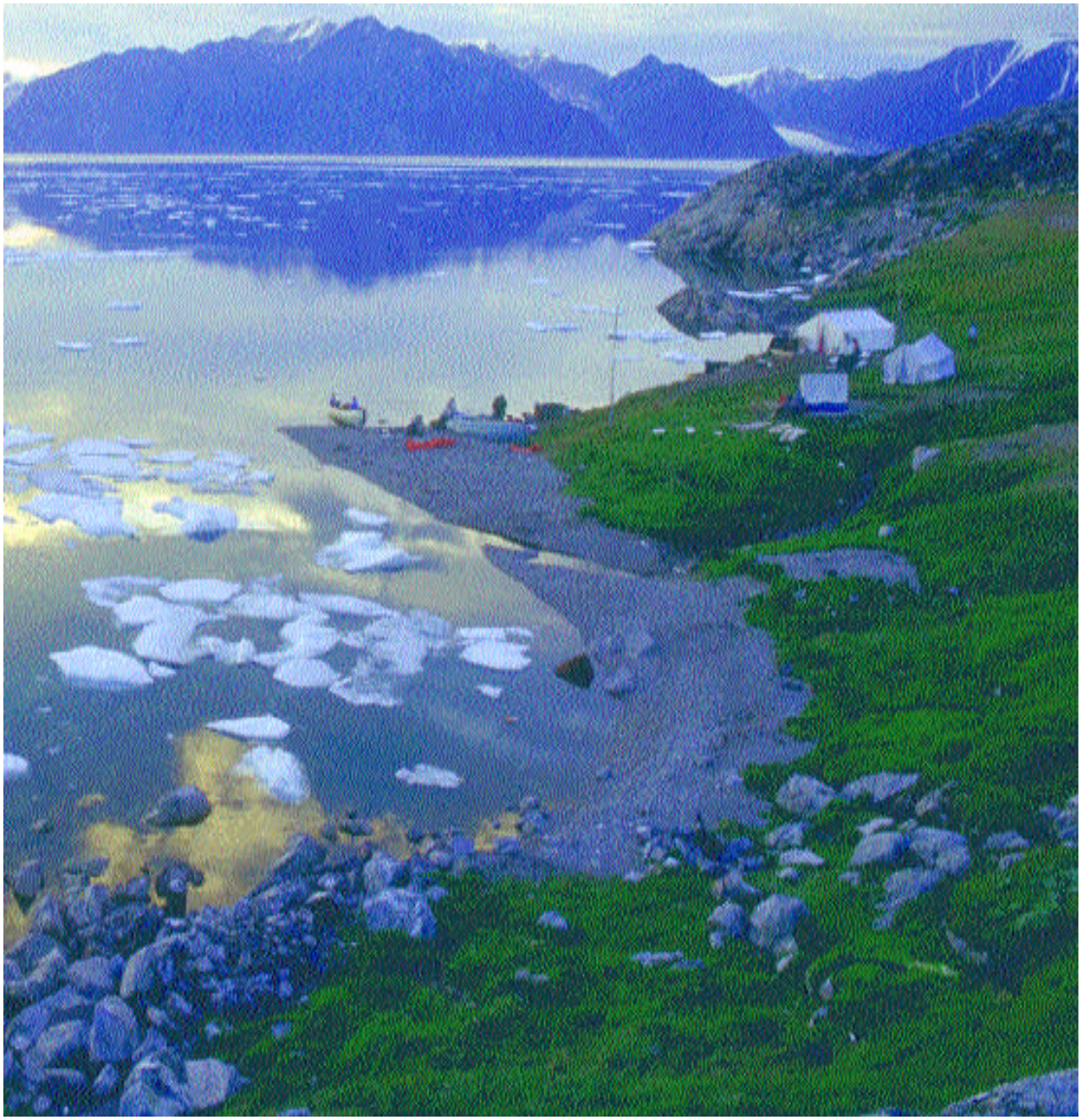
Arctic Council
Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities



September 1998

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1.0 INTRODUCTION

1.1 The Arctic Ocean and its biota are generally very clean in relation to other oceans and marginal seas. There are two important categories of exception:

1) combinations of physical and biological mechanisms have the potential to focus particular contaminants in certain geographical locations and/or species; and

2) geographically localised elevations in contaminant levels in the marine or estuary environment can be attributed to pollution sources within the Arctic and located in the coastal zone.

1.2 Land-based sources of pollution located both within and outside the Arctic represent the major sources of pollutants to the Arctic marine environment, and there is a need for action on land-based sources of pollution at international, regional and national levels These actions need to incorporate integrated environmental management approaches and processes, such as integrated coastal area management, harmonized as appropriate with river basin management and land-use plans.

1.3 Aboriginal people are closely linked to their environment, particularly due to their dependence on traditional foods, which forms the basis of indigenous society, cultures and economies. Because of the consumption of these foods, certain Arctic populations are amongst the most exposed populations in the world to certain environmental contaminants.

1.4 There are large exports of fisheries products from the Arctic Region to other parts of the world. The well-being of many Arctic communities therefore depends on a clean and unpolluted marine environment.

1.5 In the Iqaluit Declaration dated September 18, 1998, the Arctic Council Ministers adopted the Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities (RPA). They also recognized the important role of the Protection of the Arctic Marine Environment (PAME) Working Group in the implementation and further development of the RPA. In this context it is important to note the associated Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA).

1.6 The RPA addresses impacts on the Arctic marine and coastal environment and recognizes the benefit of using a phased or stepwise approach in its development. The initial phase focuses on impacts on the marine environment. The definition of coastal zone is part of the future work, and in subsequent stages the RPA will be expanded to more fully address impacts on this area.

