

## Long term interim storage facility for nuclear reactor compartments of submarines

### German Support for Utilization of Nuclear Submarines in Russia –

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## Introduction

The pros and cons of the storage of civilian highly activity waste like spent nuclear fuel elements have been under political discussions since the beginning of the nuclear plant operations. In the meanwhile two basic types of storage facilities are currently constructed and well-built or accordingly still under process

**interim storage facilities for the temporary storage repositories mostly in a deep geological formation**

Some of these interim storage facilities are in a proximate distance to the nuclear plants or directly on site. Others are in a certain distance and therefore a transportation of the highly activity waste (HAW) is thus necessary. Big final storage facilities for spent fuel elements or HAW have been not realised until now.

All these processes and discussion are strong related to the civilian nuclear waste however **military nuclear waste** can't be neglected e.g. waste from nuclear driven submarines and mass destruction weapons materials.

## Introduction (cont.)

Based on the G8 heads decision against the distribution of nuclear weapons and materials of mass destruction the German Federal Ministry of Economics and Technology (BMWt) established a project in October 2003 concerning the storage of decommissioned Russian nuclear submarines. On the German side the project management of this 600 million EUR project was assigned to

**Energiewerke Nord GmbH (EWN)**



and the technical controlling is performed by

**Bundesanstalt für Materialforschung und -prüfung (BAM)**



under respective contracts from

**BMWt.**



Federal Ministry  
of Economics  
and Technology

## Subjects of the Project

(Agreement between the German Federal Ministry of Economics and Technology and the Russian Ministry for Atomic Energy, dated 9. October 2003)

Article 1: „(1) ...

1. Erection of an onshore long-term interim storage facility for reactor compartments in the Sayda Bay, including respective infrastructure;
2. Optimization of the material and technical situation and of the equipment of Russian companies, in order to accelerate disposal of nuclear submarines;
3. Establishing of conditions for a safe handling of waste products, generated in the disposal of nuclear submarines in the northern region of the Russian Federation;
4. Creation of an ecologically sound status of the environment in the Sayda Bay.“

## Aim of the Project

Construction of a long-term interim storage facility (LTSF) for 150 reactor compartments at Sayda Bay near Murmansk with the following features:

- ▶ storage platform with rails and drains
- ▶ physical protection
- ▶ pier for floating dock
- ▶ indoor reactor compartments repair hall
- ▶ auxiliary buildings
- ▶ radiation protection system
- ▶ roads and external infrastructure



**BAM's surveillance work includes immediately accompanying of the EWN throughout the project and reporting continually to BMWi. Goal oriented project management and BMWi supervision are therefore necessary all the time.**

The milestones of the technical surveillance are in the first part of the project:

- Building progress of the long-term interim storage facilities
- Evaluation and, if necessary, modification of technical tasks
- Transportation of heavy reactor compartments from the Nerpa shipyard by a floating dock to the storage place at Sayda Bay
- Conditioning of reactor compartments

