

**AMAP Progress Report to the Arctic Council Ministerial Meeting.**

**Inari, Finland, October 9-10, 2002.**

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### **Key findings of the 2002 AMAP assessment of Arctic pollution issues, as adopted by the AMAP Working Group, May 3, 2002.**

The Arctic Monitoring and Assessment Programme (AMAP) was established in 1991 to monitor identified pollution risks and their impacts on Arctic ecosystems. In 1997 the first AMAP report, *Arctic Pollution Issues: A State of the Arctic Environment Report* [add footnote with citation of the 1997 and 1998 reports], was published.

The assessment showed that the Arctic is closely connected to the rest of the world, receiving contaminants from sources far outside the Arctic region. The report was welcomed by the Arctic Council Ministers, who agreed to increase their efforts to limit and reduce emissions of contaminants into the environment and to promote international cooperation in order to address the serious pollution risks reported by AMAP.

The AMAP information greatly assisted the negotiation of the protocols on persistent organic pollutants (POPs) and heavy metals to the United Nations Economic Commission for Europe's Convention on Long-Range Transboundary Air Pollution (LRTAP Convention). They also played an important role in establishing the need for a global agreement on POPs, which was concluded in 2001 as the Stockholm Convention. Persistence, long-range transport, and bioaccumulation are screening criteria under both the POPs protocol and the Stockholm Convention, to be applied to proposals to add substances to the agreements. Information from AMAP will be useful in this context in showing whether persistent substances are accumulating in the Arctic and are therefore candidates for control, and also in assessing the effectiveness of the agreements.

The Arctic Council also decided to take cooperative actions to reduce pollution of the Arctic. As a direct follow up of the AMAP reports, the Arctic Council Action Plan to Eliminate Pollution of the Arctic (ACAP) was created to address sources identified through AMAP. ACAP was approved in 2000 and several projects have begun. The AMAP information was also used in establishing priorities for the Arctic Regional Programme of Action to Prevent Pollution from Landbased Sources (RPA), developed by the working group on Protection of the Arctic Marine Environment (PAME), and adopted by the Arctic Council in 1998.

After the first assessment, AMAP was asked to continue its activities and provide an updated assessment on persistent organic pollutants (POPs), heavy metals, radioactivity, human health, and pathways in 2002. Five scientific reports and a plain-language report have been prepared [add footnote with full citation of all six reports]. This Executive Summary provides the main conclusions and recommendations of the 2002 AMAP assessments.

## International Agreements and Actions

As described above, the LRTAP Convention protocols and the Stockholm Convention are essential instruments for reducing contamination in the Arctic. However, they cannot have any effect until they are ratified and implemented.

*It is therefore recommended that:*

- **The UN-ECE LRTAP Protocols on Heavy Metals and POPs be ratified and implemented.**
- **The Stockholm Convention on POPs be ratified and implemented.**

Specific recommendations for monitoring activities in support of these agreements are included in subsequent sections.

## Persistent Organic Pollutants

The POPs assessment addresses several chemicals of concern, including both substances that have been studied for some time and chemicals that have only recently been found in the environment.

The 1997 AMAP assessment concluded that levels of POPs in the Arctic environment are generally lower than in more temperate regions. However, several biological and physical processes concentrate POPs in some species and at some locations, producing some high levels in the Arctic.

The present AMAP assessment has found that the conclusions and recommendations of the first assessment remain valid. In addition:

*It has clearly been established that:*

**Certain Arctic species, particularly those at the upper end of the marine food chain as well as birds of prey, carry high levels of POPs.** Marine mammals, such as polar bear, Arctic fox, long-finned pilot whale, killer whale, harbor porpoise, minke whale, narwhal, beluga, harp seal and northern fur seal, some marine birds including great skua, great black-backed gull and glaucous gull, and birds of prey such as peregrine falcon, tend to carry the highest body burdens.

**Most of the total quantity of POPs found in the Arctic environment is derived from distant sources.** The POPs are transported to the Arctic by regional and global physical processes, and are then subjected to biological mechanisms that lead to the high levels found in certain species. Several potential source regions have now been identified within and outside of the Arctic. A better understanding of local re-distribution mechanisms has also emphasized the important potential role of local processes and sources in determining observed geographical variability.

*There is evidence that:*

**Adverse effects have been observed in some of the most highly exposed or sensitive species in some areas of the Arctic.** Several studies have now been completed on a number of Arctic species, reporting the types of effects that have been associated in non-Arctic species with chronic exposure to POPs, of which there are several examples. Reduced immunological response in polar bears and northern fur seals has led to increased susceptibility to infection. Immunological, behavioral, and reproductive effects as well as reduced adult survival has been found in glaucous gulls. Peregrine falcons have suffered from eggshell thinning and reproductive effects. Reproductive effects in dogwhelks are associated with exposure to tributyltin.

*It is therefore recommended that:*

- **AMAP be asked to further enhance studies aimed at detecting effects in Arctic species relating to exposure to high levels of POPs and to integrate this information with an understanding of general population effects and health.** Without this understanding, it will not be possible to assess whether proposed and existing controls can be expected to afford the necessary protection (e.g., under the LRTAP and Stockholm agreements).

*There is evidence that:*

**The levels of some POPs are decreasing in most species and media in the Arctic, but the rates vary in extent, location and media or species being studied. The decreases can be related to reduced release to the environment.** For example, declines in alpha-HCH in air closely follow decreases in global usage, but declines in marine biota are much slower due to a huge reservoir of the substance in the global oceans. **For other POPs, declines are minimal and some levels are actually increasing, despite low current emissions.** This illustrates the long period that may pass between the introduction of controls and the resulting decrease in levels in biota, as has been observed for PCBs, toxaphene, and beta-HCH.

*It is therefore recommended that:*

- **AMAP be asked to continue trend monitoring of POPs in key indicator media and biota.** This will enable assessment of whether the measures taken in the LRTAP Protocol and the Stockholm Convention are being effective in driving down POPs levels in the Arctic.

*There is evidence that:*

**POPs substances other than those included in the LRTAP Protocol and Stockholm Convention may be at or approaching levels in the Arctic that could justify regional and global action.** For example, levels of the brominated flame-retardants such as polybrominated diphenyl ethers (PBDEs), polychlorinated naphthalenes (PCNs), and some current-use pesticides such as endosulfan have been monitored in Arctic air and biota. PBDEs are increasing in the Canadian Arctic.