1.7 Sources and activities which impact on the marine and coastal environment necessitate a collaborative approach by the Arctic Council. The RPA builds on existing and planned activities and is intended, in part, to provide a mechanism for improving co-ordination among these programmes as well as to identify additional action needed. The RPA will thus become a comprehensive action plan for the Arctic Council's work relating to protection of the marine environment from land-based activities.

1.8 In preparing an Arctic Regional Programme of Action, due consideration has been given to the suggested GPA approaches identified by source category (Appendix 1) and the methodology for preparing programmes of action. Through the GPA, Arctic countries have declared their intention to develop or review national programmes within a few years on the basis of their national priorities and strategies.

1.9 The RPA follows the GPA methodology and includes provisions for:

a) identification and assessment of problems;
b) establishment of priorities;
c) setting management objectives and targets for priority problems;
d) identification, evaluation and selection of strategies and programmes;
e) criteria for evaluating the effectiveness of strategies and programmes; and
f) programme support elements.

2.0 GOALS AND OBJECTIVES

2.1 Circumpolar countries have much to gain from co-ordinated international, regional and national efforts to protect the marine environment from land-based activities. The RPA will make a significant contribution towards sustainable development as demonstrated by its goals, set out in Figure 1.

Figure 1: Goals for RPA Co-operation to Protect the Arctic Marine Environment

GOALS

- **PROTECT HUMAN HEALTH**
- **PREVENT AND REDUCE DEGRADATION OF**
- **THE MARINE ENVIRONMENT AND COASTAL AREAS**
- **REMEDIATE CONTAMINATED AREAS**
- **SUPPORT CONSERVATION AND SUSTAINABLE**
- **USE OF MARINE RESOURCES**
- **MAINTAIN BIODIVERSITY**
- **MAINTAIN CULTURAL VALUES**

2.2 The RPA objectives are:

- take action individually and jointly which will lead to prevention, reduction, control

and elimination of pollution in the marine environment;
- regional identification and assessment of problems;
- regional establishment of priorities for action;
- strengthen regional and national capacity building; and
- harmonize, as appropriate, and adjust measures to fit the particular environmental and socio-economic circumstances.

2.3 The RPA recognizes and supports sub-regional and national efforts in the Arctic for the protection of the marine and coastal environment from land-based activities.

3.0 PRINCIPLES

3.1 The Arctic Council is committed to sustainable development. Sustainable development includes a number of principles and therefore, in developing and implementing the Arctic RPA, Arctic States should be mindful of these principles, including *inter alia:*

- application of precautionary approach;
- polluter pays principle;
- protection of biodiversity;
- application of Environmental Impact Assessments (ElAs);
- promotion of integrated ecosystem management;
- promotion of the use of best available technology (BAT) and best environmental practices (BEP);
- the duty not to transfer, directly or indirectly, damage or hazards from one area of the marine environment to another or transform one type of pollution into another;
- the duty to co-operate on a regional basis for protection and preservation of the marine environment, taking into account characteristic regional features;
- full public participation through a transparent process; and
- recognition and use of traditional knowledge.

4.0 IDENTIFICATION OF PROBLEMS AND ASSESSMENT

4.1 The CPA recommends that assessment of land-based activities consider the severity of the problem in relation to:

- food security;
- public health;
- coastal and marine resources;
- ecosystem health; and
- socio-economic benefits, including cultural values.

4.2 In addition, the assessment should consider the sources of degradation, be they point or non-point sources, and the affected areas of concern.

4.3 A preliminary overview of land-based activities for the protection of the marine and coastal environment is illustrated in Table 1 The table is compiled from a qualitative assessment of the information contained in this chapter and the referenced reports. It addresses existing and possible sources of concern. It should also be noted that not all the pollution sources identified in this table are explicitly addressed in this chapter.

4.4 There are several sources of information regarding the existing environmental situation and potential threats to the Arctic, including Working Group reports such as the Arctic Monitoring and Assessment Programme (AMAP) Assessment and the Advisory Committee on Protection of the Sea (ACOPS) reports on Identification and Assessment of Land-based Sources which lead to the Degradation of the Arctic Marine Environment in the Russian Federation. The information presented in the AMAP Assessment provides the scientific data for assessing the major source categories and there is general concurrence with the information provided by the Russian Federation on major pollution sources. It should be noted that all the reports have concluded that there is a need for better information, including information on inputs, causes, sources and pathways of persistent organic pollutants (POPs), heavy metals and radionuclides to the marine environment, to improve the basis for decision making on Arctic environmental issues.

4.5 With respect to POPs, the present knowledge indicates that:

- POPs are of particular concern to human health and the environment as they are toxic and resist photolitic, biological and chemical degradation.

- The use of different foods is a major factor in contaminant intake. Some indigenous groups are exposed to levels that exceed established tolerable intake levels. Transfer to infants can result in levels in newborns which are 2 times higher than in regions further south.

- POPs have the potential to interfere with the reproductive system of wildlife and humans. The effects can include reduced fertility, increased birth abnormalities, metabolic and behavioral abnormalities, demasculisation and defeminisation and compromised immune systems.

- Outside of the Arctic, sources exist for a number of the POPs that impact on the Arctic. The main contaminants of concern are: organochlorine pesticides (e.g., HCH) and their metabolites from agricultural activities/practices; industrial chemicals (e.g., PCBs); and anthropogenic and natural combustion products such as polychlorinated dioxins/furans and polycyclic aromatic

hydrocarbons (FAH5). Other sources of dioxins and furans in the Arctic include burning wood for heating and waste incineration.

