

MILITARY ENVIRONMENTAL COOPERATION ON RADIOACTIVE AND NON-RADIOACTIVE WASTE IN RUSSIA'S NORTHWEST AND FAR EAST

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ABSTRACT

The Arctic Military Environmental Cooperation (AMEC) Program is a cooperative effort between the Ministries of Defense of Norway and Russia and the Department of Defense of the United States. The goal of the program is to mitigate the impact of military operations in the fragile Arctic environment. This paper discusses the history of the Program, current efforts, accomplishments and challenges. It provides an overview of the eighteen projects addressing five radioactive waste program areas (spent nuclear fuel, liquid waste, solid waste volume reduction, solid waste storage technologies; radiation monitoring and personnel safety) and two nonradioactive waste program areas (remediation technologies, clean ship technologies). Most of these projects will be described in greater detail in papers presented during a separate session. The paper will also discuss an AMEC-like initiative addressing similar problems in Russia's Far East – the Pacific Military Environmental Cooperation (PMEC).

HISTORY OF THE PROGRAM

Towards the end of the 1980s, acknowledgement of the cross-border nature of the environmental problems, together with a changed political climate, opened the way for bilateral cooperation between Norway and Russia in the field of nuclear safety.

Cooperation in matters of nuclear safety and the prevention of radioactive pollution at installations in the former Soviet Union and the countries of Eastern Europe thus became an important focus of Norwegian activity. Priority consideration was given to Northwest Russia because of the unsafe nuclear power stations, decommissioned nuclear submarines in a poor state of repair and the existence of large amounts of spent nuclear fuel and radioactive waste.

While the main emphasis in the initial years was placed on the collection and analysis of data, Norwegian efforts are now focused on helping to eliminate problems due to bottlenecks in the established Russian infrastructure specifically as to the handling and storage of spent nuclear fuel and the radioactive waste associated with the dismantling of decommissioned Russian submarines. In addition, measures to improve safety at the Kola and Leningrad nuclear power plants have been implemented. Since 1995, under the Plan of Action for Nuclear Safety, Norway has contributed 590 million kroner (equivalent to some 70 million US dollars) towards the cost of addressing nuclear safety problems.

The extent of the problems associated with spent nuclear fuel and radioactive waste in Northwest Russia, and the costs involved in addressing them, preclude their solution by Russia alone. International involvement is therefore essential. Our close proximity to Russia, our common border in the North, and the large concentration of nuclear installations in the Northern regions, has made it natural for Norway to take a lead in working towards international solutions.

Norwegian authorities have therefore sought to involve other governments and international organizations with a view to establishing an integrated international approach to assisting Russia in the solution of its nuclear-related environmental problems.

The most serious and pressing defense-related environmental problem in Northwest Russia concerns the responsible handling and storage of spent nuclear fuel. In 1995, as part of the initiative taken in the context of its lead role in stimulating international action, Norway approached the United States and Russia with proposals for a discussion of defense-related environmental problems in the Arctic region. This resulted in a joint declaration, signed in September 1996 by the Defense Ministers of Norway and Russia and the United States Secretary of Defense, on Arctic Military Environmental Cooperation (AMEC) under which the three nations' armed forces will work together to ensure that their military activities do not harm the Arctic environment, especially with regard to contamination by radioactive materials. This cooperation is intended to develop better methods and infrastructure for the processing of radioactive waste from military sources, the handling of spent nuclear fuel and radioactive waste from decommissioned submarines and the assessment of environmental risks associated with military activities. The list of collaborative projects includes, for example, the development of a 40-ton container and associated storage platform for spent nuclear fuel, monitoring systems for radioactive waste and mobile units for the collection of both solid and complex liquid radioactive waste.

For Norway's part, the AMEC cooperation forms an integral part of the overall cooperation with Russia on matters of nuclear safety. What makes this project so unique in this context is that it is a "military-to-military" cooperation project focusing on the task of solving the serious environmental problems stemming from military activities in Northwest Russia.