*It is therefore recommended that:*

- **AMAP be asked to maintain a capacity to detect current-use POPs in the Arctic.** This will help ensure that Arctic States have an early opportunity to respond to a trend indicating Arctic accumulation, thus allowing a proactive approach to minimize the contamination rather than having to respond to a more serious situation later.

## **Heavy Metals**

The heavy metals assessment focuses on mercury, lead, and cadmium.

*It has clearly been established that:*

**In the Arctic, mercury is removed from the atmosphere and deposits on snow in a form that can become bioavailable. Enhanced deposition occurs in the Arctic.** This recently discovered process is linked to polar sunrise, and is unique to high latitude areas. The resulting enhanced deposition may mean that the Arctic plays a previously unrecognized role as an important sink in the global mercury cycle.

*There is evidence that:*

**Some of the deposited mercury is released to the environment at snowmelt, becoming bioavailable at the onset of animal and plant reproduction and rapid growth.** Although poorly understood, this process may be the chief mechanism for transferring atmospheric mercury to Arctic food webs.

*It is therefore recommended that:*

- **The Arctic Council encourage expanded and accelerated research on critical aspects of the mercury cycle and budget in the Arctic.** Such research should include long-range transport, mercury deposition mechanisms, processes leading to biological exposure and effects, and the influence of climate variability and change on these processes.

*There is evidence that:*

**Despite substantial mercury emission reductions in North America and Western Europe during the 1980s, global mercury emissions may, in fact, be increasing.** Mercury emissions from waste incineration are likely underestimated. The burning of coal in small-scale power plants and residential heaters, principally in Asia, are major potential sources of current mercury emissions. These emissions are likely to increase significantly due to economic and population growth in this region.

*It is therefore recommended that:*

- **The Arctic Council promote efforts at global, regional, and national levels to quantify all sources of mercury and report results in a consistent and regular manner to improve emission inventories.** Particular efforts should focus on measuring contributions made by the burning of coal for residential heating and small-scale power plants as well as by waste incineration.

*There is strong evidence that:*

**There is a trend of increasing mercury levels in marine birds and mammals in the Canadian Arctic, and some indications of increases in West Greenland.** The effects of these levels are not well understood. However, there are also examples of stable or decreasing levels in other regions, perhaps indicating the importance of local or regional processes.

*It is therefore recommended that:*

- **AMAP be asked to continue temporal trend monitoring and the assessment of effects of mercury in key indicator media and biota.** This will enable assessment of whether the measures taken in the LRTAP Protocol are being effective in driving down mercury levels in the Arctic.

*There is evidence that:*

**Current mercury exposures pose a health risk to some people and animals in the Arctic.** These risks include subtle neurobehavioral effects.

*It is therefore recommended that:*

- **In view of the fact that reducing exposure to mercury can only be addressed by regional and global action to reduce worldwide emissions, and acknowledging the assessment for global action undertaken by UNEP and its resulting proposals, the Arctic Council take appropriate steps to ensure that Arctic**

**concerns are adequately addressed and to promote the development of regional and global actions.**

*It has clearly been established that:*

**Dramatic reduction in the deposition of atmospheric lead has occurred in Arctic regions where the use of leaded gasoline is banned.** Arctic-wide elimination of leaded gasoline use will reduce lead exposure in other regions of the Arctic. Although levels in wildlife and fish have not measurably declined, likely reflecting continued uptake from the large reservoir of lead deposited in soils and sediments, lead levels in the environment are expected to diminish over time if current trends continue.

*It is therefore recommended that:*

- **The Arctic Council support continued efforts to eliminate the use of leaded gasoline in all Arctic regions.**

*It has clearly been established that:*

**Certain regions of the Arctic contain elevated lead levels in the environment because of past or current use of lead shot by hunters.** Even though lead shot is banned in Alaska, for example, lead blood levels in endangered U.S. populations of Steller's eiders are above known avian toxicity thresholds for lead poisoning, which may be responsible for observed reduced breeding success. In Greenland, lead shot appears to be a significant source of human dietary exposure to lead.

*It is therefore recommended that:*

- **The Arctic Council encourage a complete ban on the use of lead shot in the Arctic, and that enforcement be improved.**

*There is evidence that:*

**Cadmium levels in some seabirds are high enough to cause kidney damage.** Monitoring data on cadmium in the abiotic and biotic environment to date provide no conclusive evidence of trends or effects. However, cadmium accumulates in birds and mammals and not enough is known about possible effects.

*It is therefore recommended that:*

- **The monitoring of cadmium in the Arctic be continued to support human exposure estimates.**

*There is evidence that:*

**Levels of platinum, palladium, and rhodium have increased rapidly in Greenland snow and ice since the 1970s.** These elements are used in automobile catalytic converters to reduce hydrocarbon pollution. The toxicity and bioaccumulation potential of these elements are largely unknown, which prevents assessment of their potential impact in the Arctic.

*It is therefore recommended that:*

- **AMAP be asked to consider the need to monitor trends of platinum, palladium, and rhodium in the Arctic.**

## **Radioactivity**

The radioactivity assessment addresses man-made radionuclides and radiation exposures deriving from human activities.

*It has clearly been established that:*

**In general, levels of anthropogenic radionuclides in the Arctic environment are declining.** Most of the radioactive contamination in the Arctic land environment is from the fallout from nuclear weapons testing during the period 1945 to 1980. In some areas, the fallout from the Chernobyl accident in 1986 is a major source. For the Arctic marine environment, a major source of radionuclides is the releases from European reprocessing plants at Sellafield and Cap de La Hague.

**However, releases from the reprocessing plants have resulted in increases in levels of some radionuclides in the European Arctic seas during recent years, in particular technetium-99 and iodine-129.** The present doses to the population are low but the present levels of technetium in some marine foodstuffs marketed in Europe are above the EU intervention levels for food to infants and are close to the intervention level for adults.

*The technetium information adds further weight to the recommendation made by AMAP to the Arctic Council in Barrow in 2000 that:*

- **“The Arctic Council encourage the United Kingdom to reduce the releases from Sellafield to the marine environment of technetium, by implementing available technology.”**

*There is evidence that:*

**Radionuclides in sediments are now a source of plutonium and cesium-137 to the Arctic.** Earlier releases such as those from Sellafield that have deposited in sediments in the Irish Sea, especially cesium-137 and plutonium, have been observed to remobilize so that these deposits are now acting as sources to the Arctic. Thus, even if operational releases of these radionuclides from reprocessing plants are reduced, releases from environmental sources such as contaminated sediment in the Irish Sea and the Baltic Sea will be observed in the Arctic.

