

The UK Government's Global Partnership Programme contribution to addressing nuclear submarine legacy issues in NW Russia – projects and lessons learned

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Introduction

Through its Global Partnership Programme the UK continues to make a significant contribution to improve global security. Over the past year the UK has continue to implement a wide range of projects across the breadth of its Global Partnership Programme. Around a half of the £32.5 million annual budget administered by the Department of Business is currently spent on projects in NW Russia related to submarine dismantlement and making safe and secure Spent Nuclear Fuel from submarines and icebreakers.

This paper summarises the projects now completed, underway and planned for the next few years in the Region. The paper also sets out the lessons learned in establishing and implementing projects which may be of interest to other donors together with a few thoughts on the challenges ahead.

Submarine dismantlement

The UK was one of the first Global Partnership countries to provide financial support for submarine dismantlement and was able to proceed promptly in establishing projects in part due to the guidance provided by US colleagues who were supporting the dismantlement of ballistic nuclear submarines at NW Russian shipyards under the Cooperative Threat Reduction Programme. The availability of equipment provided to the shipyards by the US to enhance the efficiency of dismantling submarines also greatly assisted the effectiveness of UK funded projects.

The objectives of the UK work in this area are to:

- Establish contracts for and to monitor, the dismantling of general-purpose nuclear submarines, ensuring they are completed on time and to cost;
- Liaise with other international donors engaged in similar programmes to enhance lessons learned/best practice culture;
- Investigate the sustainability of a future decommissioning/dismantling programme for general-purpose submarines at the shipyards in NW Russia;
- Address aspects of the submarine dismantling lifecycle that require support in order to improve safety, security and the environment;
- Inform development of the most cost effective options for the dismantling of UK decommissioned submarines

Since the inception of the programme in 2002 following the Kananaskis G8 summit meeting, the UK has financed the dismantling of two Oscar I class nuclear submarines at Sevmash/Zvezdochka shipyards near Archangelsk, and a Victor III nuclear submarine at

Nerpa shipyard near Murmansk. A final, fourth submarine will be dismantled in partnership with Norway during 2007 and 2008. The dismantlement work of this November class submarine – number 291 is expected to be undertaken at Polyarni shipyard with some work completed at NERPA shipyard. Contract discussions for this work are currently underway. Submarine 291 was successfully moved from its long term storage base at Gremikha in 2006 under a project funded by Norway with technical assistance from Royal Navy salvage experts as part of the Arctic Military Environmental Co-operation Agreement programme.

Atomflot Spent Nuclear Fuel Facility

A fundamental element of UK Global Partnership policy is to make safe and secure Spent Nuclear Fuel (SNF). This project focuses very much on contributing to the eventual safe and secure storage and handling of nuclear and radioactive material at the Atomflot site. The £23 million Atomflot Interim Fuel Storage Facility project was the UK's first project in NW Russia and is currently the largest supported by the programme in terms of financial support.

The objectives of the project are:

- To extend the existing shore-based nuclear fuel storage facilities at Atomflot, and provide 50 licensed and certified storage casks;
- To transfer the uranium-zirconium SNF presently on board the storage ship Lotta to a shore-based physically secure storage facility;
- Enhancement of the physical security of the new building.

The project managed by Crown Agents provides for the conversion of the existing Building No.5 into a SNF storage facility and the manufacture of fifty TUK-120 ferro-concrete storage casks, so that the spent fuel can be removed safely from the storage ship and placed into secure storage. The scope includes the provision of fuel conditioning facilities, cask maintenance facilities, equipment for monitoring the casks and the condition of the SNF, and physical protection of the building. The facility has now passed its formal State Commissioning and has obtained all of its licences to operate. The UK financed project will be completed in 2008 once its complement of casks are manufactured and delivered to the facility. The transfer of the fuel from the Lotta is the responsibility of the Russian Federation to undertake, and this is expected to be completed in 2009.

