

Objectives and Progress with Independent Environmental, Health and Safety Studies for Two Nuclear Submarine De-fuelling and Dismantling Projects

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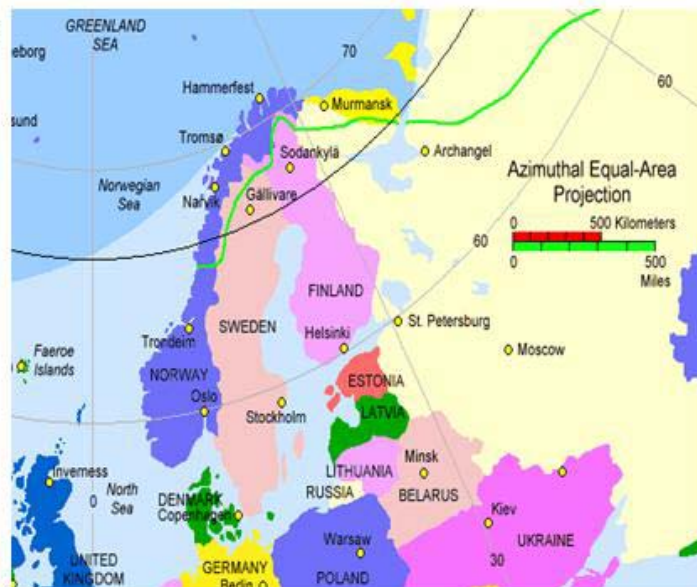


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Dismantling Project Background

- The Norwegian Ministry of Foreign Affairs (NMFA) has established **PILOT** projects to de-fuel and dismantle two Victor II nuclear powered submarines
- **K-517** (factory no. 627), commissioned 1978, being dismantled at Zvyozdochka, Archangel
- **K-513** (factory no. 625), commissioned 1977, being dismantled at Nerpa, Murmansk
- Both contracts were signed June 2003



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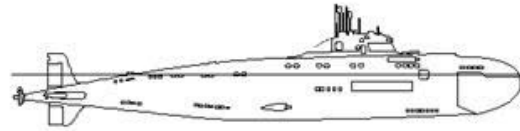
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Dismantling Project Scope

The Victor II's are multi-purpose nuclear powered submarines constructed in 8 compartments

The contract to dismantle includes:

- Transport to shipyard
- De-fuelling
- Interim and final SNF storage
- Remove & recycle bow & stern sections
- Form up 3 compartment hull (with reactor compartment)
 - Process & store all radioactive and chemical hazardous substances arising
 - Recycle all salvageable materials
- Transport hull to Saida Bay



Length: 102 m	Displacement: 4 245/5 800 tonnes
Speed: 24 knots	Crew: 100
Reactor type: Two pressurised water reactors, model OK-300, with a VM-4 type reactor core generating 75 MWt	

At each stage relevant certification and risk assessments to be produced



Current Status

K-517 (factory no. 627, Zvyozdochka, Archangel)



Bow & Stern sections removed for recycling

Defuelled



3 compartment hull formed and awaiting transport to Saida Bay

Similar progress at Nerpa



Objectives and Scope of the Independent Environmental Impact Studies (1)

- The NMFA have required the dismantling contractors to prepare risk assessments to ensure that all operations are undertaken 'safely', in compliance with relevant 'adopted regulations' (covering all nuclear and chemical hazards associated with the operations) and supply copies of all permits and certificates of handover.
- Through NRPA and Enviros the NMFA have commissioned an independent review of the 'Environmental Impact Assessments' completed by the dismantling contractors. The study also is to examine the impact of taking no action!
- Where appropriate, the review will extend to an independent Environment, Health and Safety (EHS) assessment, based on available information and independently identify regulatory compliance issues.
- Work is being done from January to April 2004



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Objectives and Scope of Independent EIA Studies (2)

- The purpose is to determine whether the dismantling projects at Nerpa and Zvezdochka are being carried out in accordance with applicable Russian Federation law and regulations, and so far as applicable to the circumstances, consistent with international recommendations and standards and other national good practice.
- The studies will analyse potential consequences for the environment with an emphasis on radiological consequences, while reviewing working procedures and quality assurance measures. The assessment will be carried out taking account of Russian laws and regulations, international recommendations and conventions and national good practice. However, it is noted that some rules and norms, as well as international recommendations, relevant to the current work are under review and possible revision.
- *It is not to take responsibility for safety, which clearly remains with the Russian side; rather, it is to give confidence to stakeholders that the resources used in the dismantling projects are being applied with due consideration to safety.*



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Environment, Health and Safety?

Environment

Environmental quality standards for radioactive and other contaminants, non-human biota protection, resource management implications, in routine and planned circumstances, now and in longer term; operational and discharge impacts

Health

Human health, workers and public, in planned circumstances, now and in longer term; operational and discharge impacts

Safety

Both of the above in the case of unplanned events/accidents

- Actions to reduce chances of such events
- Actions to mitigate consequences, emergency plans etc.