*It is therefore recommended that:*

- **The Arctic Council support a more detailed study on the remobilization of radionuclides from sediment and its potential effect on the Arctic.**

*It is apparent that:*

**There is continuing uncertainty about the amount of radionuclides present at a number of sources and potential sources in the Arctic.** Access to information about civilian and military sources continues to be a problem.

*It is therefore recommended that:*

- **The Arctic Council promote more openness of restricted information from any sources.**

*It has clearly been established that:*

**Compared with other areas of the world, the Arctic contains large areas of high vulnerability to radionuclides.** This is due to the characteristics of vegetation, animals, human diets, and land- and resource-use practices. On land in the AMAP area, there is considerable variation in vulnerability due to differences in these characteristics. In contrast, vulnerability associated with releases of radionuclides to the marine environment is relatively uniform and similar to that for other areas of the world. Maps of vulnerable areas,

when combined with deposition maps, can be useful in an accident situation. The information on vulnerability is of importance for emergency planning.

*It is therefore recommended that:*

- **AMAP be asked to clarify the vulnerability and impact of radioactivity on the Arctic environment and its consequences for emergency preparedness planning.**

*It is apparent that:*

**When performing risk reducing actions, close links to assessment programs are important and interventions should be prioritized in relation to the extent and magnitude of threats posed by nuclear activities, especially in respect to accidents.**

Interventions themselves can also have negative effects for humans and the environment, and careful judgments have to be made together with environmental impact assessments prior to carrying out a project. It is the view of AMAP that this has not always been done in interventions adopted to date.

*It is therefore recommended that:*

- **Risk and impact assessment programmes be performed prior to implementation of action to reduce risk.**
- **Risk and impact assessments, including accident scenarios, be performed with regard to the transport of nuclear waste and fuel within the Arctic and nearby areas and with regard to planned storage and reprocessing within the Arctic and nearby areas.**

*It is apparent that:*

**The protection of the environment from the effects of radiation deserves specific attention.** The current system of radiological protection is entirely based on the protection of human health. This approach can fail to address environmental damage in areas such as the Arctic that have low human population densities. Recently, an international consensus has emerged that the rapid development of a system and a framework for the protection of the environment needs further effort. The International Union of Radioecology (IUR), with support from AMAP, was one of the first international organizations to promote and present such a system and framework.

*It is therefore recommended that:*

- **AMAP be asked to take an active part in the continued efforts to address environmental protection, with special responsibility for the Arctic.** This should include the task of adding the need for protection of the environment into monitoring strategies and assessment tools.

*It is noted that:*

**Since the previous AMAP assessment, nuclear safety programmes have been implemented in Russia at some nuclear power plants and other nuclear installations relevant to the Arctic.**

*It is therefore recommended that:*

- **The Arctic Council continue its cooperation with Russia to improve the safety and safeguarding of nuclear installations and waste sites.**

## Human Health

The human health assessment considered health risks associated with exposure to contaminants in relation to other lifestyle factors determining health. This assessment has extended geographical coverage and confirmed the conclusions and recommendations from the first assessment.

*It has clearly been established that:*

**The highest Arctic exposures to several POPs and mercury are faced by Inuit populations in Greenland and Canada.** These exposures are linked mainly to consumption of marine species as part of traditional diets. Temporal trends of human exposures to POPs have so far not been observed. Exposure to mercury has increased in many Arctic regions while exposure to lead has declined.

*It is therefore recommended that:*

- **The monitoring of human exposure to mercury, relevant POPs, including dioxins and dioxin-like compounds and other chemicals of concern, be continued in order to help estimate risk, further elaborate geographical trends, and begin to establish time trends of exposure.**

*There is evidence that:*

**Subtle health effects are occurring in certain areas of the Arctic due to exposure to contaminants in traditional food, particularly for mercury and PCBs. The evidence suggests that the greatest concern is for fetal and neonatal development.** In the Arctic, human intake of substances with dioxin-like effects is a matter of concern, confirmed by recent results from Greenland. Increasing human exposure to current-use chemicals has been documented, for example for brominated flame-retardants. Others such as polychlorinated naphthalenes (PCN) are expected to be found in human tissues. Some of these compounds are expected to add to the total dioxin activity in humans. The AMAP human health monitoring program includes a number of measures of effects, ranging from biomarkers of effects at the molecular level to epidemiological outcomes.

*It is therefore recommended that:*

- **The human health effects program developed by AMAP be more extensively applied in order to provide a better base for human risk assessment especially concerning pre- and neonatal exposures.**

*It has clearly been established that:*

**In the Arctic, diet is the main source of exposure to most contaminants. Dietary intake of mercury and PCBs exceeds established national guidelines in a number of communities in some areas of the Arctic, and there is evidence of neurobehavioral effects in children in some areas.** In addition, life-style factors have been found to influence the body burden of some contaminants, for example cadmium exposure from smoking. In the Arctic region, a local public health intervention has successfully achieved a reduction of exposure to mercury by providing advice on the mercury content of available traditional foods. The physiological and nutritional benefits of traditional food support the need to base dietary recommendations on risk-benefit analyses. The health benefits of breast-feeding emphasize the importance of local programs that inform mothers how adjustments within their traditional diet can reduce contaminant levels in their milk without compromising the nutritional value of their diet.

*It is therefore recommended that:*

- **In locations where exposures are high, carefully considered and balanced dietary advice that takes risk and benefits into account be developed for children and men and women of reproductive age.** This advice should be developed by national and regional public health authorities in close consultation with affected communities.
- **Studies of the nutrient and contaminant content of traditional food items be promoted in order to assess their benefits and to estimate exposures as a basis for public health interventions.**
- **Breast-feeding continue to be recognized as a practice that benefits both mother and child.** Nonetheless, if contaminant levels increase or more information indicates increased risk, the potential need for restrictions should continue to be evaluated.

*It is noted that:*

**From the Arctic human health perspective, it is of utmost importance that considerations for global actions against POPs and mercury take into account the concerns for Arctic human health.** The Stockholm Convention and the LRTAP protocols should be properly monitored in the Arctic to determine whether their implementation is effective in protecting human health.