Andreeva Bay

The Russian Federation and the UK have been working closely together through the Global Partnership programme over the last five years to understand the challenges associated with the Spent Nuclear Fuel SNF legacy at Andreeva Bay and to implement a strategy to improve the safe and secure management of this SNF. A series of research and design studies and on-site investigations have taken place during this time in order to prioritise SNF management activities and identify the optimal technical solutions. In addition a number of initiatives to improve the nuclear and radiation safety situation at the site, and to prepare the site for new infrastructure, have been implemented. The projects the UK has financed and provided technical assistance on include:

- Site surveys
- Temporary cover for the uncovered SNF tank
- Radiation protection and monitoring equipment

- Construction of two 88 –person sanitary passes for access to both the SNF and radwaste areas
- Construction of an all weather decontamination facility for vehicles and equipment
- Refurbishment of Radiation Monitoring Centre and Laboratory
- Removal of redundant facilities
- Installation of radiation monitoring systems in the SNF area

In April 2007 a strategy for SNF management was agreed by all the Stakeholders for the site. The strategy requires the installation of new shielding over the three SNF storage units to decrease the radiation dose rates. A building will then be constructed over the storage units to provide a safe working environment for the removal of the SNF and protect the environment for the removal of the SNF and protect the environment against any release of radioactive materials. The spent fuel assemblies will be individually retrieved from the storage units using a remotely operated retrieval machine. The fuel assemblies will be repacked into canisters, which provide sealed containment of the radioactive fuel material, and the filled canisters placed into the shielded casks for storage and transport. The casks will then be transported to the refurbished pier area for short-term storage prior to transport off-site to Murmansk and then to Mayak for reprocessing.

Over the next five years the UK expects that most of its support for work in NW Russia under the Global Partnership will be focused on Andreeva Bay once the work at Atomflot and dismantling Submarine 291 is completed. The UK expects most of its support at Andreeva will contribute to constructing the infrastructure for handling the removal of SNF from the site.

Mayak Buffer Dry Storage Facility

Under current plans nearly all SNF in NW Russia recovered whilst dismantling submarines or retrieved from insecure locations on shore bases, particularly Andreeva Bay is destined for PO Mayak in the Urals, where it will be reprocessed. The UK has supported a study to investigate the benefits of supporting a project to build a cask store at Mayak which has been designed under the US Co-operative Threat Reduction Programme. The work in 2006 focused on the logistical analysis of SNF transfers from Andreeva to Mayak and work to gain regulatory approval for the current design to store damaged as well as undamaged fuel.

Arctic Military Environmental Co-operation Agreement (AMEC)

The UK joined AMEC in 2003 with the specific purpose of promoting co-operation between the UK and Russian Ministries of Defence on military-related security and environmental concerns in the Arctic. A number of the projects supported under the AMEC programme complement the wider Global Partnership work in NW Russia and have also fostered good working relations with the Russian Navy. A key AMEC and UK MOD objective is to optimise navy-navy co-operation between the UK and the Russian Federation. This is being progressed by undertaking joint projects in particular those involving co-operation between the respective Royal Navy and Russian Salvage and Marine Operations departments.

The value of the technical expertise available in the Royal Navy salvage team to the Global Partnership and AMEC, was aptly demonstrated in 2006 when under a Norwegian led AMEC

project the November class submarine 291 was moved from Gremikha to Polyarni shipyard under the guidance of Royal Navy salvage experts. The submarine was moved using the Dockwise Transshelf Heavy Lift Vessel. The same vessel was also used to move two other nuclear submarines for eventual dismantling under Canadian funding at Zvezdochka shipyard. This was the first time that such a move had taken place. This experience will provide valuable lessons learnt for other donors contemplating moving nuclear submarines long distances for dismantling in the Far East.

The Royal Navy salvage team also completed another high profile project this summer in partnership with the Russian Navy. This was the survey of the November class submarine 159 which sank in 2003 with the loss of nine lives while being towed. The Royal Navy team were deployed aboard the NATO research vessel MV Alliance and using a new remotely operated vehicle (ROV) they conducted a detailed survey of the submarine with a view to its possible salvage by the Russian Federation in the future. The ROV used in the survey was NATO's submarine rescue system Intervention Remotely Operated Vehicle (IROV) that is owned jointly by the UK, France and Norway. This was the first time that the system had been deployed and was operated by Rolls Royce with some UK MOD operators involved. As well as undertaking a sonar sweep of the wreck, the team spent considerable time clearing debris from the submarine to enable its future recovery to be undertaken. Russian radiation monitoring equipment was deployed to confirm that there was no radiation leakage from the vessel. The radiation monitoring was undertaken by specialists from the Dollezhal Research and Development Institute of Power Engineering (NIKIET), and Malakhit Marine Design Bureau from St Petersburg. The Russian Navy funded the monitoring work on the site and provided escort and support vessels and ships.