- Over much of the Arctic, the levels of POPs cannot be related to known use and/or releases from potential sources within the Arctic and can only be explained by long-range transport from lower latitudes. This necessitates looking at more than a regional approach.

- Elevated polychlorinated biphenyl (PCB) levels in nearshore areas have been detected close to abandoned or existing government installations (e.g., Cambridge Bay, NWT, Canada; and Thule, Greenland) and around government installations along the Norwegian coast. Similar situations may be expected to occur in other Arctic countries.

- High PCBs and aggregate DDT and derivatives on suspended solids in the Ob and Yenisey rivers and of HCH in water of the Ob and lakes of the Taimyr Peninsula are substantially higher than found in river water of industrialized areas of Europe and North America. The signature of the DDT data indicates recent use. Although both of these observations need further verification, the PCB, DDT and HCH information suggests sources in the watersheds and airsheds of these rivers. This general trend is also evident in snow, seawater, coastal sediments, fish and the few data collected for reindeer, lemming, seabirds, seals and beluga whales.

- In addition to the handling of PCBs at government installations, there are industrial complexes using PCBs (e.g., the large power plants in Murmansk, Archangelsk and Severodvinsk) as well as the heavy industry and mining activities on the Kola Peninsula. Elevated PCB levels have been detected in marine sediments close to landfills on Svalbard.

- Local dioxin/furan contamination has been detected close to a smelter in Kirkenes.

Table 1: Preliminary Qualitative Assessment of Land-based Activities

Activity	Source Within/ Outside Arctic	POPs	Radio-nuclides	Heavy Metals	Petroleum Hydrocarbons	Sewage/ Nutrients	Sediment	Litter	Physical Attractions and Destruction of Habitats
Oil and Gas	In Out				+, * *	+	+	+	+
Mining	In Out		+ +	+ +			+	+	+
Forestry/ Agriculture	in out	+ +					+		
Urban Residential	In Out	+ +		+ +	+	+	+	+	+

Nuclear Activities	**In** **Out**		**+, *** **+**						
Government Facilities	**In** **Out**	**+**	**+**	*****	**+**	*****			
Industrial & Energy Complexes	**In** **Out**	**+** **+**		**+** **+**	**+**			**+**	
Ports	**In** **Out**	**+**	*****	**+**	**+**	**+**	**+**	**+**	**+**
Reception/ Tourism	**In** **Out**					**+**		**+**	**+**

Legend: + existing source of concern for the Arctic marine environment
*** possible source of concern for the Arctic marine environment**

- Some of the biggest pulp and paper mills in Europe are situated along the North Dvina, which empties into the White Sea. Little treatment exists on the discharges to air and water which include quantities of chlorine and mercury. Some of the pulp and paper mills are close to the North Dvina river mouth and are contaminating the river delta and the White Sea (Archangelsk pulp and paper mill in Novodvinsk and Solombola in Archangelsk city), while others are further upstream (Kotlas) and are mainly affecting the river. The contamination can clearly be seen in the river sediments and the White Sea.

- Studies in the Archangelsk area show local contamination with dioxins and furans from pulp mills on the North Dvina and tributaries that extend to the White Sea. However, they are not believed to be major sources to the offshore Arctic Ocean. Drinking water for Archangelsk city is taken 1 km downstream of the outlet from Archangelsk pulp and paper mill.

4.6 With respect to radionuclides, the present knowledge indicates that:

- The Arctic marine environment has been historically contaminated by fallout from nuclear weapons testing and by releases from European reprocessing plants. The levels of contamination associated with nuclear weapons testing peaked in earlier decades and current levels of contamination of the Arctic marine environment are low.

- Recent releases of Technetium-99 from Sellafield have increased, and recent observations in Norwegian coastal areas indicate that this may be a concern for the North Atlantic marine region in the future.

- All other releases associated with, for example, waste management practices and government accidents, although often detectable in the Arctic marine environment, are minor in comparison with nuclear testing fallout and European reprocessing plant releases.

- Radioactivity issues of relevance to the Arctic marine environment are currently of a potential nature rather than representing health and environ mental concerns due to current levels. Due to the significance of the potential risks, several programmes are under way to address the problems. Russia provided most of the information relevant to such potential threats. In this context, two groups of future environmental contamination and threat from radioactive sources may be identified:

Accidental Releases

- Potential large-scale releases associated with accidents at existing nuclear sites in the Arctic, as well as accidental releases in connection with handling of the nuclear waste produced during normal operation of a nuclear reactor, and handling of spent nuclear fuel from nuclear reactors, constitute particular topics of concern.

- Northwest Russia, particularly in the Kola region, contains the highest concentration of nuclear-powered vessels and nuclear reactors in the world. Two thousand and three (2003) naval reactors and four (4) reactors in nuclear power plants are in operation. Spent Nuclear Fuel (SNF) is produced during operation of the reactors, and consists of activation products and contaminated tools. SNF is highly active and needs special treatment, and is often stored temporarily close to the reactors to allow the decay of short-lived fission products.

Future Leakages of Contaminated Radioactive Materials and Run-off of Deposited Radioactive Material

- At the government bases in Russia, about 250 reactor cores are temporarily stored. This includes approximately 150 reactors containing nuclear fuel and 76 decommissioned submarines. Among the reactor bores stored on land about 80% are stored at the naval base in Andreyeva fjord, 15% are at the Gremikha base and at the Murmansk Shipping Company (including the “Lepse”), and 5% at other locations including the Severodvinsk shipyard. Potential radioactive waste management problems that have been identified include those associated with the handling and transport of waste and spent fuel in the Murmansk and Archangelsk districts.