*It is therefore recommended that:*

- **AMAP participate in the global monitoring of human exposure to be established under the Stockholm Convention on POPs.**
- **The Arctic Council monitor proposals for global action on mercury being undertaken by UNEP, and contribute as necessary to ensure that Arctic concerns related to human health are adequately addressed.**

### **Changing pathways**

The assessment of changing pathways provides an introduction to the types of changes on contaminants pathways to, within, and from the Arctic that might be expected as a result of global climate change and variability.

*There is evidence that:*

**The routes and mechanisms by which POPs, heavy metals, and radionuclides are delivered to the Arctic are strongly influenced by climate variability and global climate change.** These pathways are complex, interactive systems involving a number of factors, such as temperature, precipitation, winds, ocean currents, and snow and ice cover. Pathways within food webs and the effects on biota may also be modified by changes to climate. Studies using global change scenarios have indicated the potential for substantial changes in atmospheric and oceanographic pathways that carry contaminants to, within, and from the Arctic. These effects mean that climate-related variability in recent decades may be responsible at least in part for some of the trends observed in contaminant levels.

*It is therefore recommended that:*

- **AMAP be asked to further investigate how climate change and variability may influence the ways in which POPs, heavy metals, and radionuclides move with respect to the Arctic environment and accumulate in and affect biota.** This will enable Arctic States to better undertake strategic planning when considering the potential effectiveness of present and possible future national, regional, and global actions concerning contaminants.

## Progress report 2000 – 2002

**The 2002 SOAER (State of the Arctic Environmental Report)** will be released and presented to Ministers in October. **The 2002 AMAP Assessment Reports (2002 AAR)** on Persistent Organic Pollutants (POPs), Heavy Metals, Radioactivity, Human Health and Changing Pathways have been prepared and will be published during the later part of 2002.

Since the ministerial meeting in Barrow October 2000, **ACIA** has been further developed by AMAP, CAFF and IASC. More than 180 scientists have now committed to take part in the scientific assessment. The extended outlines of the 18 chapters have been further elaborated. The drafting teams are now actively engaged in the drafting work and several workshops have been arranged to develop different components of the programme, see Appendix 1.

A more detailed report from the ACIA process has been prepared to the Ministers of the Arctic Council by the ACIA Chair.

A joint AMAP/CAFF WG meeting was held in Stockholm in August 2001 to discuss the **harmonization of monitoring programmes**. Connected with this, CAFF arranged a workshops on monitoring of biodiversity in Akureyri in March 2002.

The **AMAP Working Group (AMAP WG)** has met twice since the Barrow meeting, in Stockholm in August 2001, and in Torshavn in April/May 2002. In connection with the Stockholm meeting, the second joint AMAP/CAFF WG meeting was held to discuss ACIA and harmonization of monitoring programmes.

At the AMAP WG meeting in Stockholm the AMAP Chair Hanne Petersen from Denmark announced that she would have to step down as Chair. The WG elected Helgi Jensson as the new Chair and Yuri Tsaturov Russia as the new Vice Chair of AMAP.

The list of observing countries and organizations to AMAP is shown in Appendix 2. At the Secretariat there have been no changes.

The **AMAP Foundation Board** is a Norwegian body established to oversee the financial affairs of the Secretariat, which is established as a Public Foundation under Norwegian law. The AMAP Secretariat accounts are audited by the Norwegian Governmental Audit. The accounts regarding both AMAP Secretariat operations and project accounting for 2001 have been accepted by the auditors.

The **Assessment Steering Group (ASG)** has met four times since Barrow, in Reykjavik in November 2000, in Stockholm in August 2001 (where a Cross-Fertilization meeting involving a large number of scientific experts was also held), in Tromsø in connection with the AMAP Symposium in January 2001, and finally in Oslo in March 2002.

The **expert groups** for radioactivity, human health, heavy metals and POPs have met independently on several occasions in connection with the preparation of the 2002 AMAP Assessment Reports.

The **National Implementation Plans (NIPs)** for fulfilling the AMAP programme have been updated during the period. These are described in the **AMAP Project Directory (AMAP PD)** ([www.amap.no/pd2000.htm](http://www.amap.no/pd2000.htm)) and in various reports that are available as online

documents from the AMAP website ([www.amap.no](http://www.amap.no)). Almost 300 projects and programmes are now registered in the AMAP PD and a large number of these have contributed data and information to the AMAP assessments. The AMAP PD also has a wider relevance. CAFF have adopted the AMAP PD as a resource for documenting their projects, and the system has also been extended (using external funding) to serve the needs of other organizations such as ENVINET (see below). In this way a resource has been developed that describes Arctic monitoring and research projects and programmes whereby information compiled under different organizations can be shared to the mutual benefit of all organizations – avoiding duplication of effort in building independent systems to serve similar needs. The AMAP PD is developed as an online database – both registering/updating information and searching/accessing information are activities that are conducted online over the Internet.

During the last two years AMAP has placed increasing effort on identifying and quantifying **sources** of contamination to the Arctic. This is a complex issue and national reporting of emissions and discharges of priority contaminants is often inadequate, unreliable or unavailable. Improved information has been received concerning a number of sources. On a project level, both the PTS and the PCB projects (see above) include a source identification/quantification component, as does the ACAP project on obsolete chemicals in which AMAP is involved. Close cooperation has been further developed between AMAP and UN-ECE, OSPARCOM and GEIA on related issues. An AMAP workshop on source information for POPs and Heavy metals was held in Oslo in August 2001 and the report from this workshop is available. AMAP has also been involved in the preparation of a spatially distributed version of the most recent global inventory of atmospheric emissions of Hg from anthropogenic sources, which was a pre-requisite for Hg transport modeling that has been employed in the AMAP assessments.