Other AMEC projects funded by the UK underway in 2007 include:

Development and manufacture of equipment for safe transport of decommissioned nuclear submarines

The objective of this task is to provide pontoons for transportation of two Echo class nuclear submarines from Motovski Bay to the Kola Bay for dismantling. The UK is funding the manufacture of four pontoons at NERPA shipyard.

Polystyrene Extraction

The objective of this task is to provide equipment for the safe and efficient removal of polystyrene from the main ballast tanks of decommissioned nuclear submarines. The equipment will be used for removal of polystyrene from the Victor submarine 601 during dismantling operations at Nerpa shipyard which will be undertaken during summer 2007.

Polystyrene recycling

The objective of this task is to provide a facility for manufacture of polystyrene concrete using polystyrene extracted from the main ballast tanks of decommissioned nuclear submarines. The polystyrene concrete production facility will be sited at NERPA shipyard. Delivery of the polystyrene concrete production equipment is expected to be completed by September 2007. Output from this facility is expected to be utilised for some of the building work at Andreeva Bay.

The above projects should be completed during 2007 and projects currently at the definition stage for potential future support by the UK include:

- Investigation of alternative cutting techniques for improving operational safety and reducing the environmental impact of discharges during submarine dismantlement.
- De-fuelling Simulator – provision of a computerised simulator system to allow operators to be trained in the de-fuelling of decommissioned nuclear submarines.
- Mobile Effluent treatment Plant – to provide to the Russian Navy a mobile effluent plant.

Decisions on future projects will be made at the next AMEC Principles meeting in September 2007.

Lessons Learned

Over the past five years of operating its Global Partnership Programme the UK has successfully delivered a major portfolio of projects in NW Russia and across the Former Soviet Union. Fundamental to this success has been the recruitment of top quality private sector project managers. These were selected by international competitive tender using EC procurement procedures in 2002 and 2006. Our project managers provide the UK with a robust framework to manage risks, negotiate and implement complex projects in a timely manner. Our success is also in large part due to:

- Having a strong in country team with local knowledge of the political, legal, procurement and financial framework you need to operate in across the FSU
- Having good working relations with beneficiaries, understand their constraints and work with them to mitigate risks

Other lessons learned include:

- Projects cannot be established overnight. It takes time to obtain the necessary level of information, licensing consents etc and many nuclear project are technically complex and require careful planning to meet health and safety concerns
- It is essential to share lessons learned with other donors, ensuring that projects are co-ordinated or complementary, and do not overlap or clash (this is particularly important for complex sites such as Andreeva Bay)
- Maximum transparency is needed for both sides, especially in relation to allocation of funding for projects and actual expenditure. This builds mutual confidence and provides evidence of real commitment by all parties.
- Where several donors provide assistance for a single project, co-ordinated implementation through a single contractual arrangement can reduce overheads for both donors and recipients (piggybacking)
- The Russian Federation and other FSU countries need to share their overall strategies in order to allow donors to decide on specific assistance projects and have the confidence their contributions are focused on the highest priority projects (the development of the strategy for Andreeva Bay is an excellent example of donor-recipient collaboration)
- Use of local sub-contractors, wherever practicable, provides best value for money, both for the UK and for the recipient.

Challenges ahead

Over the next few years the UK intends to focus on:

- Assisting Russia to make safe and secure SNF at Andreeva Bay in partnership with other donors
- Establishing 2-3000 sustainable jobs for former WMD scientists and engineers
- Enhancing the physical security of nuclear materials and facilities in the FSU
- Working with the US to ensure the closure of the remaining weapons-grade Pu producing reactors in Russia and the safe, irreversible shutdown of the BN350 fast breeder reactor at Aktau in Kazakhstan

A key feature of our Global Partnership policy in the nuclear area is to complete all the work we started in Russia while starting to address global threats elsewhere. Much of the work the UK has supported at Andreeva Bay should provide “lessons learned” for work that will need to be undertaken in the Far East.