- Leakage from discarded reactor cores and associated waste constitute potential sources of future radioactive contamination of the Arctic Ocean.

- At the Mayak Reprocessing Plant (next to the Tetcha river, a tributary to Ob river that empties to the Kara Sea), there are considerable amounts of stored radioactive material found in lakes, reservoirs and river beds, especially close to the reprocessing plant. It has been assessed that transport of radioactive material by rivers to the Arctic Seas from the plants at Tomsk and Krasnoyarsk

is unlikely. The assessment also concluded that the contribution of Mayak to the radioactive contamination of the Kara Sea has been significantly less than from other sources (e.g., fallout from atmospheric nuclear testing and from Sellafield). However, there remains a potential for further transport of radioactive material from Mayak through the river systems to the Arctic Seas should there be a failure in containment facilities.

4.7 With respect to heavy metals, the present knowledge indicates that:

- Mercury (Hg) and cadmium (Cd) are of the greatest concern, as they tend to accumulate in the food chain and are a public health concern. Some metals can occur in the gas phase (e.g., mercury) and are transported and dispersed much more widely than metals in the particulate form. Cadmium levels are high enough in some marine birds and mammals to pose a threat of kidney damage. Mercury has been shown to be increasing in aquatic sediments and in marine mammals in the Arctic. Methyl mercury is efficiently taken up following consumption, is retained very effectively following uptake and therefore poses the main risk. Mercury is proven to have serious health effects on animals and humans.

- The major anthropogenic sources of heavy metals are mining and smelting, urban settlements, government facilities and industrial complexes.

- Widespread contamination of the Arctic marine environment also occurs as a result of anthropogenic activities, in particular from sources in the industrialised regions of Europe, Asia and North America. Emissions from these areas are subject to long-range transport by the atmosphere or ocean currents. This is especially so in the case of mercury, which exhibits characteristics similar to those of POPs. A major source of mercury to the Arctic marine environment will be atmospheric emissions from coal-burning power stations. This source is likely to increase in importance in the future as global energy demand increases. Of the heavy metal contamination in the Arctic, industrial sources outside of the Arctic in Europe and North America account for up to one third of the deposition, with maximum input in winter.

- Mining and metallurgical industries on the Kola Peninsula and in the Norilsk region are major contributors of metals to the local aquatic environment, and to elevated metal concentrations in air in these regions. The atmospheric emissions from these sources within the Arctic supplement the atmospheric loading from Eurasian sources further south. Downstream of Norilsk, the lower reaches of the Yenisey river are at global background levels for heavy metals, indicating that Norilsk may not be making a significant contribution to the pollution of the adjacent marine environment.

- Local sources which may impact directly on the marine environment include mines and industrial activities located on or close to the coast. These may

have significant local impacts with heavy metal concentrations exceeding background at distances generally within 30 km of the source.

- Heavy metals occur in all Arctic marine ecosystems as a result of natural sources and take part in natural geochemical cycling processes. Metal levels in Arctic Ocean water away from local sources are generally similar to background levels. Regional differences in metal burdens in marine mammals for lead (Pb), Cd and Hg strongly imply that tissue concentrations depend largely on regional geology and biogeochemistry.

- River systems can be significant in transporting metals, in particular zinc (Zn), and to a lesser extent Cd and Pb, to the marine environment. However, levels away from local sources are generally similar to background levels. The flux of metals to the marine environment depends on season, the characteristics of the river system, and distance from the source. Metal-laden sediments transported to the coast by rivers are generally deposited on the shelf seas and only a minor proportion reach the open ocean. Natural sources of metals are important and in many cases are found to be the main source to the marine environment.

- Local sources with impacts restricted largely to a local scale also include untreated sewage sludge which is contaminating the Kola fjord and part of the White Sea from discharges in Murmansk and Archangelsk, respectively.

- Incineration plants such as those at Murmansk emit heavy metals (Pb, Zn, Hg, Cd) and other pollutants, largely in particulate form, leading to deposition in the nearby coastal environment.

4.8 With respect to petroleum hydrocarbons, the present knowledge indicates that:

- The risks of oil pollution from onshore oil and gas operations are associated with the catastrophic release of oil. The effects of such a release would not be of regional significance, but they could become of subregional significance if large amounts of oil were to reach the Arctic marine environment. Severe local and subregional problems have occurred recently, associated with the develop ment and transportation of oil and gas.

- Oil pollution from urban settlements, government facilities, and industrial complexes is primarily of local rather than regional concern with respect to the marine environment.

- Oil pollution at ports is likewise primarily of local rather than regional concern The severity of this problem is likely to vary in accordance with the volume of ship traffic in the Arctic. With the potential increase in ship traffic associated with expanded oil and gas operations mining and greater use of the Northern

Sea Route and taking into account the precautionary approach it is concluded that there is a shared regional interest in addressing this issue.

- Accidental releases are an emerging potential source of oil pollution, for which the extreme environmental conditions and isolated localities in much of the Arctic greatly increase the difficulties of detection and taking remedial measures.

- In relation to subregional petroleum hydrocarbon contamination of the Arctic marine environment resulting from land-based activities, the threats are essentially potential in nature and related to possible unintentional releases from existing facilities and future development of oil and gas resources (including related oil transportation infrastructure) in the coastal zone or watersheds of north-flowing rivers. A key feature in evaluating potential threats will be the distance from the marine environment and the characteristics of the relevant riverine environment.

- Incineration plants such as those at Murmansk emit PAHs (including benzo(a)pyrene) and other pollutants, often associated with particles, leading to deposition in the nearby coastal environment.