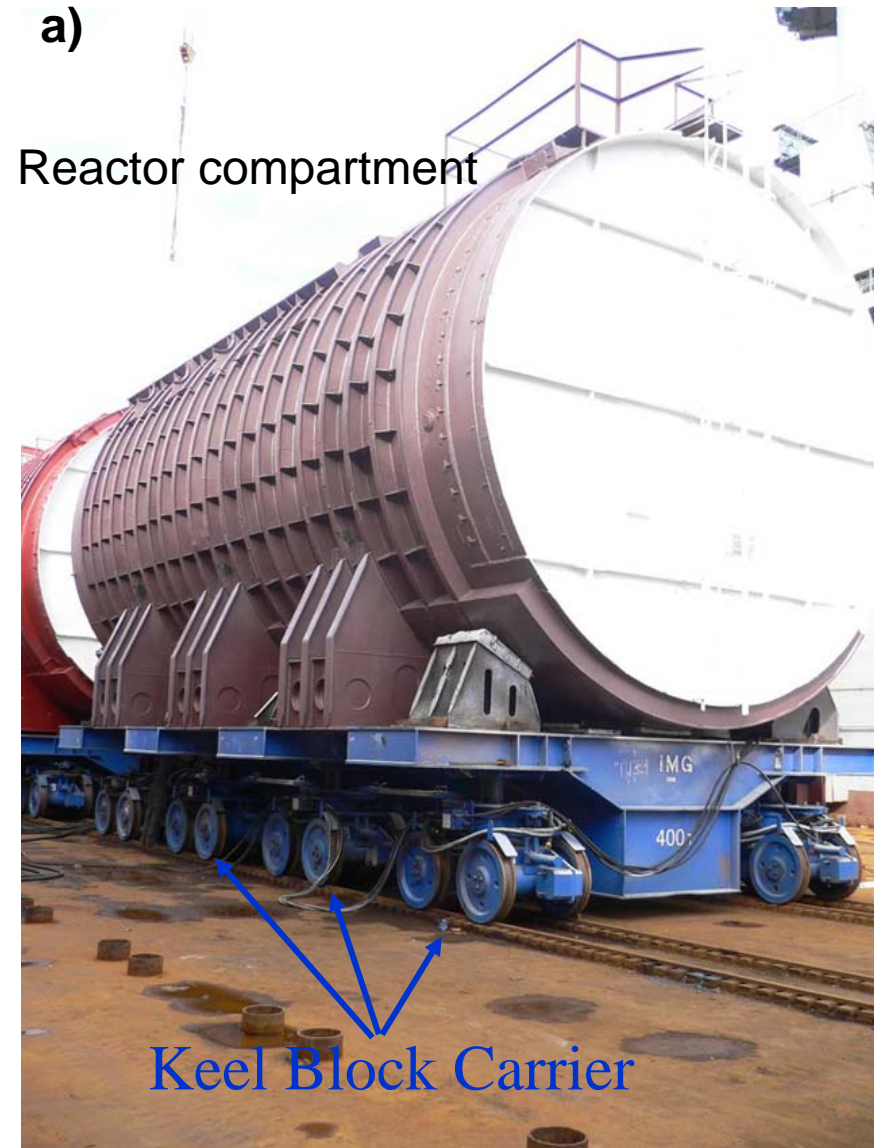


Crossing rail system at the LTSF for the carriage of the nuclear reactor compartments (max. weight 1600 metric tons) supported by so called **Keel Block Carrier**. First construction stage of the LTSF.

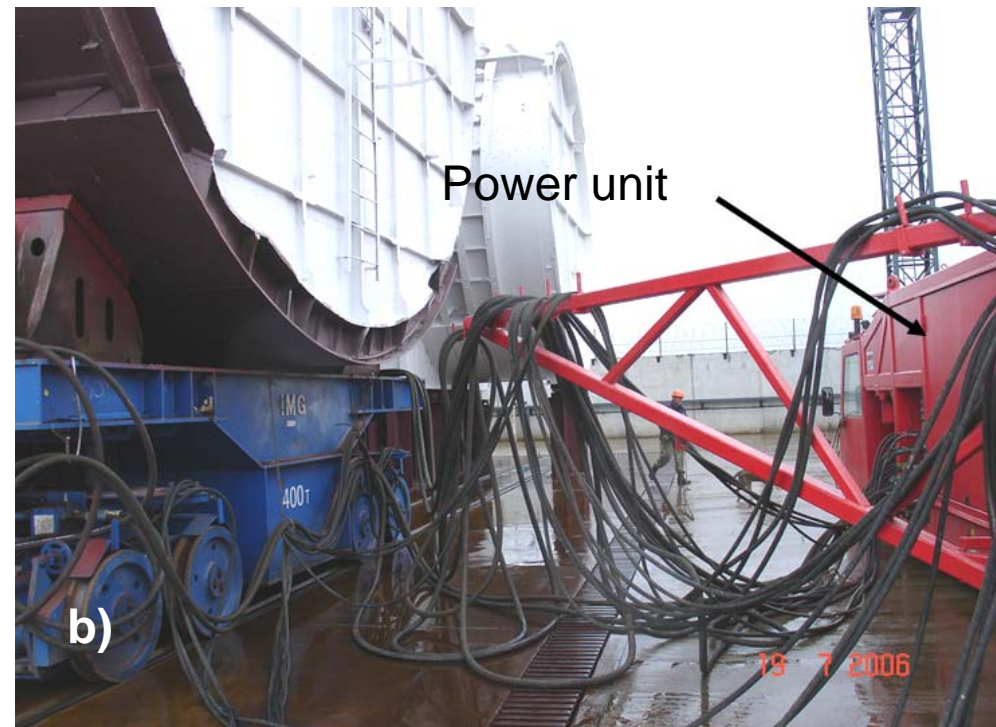


a)