AMAP continues to operate six **Thematic Data Centers (TDCs)** to support its assessment activities and to ensure the long-term access to Arctic environmental data that is necessary for the conduct of, for example, temporal trend assessments. A lot of the new environmental data that has been used in the 2002 AMAP Assessment Reports has been reported to the AMAP marine TDC at the International Council for the Exploration of the Sea (ICES, Denmark), the atmospheric TDC at Norwegian Institute for Air Research (NILU, Norway), the terrestrial/freshwater TDC at University of Alaska Fairbanks (UAF, USA) and the radioactivity TDC at the Norwegian Radiation Protection Authority (NRPA, Norway). The TDC for human data has not been in operation last year due to administrative problems linked to handling of classified information. These problems will hopefully be solved soon, and the TDC in operation. The ICES TDC hosted a special workshop in November 2001 to analyse AMAP temporal trends data sets as part of the heavy metals assessment. The UAF TDC has developed systems to provide online access to its database (see [www.syncon.uaf.edu](http://www.syncon.uaf.edu)); these systems developments include necessary restrictions on public access to restricted AMAP datasets, according to the AMAP Data Policy. The TDC for human health has not been in operation due to problems related to handling/storing of personal and confidential data. Hopefully these problems will be resolved in the near future.

Based on requests from the SAOs, three **Fact Sheets** have been prepared and produced by AMAP. These Fact Sheets, concerning Persistent Organic Pollutants, Heavy Metals and Radionuclides, provide an overview of the Ministerial decisions that have been made under the AEPS and Arctic Council in relation to these issues for use in international negotiations, etc. Initially 1000 copies of each sheet were produced and circulated to the eight Arctic countries, observers and permanent participants; subsequently an additional 1000 copies of

each Fact Sheet were requested and produced. The Fact Sheets have been translated into Russian and Saami for production in these languages.

The **AMAP website** ([www.amap.no](http://www.amap.no)) has continuously been updated with new information, and almost all reports produced by AMAP are now made available online as electronic documents. In addition, online databases have been developed to provide access to datasets and graphics that are compiled or produced by AMAP as part of its assessment production work. Website usage statistics show that access to the AMAP website has increased considerably over the past few years. The AMAP website currently receives some 12.000 visitors per month. This includes 3-4.000 new (first time) visitors each month. Average length of these visits are between 5 and 20 minutes, resulting in some 300.000 visit-minutes per month.

A restricted access part of the website has successfully used for distribution of the draft assessment reports during 2001-2002, for review purposes, etc.

In the **Strategic Plan for 1998 – 2003** AMAP identified 10 Key Monitoring areas, five of these in Russia. The activities within these areas are shortly described in Appendix 2.

As a part of preparations for the AMAP Phase 2 assessment work, the AMAP monitoring programme was updated with respect to the contaminants and media to be analyzed, **methodologies and QA/QC** aspects, etc. In connection with QA/QC, all laboratories were recommended to participate in relevant international intercalibrations. The majority of laboratories that are responsible for the national monitoring data that are included in the AMAP 2002 assessments are participating in either the major European laboratory QA activities (e.g., QUASIMEME laboratory performance programme, see below) or their North American equivalents (e.g., NOAA/NIST laboratory intercomparisons). Whilst these activities have led to much improved capability to reliably determine many of the 'traditional' priority contaminants, there is an need to address some QA issues relating to analysis of a 'new' contaminants (in particular current-use POPs) that are being found in the Arctic.

As a special activity in support of the AMAP Phase 2 assessment, and future human health monitoring work, the AMAP Human Health group established a special QA/QC programme directed at laboratories engaged in analysis of priority contaminants in human samples. So far, two ring-tests have been carried out under this initiative. Results of these ring-tests, concerning analysis of PCBs and organic pesticides (DDT and mirex) in human blood, can be found on the AMAP website. The AMAP ring-tests are currently being coordinated by Jean-Philippe Weber at Le Centre de Toxicologie du Quebec (Sainte-Foy, Quebec, Canada). They are open to participation from both AMAP and non-AMAP laboratories. The next ring-test, including heavy metals analyses, is currently being planned.

The improvement of the laboratory QA/QC has been a major step forward for the quality of AMAP monitoring and assessment. Many issues still, however, need further work to continue these positive developments.

AMAP secretariat has had the task to administrate two **special projects**. Phase 2 of the **PCB project** has been implemented since the Barrow meeting. A report for Activity 1, Russian legislation relevant to PCB handling has now been finalized has been prepared for publication. All other activities are under implementation, and are expected to be finalized

by the beginning of November. The project Steering Group plans to publish the Phase 2 Executive Summary by the time of the Arctic Council Ministerial Conference in October.

According to the request from ACAP, preparatory work for Phase 3 has been initiated, a Discussion Paper on implementation of Phase 3 has been prepared and based on the discussion during the Oulu meeting this document is now updated.

The project '**Persistent Toxic Substances**, Food Security and Indigenous Peoples of the Russian North' has made further progress during the period since the last report to SAOs. Environmental samples collected in 2000-2001 have been analysed, and the data from these analyses have been used in the AMAP assessments. Dietary survey conducted among indigenous populations covered approximately 1500 persons, and the information obtained is currently under evaluation. An analytical laboratory for analysis of human samples has been selected, partly on the basis of results of two ring tests arranged under the AMAP Human Health programme QA/QC activity (see below), and the work on the analysis of blood samples has started. For determination of fluxes of PTS with the Pechora and Yenisey river flow, four seasonal sample collections have been performed. These field activities were performed according to international guidelines and include simultaneous measurements of hydrological characteristics. Analysis of the resulting water samples are planned to be started this summer.

The PTS project work is performed in close collaboration with RAIPON and its regional branches. Indigenous representatives are actively participating in a number of the project activities, including the dietary survey work, environmental and human sampling, and assessment of local pollution sources, etc. Following an initiative of RAIPON, every mother and newborn child that participates in the project will receive a special post-natal care-pack in recognition of their contribution to the project. An information flyer about the PTS project has been produced (in English and Russian) to advertise and communicate information on the project.

With regard to the project budget deficit, which has not yet been completely eliminated, the AMAP Secretariat highly appreciate the additional financial contributions from Norway and Finland, and the appeal from Finland to the other Arctic Council members to provide further assistance to this project.