AMEC is a forum for dialogue and joint activities among military and environmental officials from Norway, Russia and the United States. AMEC is led by designated senior officials, the AMEC Principals, from the United States Department of Defense and the Defense Ministries of Norway and Russia. A Steering Group, assisted by the Technical Guidance Group consisting of experts in the field, identifies and prioritizes military environmental projects in the Arctic region.

It is important to note that although this is a military-to-military programme led in the case of the United States by the Department of Defense, the Department of Energy, the Environmental Protection Agency and the Department of State all participate. Most of the

United States funding, amounting to some 22 million dollars since the start of the program, is provided by the Department of Defense and a further 5 million dollars is available to complete the program by September 2002. The Department of Energy has also contributed some 2 million dollars to date. In Norway the Ministry of Foreign Affairs provides the funding for the Ministry of Defense (since AMEC is an integral part of the Plan of Action for nuclear safety issues and the environment). To date Norway has provided approx. 12 million kroner while a further 27 million kroner is budgeted for the next two years.

The Russian Federation funding is provided by the Ministry of Defense and the Ministry of Atomic Energy.

CURRENT EFFORTS

There are eighteen projects addressing five radioactive waste program areas (spent nuclear fuel, liquid waste, solid waste volume reduction, solid waste storage technologies radiation monitoring and personnel safety) and two nonradioactive waste program areas (remediation technologies, clean ship technologies). All projects are scheduled for completion by September 2002. As a result of the limited AMEC budget, prototype development is the goal. Mass production of the prototype will have to be accomplished using Russian, International or other U.S. funds. This is the approach used for the spent nuclear fuel project. The U.S. will purchase this cask for the spent nuclear fuel from the Ballistic Submarines, while Russia will purchase these casks for the fuel from the General Purpose Nuclear submarines.

Naval Spent Nuclear Fuel Management

Two Projects are currently underway – Project 1.1 is the development of a prototype cask for storage and transport of spent nuclear fuel from submarines. Project 1.1-1 provides a transshipment pad at RTP ATOMFLOT in Murmansk. This pad will be used for temporarily storing casks as they are unloaded from the service ships, and on loaded onto railroad cars. The prototype cask was completed in October 1999, and is awaiting final certification for storage and transport. The pad design is nearly complete and construction has started.

Naval Liquid Radioactive Waste Treatment

This program area addresses the problem of decommissioned nuclear submarines that still have their nuclear fuel onboard. Some of these submarines are moored in remote locations and are in danger of sinking - they cannot be towed to dismantlement sites. Project 1.2 calls for the design and manufacture of a specialized mobile liquid waste processing facility to support the dismantlement of nuclear submarines in remote sites. This project is in the design-review stage.

Technologies for Solid Radioactive Waste Volume Reduction

This program area identifies and implements suitable technologies as part of an integrated treatment system necessary to process (volume reduce and stabilize) solid radioactive wastes generated and accumulated during the decommissioning of Russian nuclear submarines. Because of the anticipated high cost, a phased approach is used. The first phase, an initial Technology Assessment (Project 1.3-1) is completed. Phase two is limited implementation - the design and construction of a Mobile Pretreatment Facility (Project 1.3-2) – is in progress. Phase three, full implementation adds high force compaction, a metal decontamination unit and a cementing unit – provided sufficient funding is available.