4.9 With respect to sewage and nutrients, the present knowledge indicates that:

- Public health and environmental effects associated with domestic waste-water discharges are generally local in concern.

- Urban residential settlements that could affect marine waters are either small communities with small quantities of human sewage or urban/industrial complexes with large quantities of human sewage, often including industrial wastes.

- Disposal of sewage is a local concern for virtually all coastal communities because conventional sewage treatment systems often do not work well in the Arctic.

4.10 With respect to sediments, the present knowledge indicates that:

- Natural sedimentation and siltation are important in the development and maintenance of numerous coastal habitats. Reduction in natural rates of sedimentation can compromise the integrity of habitats, as can excessive sediment load which may bury benthic communities and threaten sensitive habitats.

- Contaminated sediments may also lead to pollution. There are elevated levels of contaminants (heavy metals, POPs and PAH5) associated with some major seaports on the Russian Federation's part of the Arctic coast.

4.11 With respect to litter, the present knowledge indicates that:

- Litter threatens marine life through entanglement, suffocation and ingestion and is widely recognized to degrade visual amenities.

- Sources of litter include numerous human activities and poorly managed or illegal waste dumps.

- Disposal of solid waste is a local concern for virtually all coastal communities because solid waste disposal systems often do not work well in the Arctic due to the cold climate and, in some areas, the presence of permafrost.

4.12 With respect to physical alteration and destruction of habitats, the present knowledge indicates that:

- Resource-use, human development and settlement activities result in physical alteration and destruction of habitats.

- Physical alteration and fragmentation of habitats is considered a major threat to biological diversity on a global scale. In the Arctic, this is still mainly a local concern. However, if the habitats affected support rare and endangered species or species of circumpolar conservation concern, such physical alterations may have regional or global implications.

- Large numbers of species are gathered in small areas such as marginal ice zones, leads and polynyas.

- Marine ecosystems support economic and socially important species including seals, murres, guillemots, polar bear, arctic char and others.

5.0 PRIORITIES

5.1 The following criteria have been used to establish regional priorities for action:

i) severity of risk (e.g., major sources/hot spots) with respect to an existing high risk to human health, the environment or economic and social benefits and uses, including cultural values;

ii) shared problems where there is an existing or potential risk of transboundary pollution effects or habitat degradation; and

iii) Common issues where there is existing or potential similarity in local and national problems which benefit from common approaches.

5.2 Combining these criteria with our current identification and assessment of the problems produces the Priorities for Regional Action found in Table 2. For example, major sources which present an immediate and concrete threat to the Arctic marine environment are given a high priority (e.g., POPs). Sources which present a potential regional threat are given a medium priority (e.g., radionuclides) and sources which present no immediate threat are given a low priority (e.g., sewage). Sources which are a combination of shared problems and common issues are given a medium to high priority (e.g., physical degradation and heavy metals, respectively).

Table 2: Priorities for Regional Action

Source Categories	Priorities for Action
POPs	**High**
Radionuclides	**Medium**
Heavy Metals	**High**
Petroleum Hyrdocarbons	**Medium**
Sewage	**Low**
Nutrients	**Low**
Sediment	**Low**
Litter	**Low**
Physical Degradation	**Medium-High**

Major Sources (Hot Spots)

5.3 Identification of major sources/hot spots within the Arctic has importance for future decisions related to programme activity priorities. The relative importance of major sources/hot spots must be evaluated in the context of the importance of sources of pollution external to the Arctic region.

5.4 For the purposes of the RPA, major sources/hot spots are defined to include those areas that are currently significant sources of pollution to the marine environment. In using this definition, the RPA recognizes that there are a number of potential major sources/hot spots in the Arctic, particularly those related to potential heavy metal and radionuclide contamination. These potential sources would benefit from further assessment and verification to help identify areas of concern.

5.5 In general there is concurrence between the identification and assessment of problems presented in section 4.0 and the information on major sources of Arctic marine contamination provided by the Russian Federation and found in Appendix 2. At the same time there are several areas where marine contamination has been found or is suspected and the sources and impacts need to be confirmed.

6.0 SETTING MANAGEMENT OBJECTIVES, STRATEGIES AND MEASURES

6.1 The GPA recommends that wherever possible, states should take immediate preventive and remedial action using existing knowledge, resources, plans and processes. The recommended activities for each CPA source category (Appendix 1) also involve a wide range of strategies, measures and management approaches which are generally applicable to the RPA.

6.2 The specific regional management strategies and actions for the priority source categories are intended to complement actions at the national and international levels (e.g., UNECE LRTAP). Horizontal issues such as reports on implementation and effectiveness (7.2), technical co-operation and assistance (7.3), and education and training (7.4) are dealt with collectively for all source categories. Specific and immediate actions are noted in bold.

6.3 Considerable work has been undertaken nationally, bilaterally and multilaterally to identify the significant sources of pollution in the Arctic and to determine the actions and investments needed to reduce or eliminate the pollution The experience and results of this work will be carefully considered when implementing the RPA.

POPs

6.4 The most appropriate RPA strategies and actions for meeting the objectives related to POPs would be:

At the international level the Arctic States should:

POP I.1
Sign and ratify the UNECE LRTAP POP Protocol and encourage other states to do the same, with the aim of bringing the Protocol into force as early as possible.

POP 1.2
Participate actively in the negotiation of a global legal instrument to control, reduce andlor eliminate emissions of identified POPs and ensure that the impacts of these pollutants in the Arctic region. are addressed. Furthermore, the Arctic States intend to give financial and technical support to the negotiation process with the aim of facilitating the earliest possible completion.