## The work plan for 2003 – 2004.

- 2003
- Continue the core ongoing and long-term monitoring activities under the AMAP Trends and Effects Monitoring Programme (for temporal and spatial trends, human health and biological effect studies, also including collection of information on new contaminants, other emerging issues, etc.).
  - Continue to implement ACIA in a close cooperation with CAFF and IASC.
  - Assessment priority 1: The ACIA assessment, prepare the policy document, ensure that pollution aspects are covered where appropriate, etc.
  - Assessment priority 2: Initiate the acidification and petroleum hydrocarbons assessment activities (assessments due in 2006).
  - Consolidate programmes and activities, taking into account any implications of reorganization of the AC, requests from the AC, also including cooperation with international bodies such as UNEP and UN-ECE, e.g., follow-up of the Stockholm Convention.
  - Develop a new strategic plan for AMAP, including planning a new strategy for performing assessments and reporting these.
  - Continue efforts aimed at communication of results, including production and presentation of translations of the 2002 assessment report.
  - Improve procedures for reporting data to AMAP TDCs, and improve accessibility to AMAP data.
  - Upgrade the AMAP website.
  - Prepare and deliver final PTS project report, planning related to any follow-up (e.g. possible international conference for presentation of the PTS project results)
  - Continue cooperation and support to specific ACAP projects.
- 2004
- Deliver the ACIA Assessment in cooperation with CAFF and IASC. Possible International Symposium on Arctic Climate and UV.
  - Agree the AMAP monitoring programmes for the next period (long-term temporal trends and biological effects, including human health, etc.) taking into account requests from Ministers, and also possible requests relating to follow-up of UN ECE Protocols, Stockholm Convention, etc.
  - Continue to implement National Implementation Programmes (NIPs) as appropriate, including those relating to assessments due in 2006, and develop NIPs in relation to future planned activities.
  - Provision of data for the acidification and petroleum hydrocarbons assessments.
  - Develop a new timetable for presentation of future assessments, based on decisions made by the AC regarding assessment priorities and follow-up of international bodies, and the new AMAP strategic plan, etc.
  - Continue cooperation and support to specific ACAP projects.

## **Requests for possible new mandates to be applied for in Inari**

AMAP would like to request a mandate to allow it to initiate projects in the same way as is currently practised under ACAP, meaning that if two or more countries (The ACAP rule might be two or more countries, but it would seem better to require that at least three countries support something before it becomes an AC activity. Any two countries can always work on a bilateral basis.) would like to implement a special study, project or programme, this can be done without any expectation that the other countries shall participate.

Extend the mandate on source related issues in relation to an identified need for development of a more comprehensive source related assessment procedure. This entire sentence makes no sense. Suggest making two sentences, one describing the issue and one requesting the action.

## **Other activities**

### **Cooperation with AC WGs:**

AMAP and CAFF has worked closely on the design and implementation of ACIA. A new cooperation has started on coordination of contaminant/biological effects and biological/biodiversity monitoring programmes. These two activities will be continued in the years to come.

AMAP and the SDWG are cooperating closely, in particular in relation to human health projects and the Children and Youth project. AMAP also contributed to the preparation of the SDWG Fact Sheet on human health and POPs.

Under ACAP, AMAP has been responsible for project administration of the PCB project, and is actively involved in the new ACAP projects related to Obsolete Chemicals, Dioxins and Mercury.

AMAP has approached the other WGs with the intention to establish a closer cooperation on assessment of Petroleum Hydrocarbon issues. Pending the decision in Ivalo a closer cooperation with the assessment and arrangement of international symposium will be initiated.

### **Cooperation with other actors:**

AMAP has continued the cooperation with **UNEP** and UNEP Chemicals on several issues:

In the **UNEP Regional Based Global Assessment of POPs**, AMAP has produced the Arctic contribution based on the 1998 AMAP Assessment Report. The activity has been funded by a contribution from Canada.

AMAP has been invited to take a coordinating role of the **GIWA** Assessment, but has been awaiting information regarding funding of the project and a specification of the tasks to be done. To date, AMAP has assisted GIWA with consultations regarding assessment of the Russian river basins.

In connection with the follow-up of the Stockholm Convention, AMAP has been invited to take part in the planning of a **new global network to monitor**, for example, effectiveness of the Convention. A first meeting on this was held in Geneva in May 2001, and the next meeting is due to be held at the same time as the SAO meeting in Oulu.

UNEP has initiated a feasibility study to assess the need for a **new global assessment of the marine environment**. AMAP has participated in the two meetings on this that were held in Iceland in September 2001 and in Bremen in March 2002.

AMAP was involved in reviewing the Arctic relevant sections of the **GEO-3 report** that is currently being prepared by UNEP.

AMAP are cooperating closely with **UN ECE** on issues relating to the follow-up of the Aarhus Protocols on POPs, Heavy Metals, and the Protocol on Acidifying substances.

AMAP is currently involved in discussions with **WHO** concerning the establishment of a new project 'Development of recommendations on breastfeeding among indigenous peoples of the Asian Russian Arctic in connection with POPs pollution' within the framework of the Child Health and Nutrition Initiative, Global Forum for Health Research.

Following a recommendation of ACSYS/CLIC, the Department of Hydrology and Water Resources initiated the development of the **Arctic-HYCOS** (Arctic Hydrological Observing System). This is an integral component of the World HYCOS, addressing informational support for climate studies and water management for the Arctic Region. AMAP assisted WMO in drafting the Project Profile, taking into consideration that implementation of this project may significantly contribute to the climate-related monitoring network in the Arctic.

The cooperation between **EU** and AMAP has developed further during the last two years. The core group of the **Inter Regional Forum**, in which AMAP Secretariat participates, has met twice, in Copenhagen in December 2000 and in Brussels in December 2002. Harmonization and improvements of monitoring and assessment of the marine areas are the main issues behind this cooperation.

The **EEA** (European Environmental Agency) has requested AMAP to take an active role in the production of parts of the Kiev report - The European Environmental Status report for 2003. The AMAP radioactivity expert group in close cooperation with Russian and EU experts will produce the chapter related to radioactivity. This activity will start in June and be funded by the EEA. The two lead countries for radioactivity under AMAP, Russia and Norway, will be responsible for the AMAP contribution.

AMAP has been invited to participate in the preparation of an **EEA/UNEP/AMAP/Nordic Council Arctic report** on the links between Europe and the Arctic that can be used as a background report for justifying and developing European policy in relation to the Arctic areas.

As a part of development of the **EU Northern Dimension**, AMAP was invited to give presentations at an EU, Canadian, Russian, USA conference in November 2001 in Brussel.