Solid Radioactive Waste Storage Technologies

This program area addresses the Russian shortage of interim storage for naval solid radioactive waste. Project 1.4-1 - a one-year test of a coating material to seal surfaces and facilitates decontamination, was successfully completed in August 1999. Results showed that this coating material could be applied in the harsh arctic climate and that contamination could be removed in one decontamination cycle without any harmful effects on the coating. Two additional efforts are underway to develop containers that meet International Atomic Energy Agency and Russian standards for the transport and storage of solid radioactive waste. Project 1.4-2, the manufacture and procurement of 100 steel radioactive waste containers has been completed - the Russian Navy is now testing the containers. Design specifications for radioactive waste containers made of concrete (Project 1.4-3) have been reviewed and production should start soon. Future plans include demonstrating the applicability of interim storage facilities to stage modular solid radioactive waste while waiting treatment using the Mobile Pretreatment Facility (Project 1.3-2), and following treatment while awaiting disposal or transport to a long term storage facility. Use of these temporary facilities will further limit the spread of contamination in the Arctic environment.

Radiation Monitoring, Personnel and Environmental Safety

This program area enhances monitoring, radiation dosimetry and safety procedures and techniques in the Russian military particularly as they pertain to nuclear submarine dismantlement. Shipyard workers and nearby civilian populations are concerned about radiation exposure resulting from submarine decommissioning and dismantlement activities. An initial project to provide equipment and training to improve efficiency of measures taken to protect the health of workers, the public, and the environment has been completed (Project 1.5-initial). Another project enhances the ability of the Russian military to effectively and safely monitor radiological objects at selected sites that deal with the decommissioning and dismantlement of nuclear submarines. Project 1.5-1, Radiation control at facilities – application of the PICASSO system is in progress. The PICASSO system includes the application of radiological sensing equipment interfaced with computerized graphic displays that are tailored to specific radiological waste storage

and submarine dismantlement sites. The system automates and greatly enhances the ability for local and centralized monitoring of radiological hazardous material.

Technologies for the Remediation of Hazardous Waste Sites on Arctic Military Bases

This Norway/Russia project focuses on the selection of proper and effective technologies for dealing with military hazardous material spills in the Arctic environment. This project was just completed.

Review and Implementation of “Clean Ship” Technologies

This program area examines technologies for the collection and comprehensive processing of “non radioactive” naval ship waste. Project 2.2 (initial), the assessment of the waste problem on board Russian naval vessels and the evaluation of existing clean ship technologies and strategies for ship waste processing is completed. This study quantified and characterized the wastewater discharges – about 250,000 gallons daily - from the Russian Northern Fleet ships. Project 2.2-1, the demonstration of “Clean Ship” technology plans to evaluate an Oily Wastewater treatment system aboard a Russian naval ship.

ACCOMPLISHMENTS

Program areas

In the area of Spent Nuclear Fuel Management, the prototype container for naval spent fuel has been developed and is awaiting final certification. The United States plans to use this cask design for the storage of spent nuclear fuel from Russian Ballistic Nuclear Submarines which will be dismantled as part of the Strategic Arms Reduction Treaty (START). Similarly, Russia plans to serially produce this cask to store and transport the spent nuclear fuel from the General-Purpose nuclear submarines, which will be dismantled. Russian solid waste storage technologies have been improved through the completion of the surface coating demonstration at RTP ATOMFLOT and the manufacturing of U.S. and Russian made steel radioactive waste transport/storage containers. Radiation monitoring, personnel and environmental safety have been improved through the transfer of radiation monitoring equipment and the training of Russian Naval radiation experts in both Norway and the U.S.

International Conferences

AMEC also formally “entered the world stage” by participating in the following three international conferences: a special AMEC session at the 4th International Conference on Environmental Radioactivity in the Arctic, Edinburgh, Scotland; the U.S. – Russia Defense Environmental Conference held in conjunction with the Pollution Prevention Conference in San Antonio TX; and the Arctic Council – Senior Arctic Officials meeting in Washington D.C.

Program Management

In addition, the Principals approved the Strategic Plan reviewed by the Technical Experts during the last Technical Guidance Group meeting. They endorsed the importance of continuing the program area emphasis on Spent Nuclear Fuel Management, Liquid and Solid Waste Treatment and Radiation Monitoring and Personnel and Environmental Safety. New Projects, both on the radioactive and non-radioactive side are also being considered. The Principals also endorsed the Program Management Manual that spells out the AMEC Program procedures.