Physical safety of personal is not included in the study, though it may be important



Steps in Independent Review Process

1. Understand the main steps and identify main points of impact in the dismantling projects
2. Identify relevant RF Regulatory Requirements and International Recommendations relevant to these steps
3. Review assessment documentation available and other source information (related studies) and compare with requirements, recommendations and other good practice. Hence identify any possible omissions or weaknesses
4. Undertake independent EHS assessments where omissions or weaknesses suggest this is appropriate
5. Make conclusions and recommendations related to objectives (see above)



1. Project Steps: matrix of issues	Environment	Health	Safety
Prior to dismantling: •Transport of the submarines to the shipyards for docking •Preparatory work before de-fuelling	Issue 1...	etc...	
Dismantling: •Removal of SNF, radioactive waste and other waste materials •Loading of SNF into flasks •Dismantling of compartments and preparation of the three compartment units	...		
Handling of waste: •Preparation and towing of the compartment units for interim storage •Handling and disposition of radioactive waste •Handling/disposition of salvageable and non-salvageable materials		



Initial Hazard Analysis Results

- Towing of the submarine, with spent fuel in the reactor – **sinking with associated loss of control/containment of materials, (and risk to life). Workforce and environment.**
- Defuelling – **criticality, fuel fires and external irradiation. Workforce, and public.**
- Confined space operations, especially cutting out of materials – **high dust loading, poor ventilation, noxious vapours. Workforce.**
- Interim storage of radioactive materials and chemically hazardous substances on site – **loss of containment. Environment.**
- Towing of three compartment hull (which may contain solid radioactive wastes in addition to the reactor compartment fixed inventory) – **sinking with associated loss of control/containment of materials. Environment**



2. Relevant RF Regulations and other recommendations...

- On environmental protection, No. 7-FZ of 10 January 2002
- On ecological expertise, No. 174-FZ of 1995, as amended by Regulation No. 650-FZ of 1998.
- On the radiation safety of the population, No. 3-FZ of 9 January 1996.
- On the sanitary and epidemiological well-being of the population, No. 52-FZ of 30 March 1999.
- On atmospheric air protection, No. 96-FZ of 4 May 1999.
- On industrial waste management, No. 89 of 24 June 1998.
- The Water Code of the Russian Federation No. 167-FZ of 16 November 1995, with the Amendments and Addenda of December 30, 2001, December 24, 2002 and June 30, 2003.
- On the use of atomic energy, No. 170-FZ of 1995, as amended by Federal Laws No. 28-FZ of 1997 and No. 94-FZ of 2001.
- On protection of the population and territories from emergency situations of natural and man-caused character, No. 68-FZ of 1994.
- IAEA (Waste Convention etc), ICRP, national experience with submarine decommissioning in USA, UK... ('ISOLUS' consultation process for British submarines)



3. Review EIA documentation

An Environmental Impact Assessment should cover:

- **Identification of hazards from routine operations, including work practices and environmental discharges**
- **Quantified inventories of material and identification of process routes through to final disposal/recycling**
- **Identification of potential hazard scenarios and quantified risks of occurrence**
- **Workforce and public exposures**
- **Individual and collective exposures and impacts, radiation and chemical**
- **Exposure of biota**
- **Environmental concentrations**

Information should include radioactive materials, chemically hazardous substances



3 cont. - identify omissions/weaknesses

- In addition to provision of documents, site visits are to be used to augment areas not covered within formal risk assessments (or where access to documentation is restricted)
- These may allow specific information exchanges and face to face explanation of methods and conclusions
- This also gives an insight into work practices and the scale of operations, to see how control is exercised at the working level.



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4. Undertake independent assessments

- This process is currently on-going.
- The main areas to be addressed are:
 - Towing of the submarine
 - De-fuelling operations
 - Confined space operations, especially cutting out of materials
 - Interim storage of radioactive materials and chemically hazardous substances on site
 - Towing of three compartment hull



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Preliminary Thoughts (Conclusions...)

- Regulatory position is not simple, a problem everywhere – difficult to determine how to balance different types of risk. We can identify the different types of risks, but the balancing is a wider process... costs etc...
- Access to information is in some areas difficult – confidentiality, but also understanding of interests and translation etc.
- EIA justification relevant available relates to whole dockyard, not to these specific dismantling projects
- Largest risks to human health appear to be associated with planned cutting methods and dust generation, not radiological.
- Major safety risk associated with de-fuelling operations
- Need clearer justification that all reasonable measures have been taken to reduce chances of accidents – clearer/broader scenario analysis, less emphasis on calculations (of very low probabilities), more on identification of the major hazards and what is being done to remove them
- Implies close inspection that work is carried out in compliance with design requirements
- Early dialogue can facilitate the safety supervision process from the perspective of operator **and** regulator
- 'No Action' would eventually lead to higher environmental risks (as with Lapse, etc.)
- ...