**ENVINET** is an EU sponsored project to promote networking among European infrastructures (mainly large-scale research facilities) involved in monitoring and research in

Arctic and Alpine areas. The AMAP Secretariat is a member of the ENVINET, representing one of main international organizations that are 'users' of data from these facilities. The AMAP Secretariat has participated in ENVINET meetings in April 2001 and January 2002, and is leading an ENVINET activity to make ENVINET Site Specific Information and Project Information available on the Internet (for further information see: [www.amap.no/envinet/queryform1.cfm](http://www.amap.no/envinet/queryform1.cfm)). This activity is being developed as an integrated component linked to the AMAP Project Directory database described above; information about projects registered through ENVINET automatically appears in the AMAP Project Directory as well.

AMAP has continued its close cooperation with the **Nordic Council of Ministers** (NCM) and Nordic Council. AMAP have provided material as input to NC/NCM activities, and the NCM have contributed substantial funding for several AMAP projects, including production of the 2002 AMAP assessments.

The Nordic Environment Finance Cooperation (**NEFCO**) participate in the ACAP PCB project, and the AMAP Secretariat participate in NEFCOs Fast Track project on PCB. This has ensured a very close coordination of the activities and avoided overlap of work.

AMAP has followed the work under the **Barents Euro-Arctic Council** and held a presentation on ACIA and climate change in the Arctic at their last Ministerial meeting in Kirkenes, Norway.

**OSPARCOM** is one of the regional organizations that AMAP work closely with. AMAP provided a substantial contribution to the 2000 OSPAR (Arctic sub-regional) Quality Status Report. Since that time cooperations have largely been through routine exchange of information and participation of both organizations in the Inter Regional Forum (see above).

AMAP has continued its close cooperation with **ICES**. ICES operates one of AMAP TDCs and hosted an AMAP workshop on assessment of temporal trend data. ICES is also a member of the IRF. AMAP and ICES have held discussions on respective activities in relation to UNEP initiatives and UNEP Chemicals planning, to avoid potential overlaps and duplication, etc. The AMAP Secretariat was also invited to contribute to an ICES evaluation of how they could improve their work to support the activities of regional organizations.

Cooperation between AMAP and **IASC** is mainly linked to the implementation of ACIA. Also, there is an agreement between IASC and AMAP on collaboration in development of the long-term Arctic Hydrology Initiative, and on joint organization of the 'Polar Regions' Session at the 3rd World Water Forum.

Together with equivalent programmes in North America, the **QUASIMEME** (Quality Assurance of Marine Environmental Monitoring programmes in Europe) programme provides an important part of the QA/QC activities linked to analysis of priority contaminants. Most of the laboratories in Denmark, Finland, Norway, Sweden and Iceland that are responsible for delivering data to AMAP participate in QUASIMEME Laboratory Performance Studies. Some laboratories from Canada, the United States and Russia are also included. AMAP has arranged for additional participation of Russian laboratories in this programme as part of the requirement for these laboratories to take part in the PTS project. AMAP is represented on the QUASIMEME Advisory Board. However, due to time and

financial constraints the AMAP Secretariat were unable to participate in the October 2001 Advisory Board meeting.

AMAP was invited to act as an observer in the development of the **ACOPS** project application to GEF aimed at raising funding for project implementation in Russia. However, due to lack of funding from the MSP funded project to ACOPS, a representative from AMAP Secretariat could only participate at a few steering group meetings.

The AMAP Secretariat is member of the steering group of the EU funded project called **MAIA**, that will provide useful information to AMAP and ACIA regarding inflow of Atlantic water into the Arctic Ocean.

The AMAP Secretariat is member of the steering group of the EU funded project called **RADARC**, a project that will provide scenarios on effects of climate change on releases of radionuclides in Russia over the next 100 year period and will be included in ACIA.

Over the period since Barrow, several radioactivity projects related to the Arctic have been funded under the EU fifth Frame Work Programme and provided information that has been used in the 2002 AMAP Radioactivity Assessment.

## **Activities needing coordination with other working groups or other actors**

The ACIA activity will need increased coordination with the all other AC working groups.

The development of the updated AMAP monitoring programme should be coordinated with CAFFs monitoring plans, but also with wishes from other working groups, e.g. health related issues under the sustainable development working group, and oil related issues with other Arctic Council working goroups.

The petroleum hydrocarbon assessment that is currently under preparation would benefit from a closer cooperation with all the other working groups under the AC.

A follow up of the PTS project would most probably need a closer cooperation with the sustainable development working group.

The follow up of the PCB project will be done under ACAP.

### **Funding issues:**

The AMAP Secretariat receive core funding from Norway that covers approximately 67% of the operational costs of the Secretariat. The reminder has been covered by voluntarily contribution from Canada and Finland, and through administration of projects such as the PTS and PCB project.

The production of the AMAP 2002 Assessment Reports is funded partly through in-kind contributions, whereby all lead countries support participation of their National Key experts in the assessment work. Report production work, including authoring of the SOAER, graphical production work, report lay-out and printing, etc., is covered partly by grants from some countries such as Canada, Denmark, Finland, Norway, and USA, and the Nordic Council of Ministers. The remainder is covered at cost through national orders for copies of the reports.

The production and translation of the Fact Sheets was funded by Denmark, Finland and Norway.

Phase two of the PCB project has been funded by all eight Arctic countries and UNEP-Chemicals.

The AMAP/RAIPON/GEF PTS project has been funded by all eight Arctic countries, GEF, the Salamander Foundation, WWF, the Nordic Council of Ministers (NCM), and UNEP-Chemicals.

A special application has been sent to GEF concerning an ACIA project in Russia. This received PDF-A support. A MSP (medium sized project) proposal has been prepared and sent to the GEF secretariat for evaluation and hopefully support.

**Appendix 1:** Internatiuonal workshops and conferences arranged by AMAP in cooperation with other national and international bodies during 2001-2002, as a part of the assessment process:

- ACIA Scenario Workshop, Stockholm, January 2001
- ACIA Workshop: Russian Climate Research and Monitoring Programmes, St. Petersburg, May 2001.
- EMEP/AMAP (US-EPA) Workshop on Photooxidants, Particles, and Haze across the Arctic and North Atlantic: Transport Observations and Models, New York, June 2001
- AMAP Workshop on Emissions, Sources and Scenarios, Kjeller, August 2001
- Danish-EPA/NMR/AMAP Workshop on Mercury and POP's, Roskilde, September 2001
- AMAP Conference and Workshop: Impacts of POPs and mercury on Arctic environments and humans, Tromsø, January 2002.
- Fifth International Conference on Environmental Radioactivity in the Arctic and Antarctic, St. Petersburg, June 2002
- The 2<sup>nd</sup> AMAP Internatinal Symposium, Rovaniemi, Finland, October 2002

## Appendix 2. Activities within the 10 Key Areas.

In the **Key Area** representing the border areas between Norway, Finland, Sweden and Russia a significant amount of new monitoring and research activities have been undertaken, including joint operation by Sweden and Finland of the Pallas atmospheric monitoring station. The PTS project has contributed to the collection of a large number of samples of different environmental media from the Kola Peninsula, however there is still work to be done to achieve a more permanent operation of several programmes on freshwater, terrestrial, marine and human health monitoring in the area.