CHALLENGES

The two key challenges for the AMEC Program continue to be the lack of a trilateral legal agreement and Russian certification procedures.

Legal

Two years ago, a separate legal agreement was proposed to cover Norwegian, Russian and U.S. AMEC activities – the “Trilateral Legal Agreement”. The key stumbling blocks are: liability, access, taxes and status of personnel. To date, these issues have not been resolved. As a result, existing legal agreements are being used.

The U.S. uses the Cooperative Threat Reduction Agreement (CTR), while Norway uses the Norway – Russia Framework Agreement. The consequences of this approach are that the U.S. can only participate financially in those projects directly related to Ballistic Submarine dismantlement – spent fuel (cask and pad), solid waste and radiation monitoring, personnel and environmental safety. The naval liquid radioactive waste treatment, Project 1.2, was not included since it did not seem to relate directly to Ballistic Submarine dismantlement. The “Clean Ship” technologies project is in the nonradioactive waste program area and therefore is not covered by CTR. Norway has the lead on these two projects and plans to fund them until the U.S. has the necessary legal coverage to proceed.

Norway participates financially in those radioactive waste projects included in the Framework Agreement – Spent Fuel (cask and pad), liquid waste and solid waste volume reduction. Efforts are underway to include the remaining radioactive AMEC projects under the Framework Agreement. Norway has the lead on the AMEC nonradioactive waste projects since the U.S. is prohibited by Congressional mandate to participate in remediation activities in Russia, and does not have the legal coverage for the “Clean Ship” Technologies project

Both the U.S. CTR and the Norwegian Framework Agreements are “assistance” programs, while the spirit of the AMEC Declaration is founded on a “cooperative” approach. As a result, at the working level, Norway, Russia and the U.S. emphasize the cooperative approach. However, legal negotiations are conducted on the basis of a

bilateral assistance program - obviously this difference in approach has made negotiations more difficult.

Certification

Certification procedures are evolving in Russia as a result of the shift in responsibility for naval radioactive waste from the Navy to the Ministry of Atomic Energy in 1998. It was not clear if both the civilian and military regulatory bodies would be required to certify and license containers used for the transport and storage of naval spent fuel on both military and civilian property. Although the AMEC prototype cask was completed in October 1999, it still is not certified for transport and storage of naval spent nuclear fuel. This has deterred CTR from ordering the serial production casks for the spent fuel of Ballistic Submarines. In the meantime, Russia has commenced serial production of the same cask to store and transport the spent nuclear fuel from the over 100 decommissioned nuclear submarines that still have their fuel onboard. This summer, a government decree gave this responsibility to the military authority - but infighting between the two regulatory bodies continues. The latest Russian initiative consolidates the regulatory functions under the Ministry of Atomic Energy and eliminates the civilian regulatory body - we may get this cask certified yet!

PACIFIC MILITARY ENVIRONMENTAL COOPERATION (PMEC)

Based on the success of the AMEC program, Russia requested that an AMEC – like initiative address similar problems in Russia's Far East. A draft Declaration has been completed and awaits final internal coordination in Russia and the U.S. Funding for this program started this Fiscal Year and continues to September 2004. Initial projects address the radioactive program areas (Naval Spent Fuel, Liquid and Solid Waste, and Radiation Monitoring and Personnel Safety) as well as the non-radioactive program areas. Although initially this program may start as a bilateral effort between Russia and the U.S., the intent is to include other nations who have interest in this region including Japan, Korea, China and other countries.

CONCLUSION

Although the AMEC Program operates on a relatively small budget – typically about \$4-5M per year – it has made a significant difference in addressing both radioactive and nonradioactive issues in the fragile Arctic environment. Not only has AMEC developed a spirit of cooperation and trust between the militaries and other agencies of the three nations, but it also provides viable technical solutions for those concerned with preserving the environment.