POP 1.3
Draw the attention of international financial institutions (IFIs), of which they are a member, to the global aspects of the POP issue and, as appropriate, promote the participation of the lFIs in financing and partnership

arrangements that are aimed at reducing adverse effects on human health and the environment (see related action for HM 1.3).

At the regional level the Arctic States should

POP R.1
Take expeditious action to implement measures that are needed to meet obligations under the UNECE LRTAP POP Protocol as soon as possible.

POP R.2
Distribute information to Arctic communities on POPs pollution, including their geographic distribution and their impact on the Arctic marine environment and human health.

POP R.3
Consider the need to set dates for phasing out and providing substitutions for certain POPs in addition to what is required under the UNECE LRTAP POP Protocol.

Heavy Metals

6.5 The most appropriate RPA strategies and actions for meeting the objectives related to heavy metals would be:

At the international level. Arctic States should

HM 1.1
Sign and ratify the UNECE LRTAP Protocol on Heavy Metals (mercury, cadmium, and lead) and encourage other states to do the same, with the aim of bringing the Protocol into force as early as possible.

HM 1.2
Through the Arctic Council, assess the need for and examine the modalities of global action on mercury reduction.

HM 1.3
Draw the attention of international financial institutions (IFIs), of which they are a member, to the global aspects of the heavy metals issue and, as appropriate, promote the participation of the IFIs in financing and partnership arrangements that are aimed at reducing adverse effects on human health and the environment (see related action for POP 1.3).

At the regional level. Arctic States should:

HM R.1
Take expeditious action to implement measures that are needed to meet obligations under the UNECE LRTAP Protocol on Heavy Metals as soon as possible.

HM R.2
Develop and adopt Arctic-wide environmental guidelines on opening, operating and closing mines in the Arctic Coastal Zone. Mining is defined as the extraction, milling and concentration of ore.

HM R.3
Explore and, as appropriate, establish non-binding arrangements to reduce or eliminate mercury, cadmium and toad pollution in the marine and coastal environment.

All Significant Sources

6.6 The most appropriate RPA strategies and actions for meeting the objectives related to all significant regional sources would be:

Gen I
Establish and maintain a common inventory of significant sources of POPs, heavy metals, radionuclides and petroleum hydrocarbons.

Gen 2
Partnership Conference on the implementation of the Russian NPA - Arctic.

Gen 3
Conduct feasibility studies to identify specific actions and investments needed for the reduction of emissions and the clean-up of major sources of pollution/hot spots.

Gen 4
Establish collaborative mechanisms with all working groups to facilitate the provision of information required to implement and further elaborate the RPA.

6.7 This initial phase of the RPA has focused on strategies and measures that can be taken in the short term to address urgent pollution problems such as those identified in the 1997 AMAP Assessment. In later stages, the RPA would be expanded to better address land based activities in the context of sustainable development of the marine and coastal environment This would be done with the collaboration of stakeholders and take into account the specific environmental, social and economic conditions of the Arctic.

7.0 PROGRAMME SUPPORT ELEMENTS

The principal administrative and management elements considered necessary to support the Regional Programme of Action should include:

7.1 Possible Clearing House
7.2 Reports on Implementation and Effectiveness
7.3 Technical Co-operation and Assistance
7.4 Education and Training
7.5 Secretariat Support

Where specific and immediate actions are proposed they are noted in bold.

7.1 Clearing House

Using GPA concept of clearing house, actions should include:

- links to GPA and Arctic Council information systems.

- **Actively supporting participation of relevant UN agencies in GPA clearing house.**

- **Defining user needs and identifying potential information providers.**

7.2 Reports on Implementation and Effectiveness

Using GPA criteria for evaluating effectiveness, open and transparent reporting is required and this should include:

- **Progress reports on the implementation of the RPA to Arctic Council Ministers and other interested intergovernmental bodies (e.g., UNEP, UNECE and CSD).**

- **Developing a reporting procedure and format for the assessment of the RPA implementation and effectiveness in collaboration with other working groups.**

- Promoting regular consultations with indigenous people and local residents.

7.3 Technical Co-operation and Assistance

Actions for technical co-operation and assistance should include:

- Encouraging and facilitating co-operation between and among regional organizations/conventions and agreements to promote the exchange of information, experience and expertise.
- Ongoing assessment of co operative assistance projects to facilitate co-ordination and avoid duplication.

- Developing and sharing (with due regard to intellectual property rights) technology, methods and information on pollution prevention and control, habitat protection and remediation.

- Developing partnerships for environmental protection and management of the Arctic region among the Arctic countries, as well as among governmental and non-governmental organizations, research and academic institutions, organizations representing indigenous people and the general public, international financial institutions, UN system, etc.

- Promoting the application of risk assessment/cost-benefit analysis to pre-investment strategies for the priority actions identified, such as the work being done through the Barents Region Environment Programme and NEFCO.

- Augmenting the existing capacity of the Russian Federation to manage the preventive and remedial actions needed to address regional pollution concerns.

- **Exploring innovative approaches to encourage multilateral financing agencies, including regional development banks, and national institutions for bilateral development to co-operate in programming and project implementation and to further explore innovative approaches to provide continuing and predictable programme funding for the priority actions identified (e.g., partnership meetings).**

- Collaborating on the establishment of management strategies, including protected areas, for ecologically and culturally sensitive areas within marine and coastal areas of the Arctic.

- Encouraging the development and wide distribution of appropriate contingency plans for environmental accidents (particularly those involving oil, gas and chemical spills, and nuclear accidents), taking full account of emergency preparedness guidance and assessments within the Emergency Preparedness Prevention and Response (EPPR) Working Group and the broader international community.