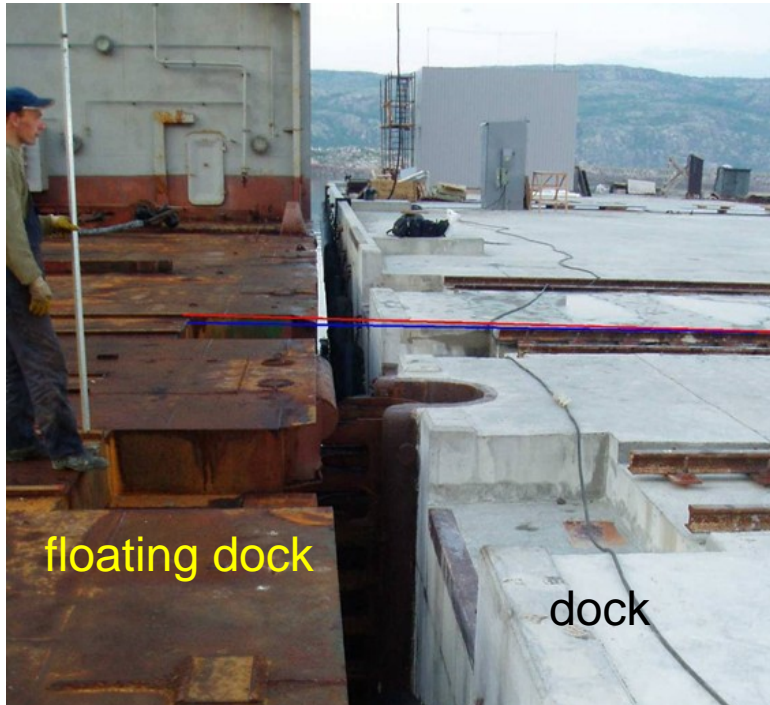
Reactor compartment



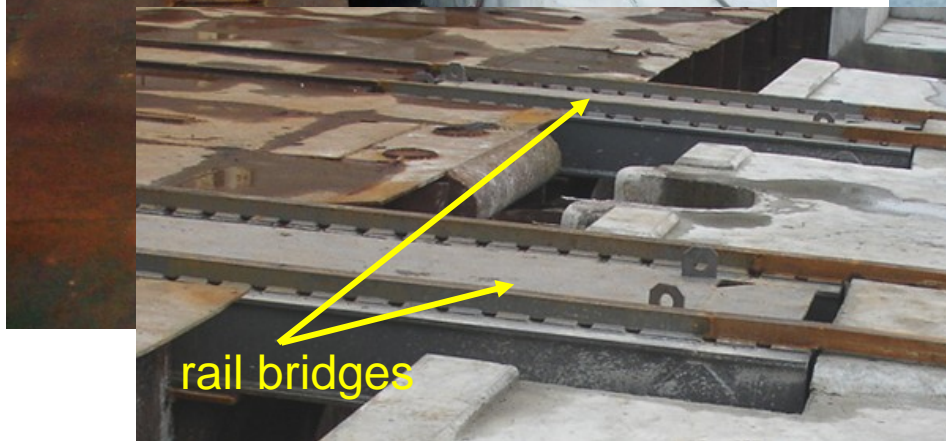
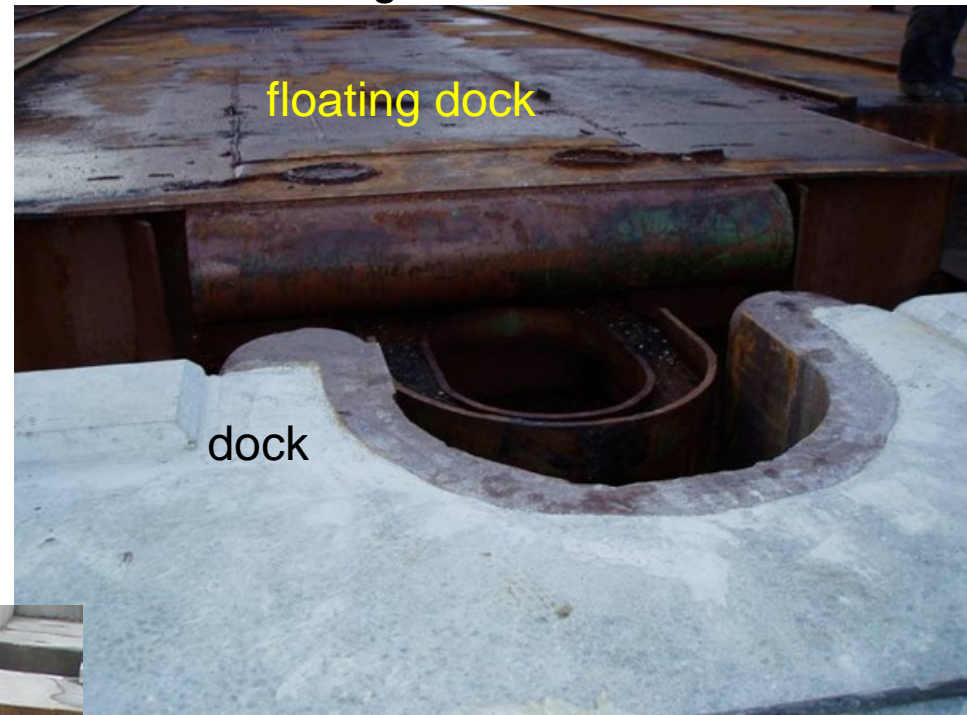
a) Transportation of a reactor section employing special developed carrier systems so called Keel Block Carrier (KBC) adapted to the rails (90° wheel rotation makes a perpendicular movement possible)