In the Pechora area, the PTS project has again ensured collection a large number of samples, but here also a long-term programme of environmental monitoring in the region is lacking. An air monitoring station at Anderma has, however, been operated for two years to collect data on POPs, and recently a Tekran instrument has been installed at the site to allow monitoring of mercury in air at Amderma. The Amderma site was originally established under a Canadian-Russian bilateral cooperation. The current operations and measurements are possible thanks to funding support from Canada, the Nordic Council of Ministers and Denmark. Future funding arrangements are, however, needed to secure continuation of the sampling and analyses from this area.

In the Taimyr/Norilsk area, the PTS project has been the main programme for collecting samples and delivering data from this region during AMAP Phase 2. No permanent environmental monitoring programme exists or is under development in this area, although this area incorporates one of the largest pollution source (for emissions of metals and acidifying substances) located within the Arctic. Bilateral work between Finland and Russia preparing for the 2006 AMAP Assessment on Acidification has been performed.

In the Lena delta area, no special programme has been established. A Lena Delta Basin programme is however, under development (involving AMAP cooperation with the World Meteorological Organization and the Third World Water Forum), as described in the following. The AMAP Secretariat were responsible for organizing a "Polar Regions" Session at the 2<sup>nd</sup> World Water Forum. On the basis of this very successful activity, the organizing committee of the 3<sup>rd</sup> World Water Forum (which will take place in Japan in March 2003) has invited the AMAP Secretariat to co-ordinate preparation of this session at the WWF-3 as well. Taking into account a special focus of WWF-3 on climate change adaptation strategy in water management, the AMAP Secretariat prepared a special project proposal "Dialogue on Climate Change Adaptation Strategy in Water management and flood Preparedness at the Lena Basin". This project has recently been approved by the steering committee of the global Dialogue on Water and Climate, and has received financial support of 203,300 Euro. Since this project is based on major elements of the capacity building strategy, the AMAP Working Group considers this project as a potentially important contribution to the Arctic Council Capacity Building Strategy and Action Plan.

In Chukotka the PTS project has been the main programme to collect samples and deliver data for use in the AMAP Phase 2 assessment. Plans for establishing two atmospheric monitoring stations in the region (one for POPs, and another for mercury measurement based on Tekran instrumentation) are however well advanced and partly implemented. This activity is funded by the USA and is closely coordinated with the programme of activities and procedures established already at Anderma.

The Alaska/North Slope Key area was a focus of work to fill geographical gaps. Atmospheric mercury measurements have been implemented at Barrow, and there are also plans for monitoring POPs in air at this site. Several screening studies, including some effects studies, in particular on marine mammals have been performed in the North Slope area. However, in general these are implemented as single studies and not part of any long-term ongoing monitoring programmes. The US National Status and Trends monitoring programme mainly only covers sites in southern Alaska. Human health studies including communities in the North Slope (Barrow), and Aleutian/Pribilof Islands have been implemented.

The Mackenzie Key area has been the subject of only minimal new/ongoing activities due to large amount of information on this area available from previous work. Studies on spatial and temporal trends of contaminants in biota have been performed in the Yukon territories. The area is covered by activities under the Canadian Northern Contaminants Programme.

The Canadian Arctic Archipelago Key area includes the long-term air monitoring site at Alert. Temporal and spatial trend monitoring studies involving biota, including retrospective studies (e.g. temporal studies using seabird eggs on Prince Leopold Island) have been implemented in the region. The area is covered by activities under the Canadian Northern Contaminants Programme.

The Baffin Island/West Greenland Key area has been a focus for human health studies on Inuit populations in the area that are highly exposed to some POPs and Hg as a result of their consumption of marine mammals. Temporal trend studies have also been performed on sediment and peat cores in West Greenland. The area is covered by activities under the Canadian Northern Contaminants Programme and the Danish AMAP Phase 2 national implementation programme.

Activities in the East Greenland/Svalbard Key area include operation of the air monitoring stations at Station Nord (mercury) and Ny Alesund (mercury and POPs). Human health studies have also now been implemented in East Greenland. Studies on Svalbard and in the Barents Sea area have focused on attempts to explain the high levels of several contaminants that are found around Svalbard. The area is covered by activities under the Danish and Norwegian AMAP Phase 2 national implementation programmes.

## **Appendix 2: Observing countries and organization to AMAP**

### AMAP OBSERVER ORGANIZATIONS:

Advisory Committee on Protection of the Sea (ACOPS)  
Association of World Reindeer Herders (AWRH)  
Circumpolar Conservation Union (CCU)  
European Environment Agency (EEA)  
International Arctic Science Committee (IASC)  
International Atomic Energy Agency (IAEA)  
International Arctic Social Sciences Association (IASSA)  
International Council for The Exploration of the Seas (ICES)  
International Federation of Red Cross and Red Crescent Societies  
International Union for Circumpolar Health (IUCH)  
International Union for the Concervation of Nature (IUCN)  
International Union of Radioecology (IUR)  
North Atlantic Marine Mammal Commission (NAMMCO)  
Nordic Council of Ministers (NCM)  
Nordic Council for Parliamentarians (NCP)  
Northern Forum (NF)  
Nuclear Energy Agency (OECD/NEA)  
Oslo and Paris Commissions (OSPARCOM)  
Standing Committee of Arctic Parliamentariants  
United Nations Economic Commission for Europe (UN-ECE)  
United Nations Environment Programme (UNEP/GEMS)  
World Health Organization (WHO)  
World Meteorological Organization (WMO)  
World Wide Fund for Nature, Arctic Programme (WWF)

### AMAP OBSERVER COUNTREIS:

France  
Germany  
The Netherlands  
Poland  
The United Kingdom