7.4 Education and Training

Actions for education and training should include:

- Exchange and training programmes to build capacity in skills (particularly among local residents) to prevent and minimize damage from land-based activities.
- Training and capacity building in conducting environmental assessments, environmental audits and evaluations, application of contingency plans and integrated coastal zone management

- Training and capacity building in relation to best available techniques, practices, etc., of people employed in land-based industries.

- Development of education materials on human influence on the Arctic marine environment (within and outside theArctic).

- Programmes and activities to raise awareness of threats to and value of the Arctic marine environment within land-based activities of greatest concern (within and outside the Arctic).

- Improved management training for conducting environmental audits, introducing economic instruments and calculating permit levels.

- Provide training for pollution inspectors in the enforcement of regulations concerning emissions, permitted discharges and waste repositories.

- Provide training for physical planners in integrated management and land-use planning, particularly of coastal areas.

7.5 Secretariat Support

Secretariat support for the RPA is required to:

- help co-ordinate the work to ensure efficiency;

- arrange regular meetings and support reporting on the progress and implementation of the RPA; and

- support the development of a possible clearing house mechanism and other programme support elements.

APPENDIX 1

GPA Assessment and Recommended Activities by Source Category

TECHNICAL & SCIENTIFIC ASSESSMENT			OBJECTIVES	ACTIVITIES[1]
Source Category	Source Activities	Effects & Targets		Recommended Activities
Sewage	Human settlements	Human health / Biological production (eutrophication) / Water quality / Fisheries Tourism	Installation of appropriate and environmentally sound sewage facilities	• Treatment (see Agenda 21) • Proper outfalls • Water-recycling • Productive uses
POPs	Industry / Agriculture Commerce	Human health / Animal health / Fisheries Water quality / Biodiversity	Reduce and/or eliminate anthropogenic inputs to prevent, reduce and eliminate pollution	• Waste reduction and treatment • Sound disposal • Substitutes and bans • Clean production • Best environmental practices
Radionuclides	Nuclear installations / Nuclear weapons / Industry / Public services (hospitals, universities)	Human health / Animal health / Water quality Fisheries	Reduce and/or eliminate anthropogenic inputs to prevent, reduce and eliminate pollution	• Limit generation of waste • Safe processing, storage, conditioning, transportation & disposal of radioactive waste • Meet IAEA Basic Safety Standards
Heavy Metals	Industry / Mining / Sewage (combined) / Non-point sources	Human health / Animal health / Water quality Fisheries	Reduce and/or eliminate anthropogenic inputs to prevent, reduce and eliminate pollution	• Treatment • Waste minimization • Clean technology • Sound disposal • Recycling
Oils (Hydrocarbons)	Oil production facilities / Oil handling facilities / Sewage works / Non-point sources	Human health / Animal health / Water quality Reduction of amenities / Tourism / Tainting seafood	Reduce and/or eliminate anthropogenic inputs to prevent, reduce and eliminate pollution	• Treatment • Waste minimization • Clean production • Sound disposal • Recycling • Spill response
Nutrients	Agriculture / Urban horticulture / Sewage Aquaculture / Certain industries Non-point sources	Human health / Biological production (eutrophication) / Harmful algal blooms Water quality / Fisheries / Tourism	Reduce inputs where they are likely to cause pollution	• Sewage treatment • Coastal Zone Management • Best environmental practices for agriculture and aquaculture
Sediment	Construction / Forestry Agriculture / Mining Dredging	Habitat destruction/modification / Water quality Erosion / Flooding / Biodiversity / Tourism	Reduce, control and prevent environmental degradation due to anthropogenic changes causing coastal erosion and siltation	• Sound land-use • Coastal Zone Management • Sound management for contaminated dredged material
Habitat	Human settlements Construction / Forestry Agriculture / Mining Dredging	Habitat destruction / Wildlife / Fisheries Water quality / Biodiversity / Tourism	Conserve and protect habitat and biological diversity	• Identify critical habitats • Protected areas • Sustainable resource-use practices • Coastal Zone Management

1 Common features for all source categories

- Regional and International Clearing House on Best Available Technology (BAT), Best Environmental Practices (BEP) and Integrated Pollution Prevention and Control (IPPC).
- Environmental Monitoring and Assessment Criteria.
- Scientific, technical and financial co-operation with countries in need of assistance.
- Regionally or internationally agreed quality control and quality assurance procedures for environmental monitoring.
- Ratification and/or implementation of relevant international and regional conventions, decisions and resolutions.
- Formulation and implementation of awareness and education campaigns for the public and industry on pollution prevention.