b) Handling of the cable duct between the KBC's and the power unit



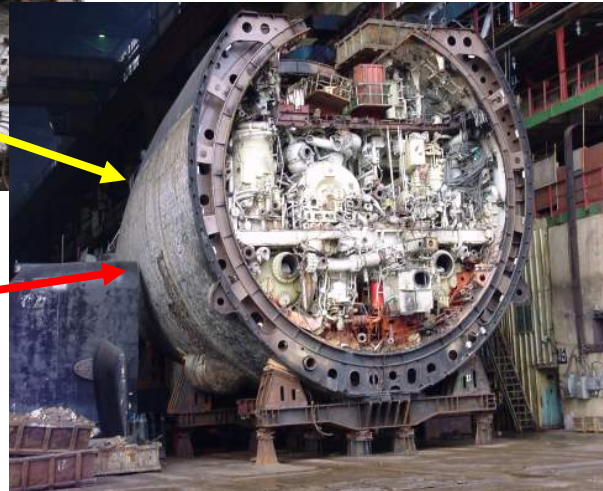
Detail of the mismatching between the floating dock and the dock



Clear visible is the mismatch between the floating dock (left) and the dock (right). The difference of the level are some centimeter and can be balanced with rail bridges.



3 sections of the former submarine

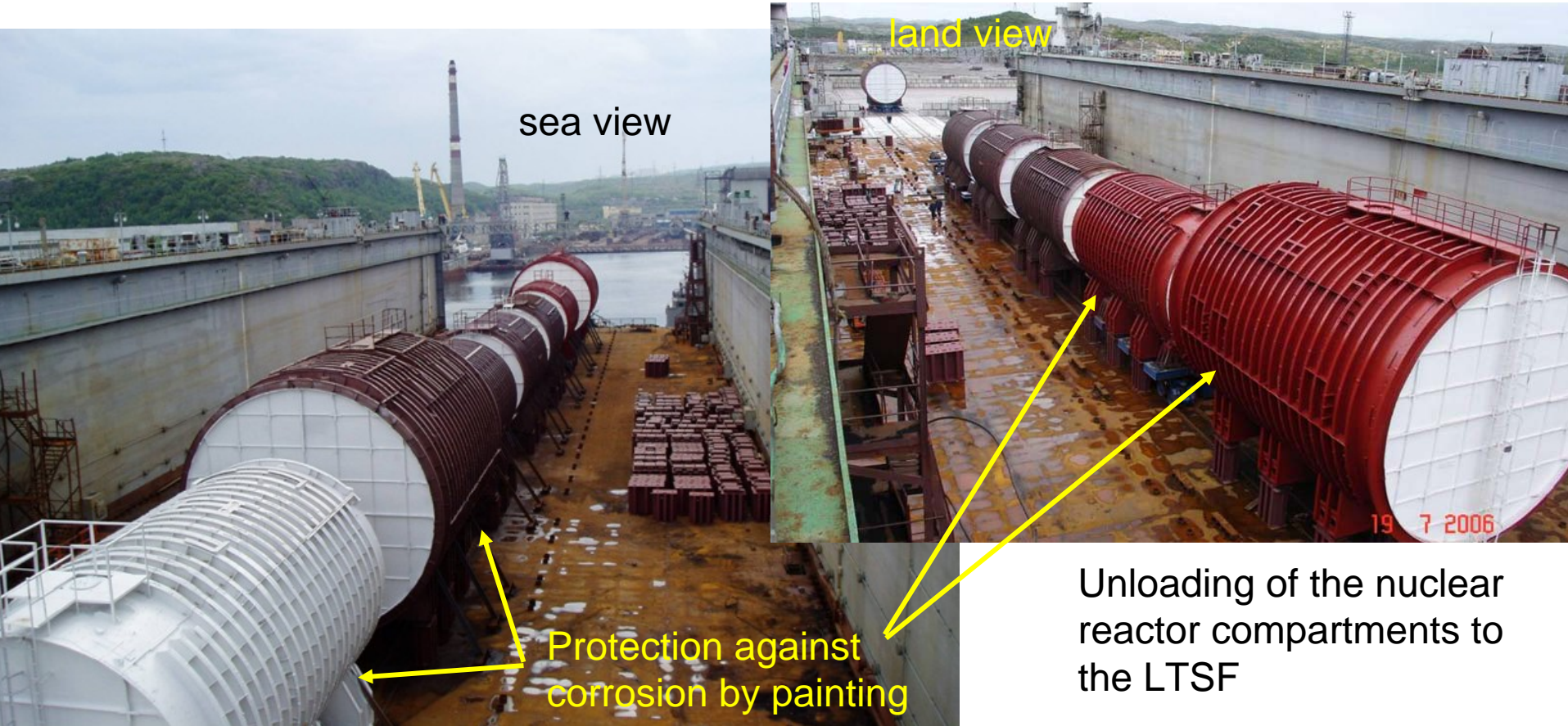


Reactor compartment

Situation at the Sayda Bay at the beginning of the Project



Segmentation of the 3 sections of the late submarine in nuclear reactor compartments capable for storage on the LTSF will be done at the vessel repair dockyard Nerpa

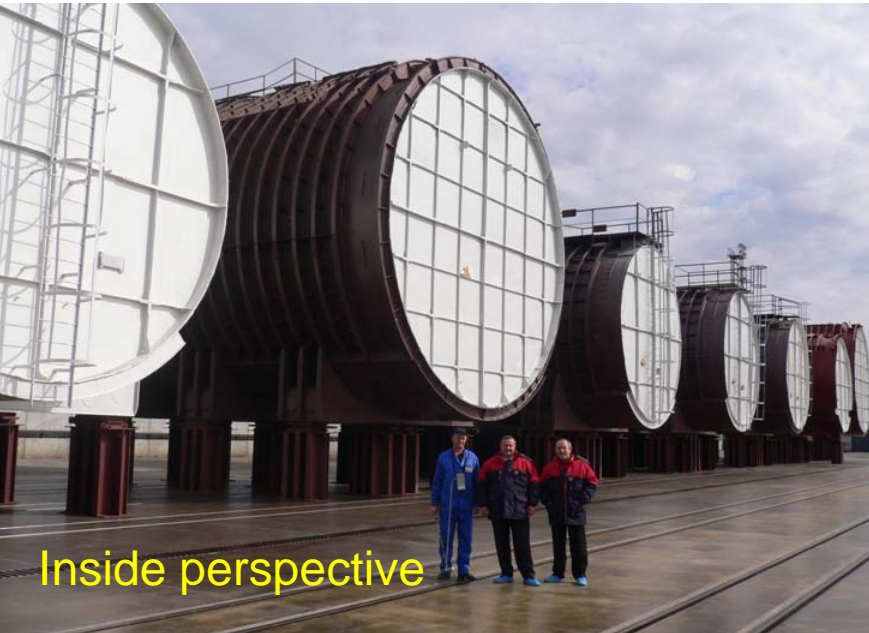


First transportation of 7 nuclear reactor compartments prepared for storage in the LTSF on the floating dock from the dockyard Nerpa to the Sayda Bay on July 2006



Inauguration of the first construction stage of the LTSF carried out by Minister Glos (Minister of the German Federal Ministry of Economics and Technology) on 18<sup>th</sup> of July 2006

The first nuclear reactor compartment on the LTSF July 2006



Inside perspective

After the work was done, all of the 7 nuclear reactor compartments are stored in the LTSF.

In September 2007 the second transport from the Nerpa dockyard arrived Sayda Bay. In the meanwhile 14 reactor compartments are stored at the LTSF.



Outside perspective



## Challenge for the near future!



## Scheme of the final construction of the LTSF

## Summary

The results we can derive from the project progress until now are as follows:

- The first construction stage of the LTSF has been finished. The planning for the next steps and the building construction of the two other parts of the LTSF are well under way.
- The dismantling of the 3-sectional compartments and the formation of nuclear reactor compartments suitable for storage in the LTSF were carried out successfully.
- The Demonstration of transport procedure with the floating dock between the Nerpa dockyard and Sayda Bay was successful, especially under the circumstances that several unforeseen difficulties had to be overcome.
- The second transportation arrived Sayda Bay on September 2007 was carried out with success and demonstrates that the executed strategies are on a proper way.