APPENDIX 2

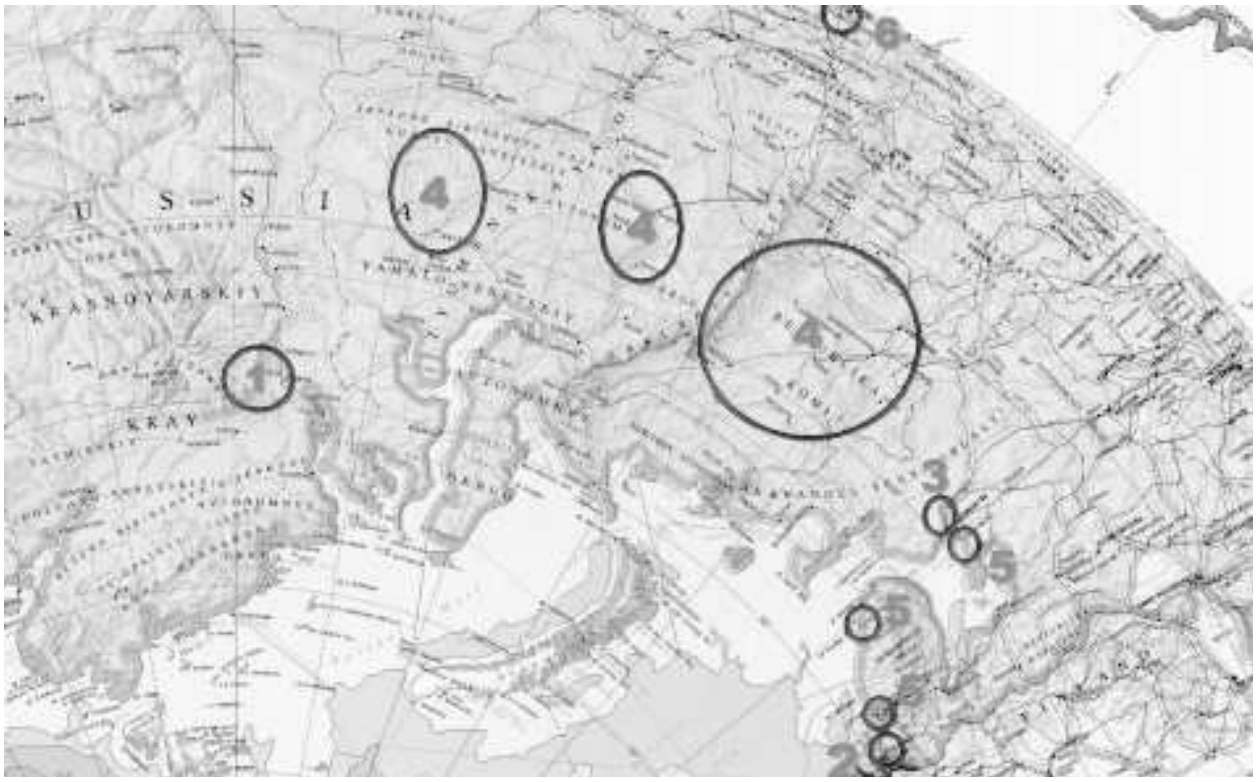
Pollution Hot Spots Identified by the Russian Federation*

Source Category	Major Sources & Priority Pollutants	Principal Pathways	Known/Suspected Effects	Status of Information & Management	Uncertainties to be Resolved	Relative Importance
POPs	3. Archangelsk and Solombalsky pulp and paper mills (PPM). • Methyl mercaptan CS_2, formaldehyde, phenols, dioxins, mercury.	1. River transfer. 2. Air transfer.	Ecosystems of the N. Dvina Gulf are destroyed.	Information is insufficient. Management is inadequate.	Exact information on discharges and emissions in recent years.	Important
Radionuclides	5. Severodvinsk nuclear fleet shipyards (SMP and Zvezdochka) Kola peninsula coastal zone. • Radionuclides	Water and air transfer.	Harm to human health. Pollution of ecosystems.	Information almost sufficient. Management inadequate.	State of existing RW storage sites.	Very Important
Radionuclides	6. (a) Mayak Reprocessing Plant (near Chelyabinsk); (b) Siberian chemical works (near Tomsk); (c) Krasnoyarsk mining and chemical works. • Radionuclides	Water and air transfer.	Harm to human health. Pollution of ecosystems.	Information almost sufficient. Management inadequate.	State of existing RW storage sites. State of radioactive pollution in river systems environment Techa-Iset-Tobol-Irtysh-Ob' (a); Tom'-Ob' (b); and Yenisey (c).	Very Important
Heavy Metals	1. Norilsk mining and metallurgical works. • Heavy metals: Cu, Ni, Co, Cd. • Flue gases (combustion products): SO_2, NO_x, suspended solids (dust), H_2S. • Anions (saline discharge), SO_4^{2-}, Cl^- and formaldehyde.	1. Air transfer. 2. River transfer. 3. Wash-out with melted snow.	1. Regional: Impact on Arctic rivers, ecosystems and coastal areas, especially Pyasina Gulf and Yenisey Gulf. 2. Local: Forest destruction 500,000 ha: 100 x background concentration in moss at 100 km.	Information insufficient. Management inadequate.	More information on the concentration of pollution in the ecosystems is required. Additional studies of effects on ecosystems. Long-range transfer should be studied in air (origin of Arctic haze?) and rivers.	Most Important
Heavy Metals	2. Pechenga-Nikel mining and metallurgical works. • Heavy metals: Cu, Ni, Co, Cd. • Flue gases (combustion products): SO_2, No_x, suspended solids (dust), H_2S. • Anions (saline discharge), SO_4^{2-}, Cl^- and formaldehyde.	1. Air transfer. 2. River transfer. 3. Wash-out with melted snow.	Forest destruction 70,000 ha. Landscape destruction within a radius of 40 km. River ecosystems damaged.	Information is almost sufficient. Management is almost adequate.	Additional studies of effects in ecosystems. Studies of long-range transfer in air and by rivers.	Most Important
Oil	4. Oil and gas installation in Timano-Pechora Province (TPP) and West Siberia Province (WSP). • Oil hydrocarbons	River transfer.	Pollution and degradation of river ecosystems, marsh ecosystems, soil and terrestrial ecosystems.	Information sufficient. Management inadequate.	Better monitoring of the condition of pipelines.	Important

*** based on papers presented by the Russian Federation to ACOPS International Conferences (Washington and Stockholm).**

APPENDIX 2 (CONTINUED)

Location of Pollution Hot Spots Identified by the Russian Federation*



*** based on papers presented by the Russian Federation to ACOPS International Conferences (Washington and Stockholm).**