A Plan for Safe Munitions Disposal

The Baltic Sea was a dumping ground for ground mines after World War I and II, and up until the 1960s. While marine scientists already know a lot about the whereabouts of munitions in the Baltic, Nord Stream’s seabed survey results added awareness to their location, improving the chances for informed handling in the future.

Surveys of the Baltic Defined Best Route

More than 40,000 kilometres have been sailed by Nord Stream research vessels along the pipeline route for detailed surveys and underwater investigations. The goal was to find the best possible route, avoiding dangerous objects and minimising impact on the physical, biological and socioeconomic environment.

Sharing Survey Findings

Although many of them were swept, it is still possible to find them in the Baltic Sea during the first and second World Wars. The combined experience of these companies ensures the best technology, safety and corporate governance for this project, which aims to provide secure energy supply for Europe.

Routine Munitions Clearance in the Baltic Sea

In order to ensure smooth mine clearance operations, Nord Stream, together with BACTEC International and relevant authorities, has developed an environmental and safety management plan that establishes monitoring and mitigation measures related to the removal of munitions. This plan includes clear risk-assessed procedures to ensure safe clearance of more than 500,000 landmines and thousands of tons of unexploded ordnance.

Mitigation Measures in Place for Safe Mine Clearance

• Qualified marine engineers manage sensitive tasks and look after all safety issues.
• Industry best practices are followed on all aspects.
• The minimum work to be employed is determined in accordance with the applicable legislation.
• Sharing of data between the clearance party and the Russian government, and the work will be undertaken by the Russian navy following their

Nord Stream AG

Nord Stream AG is an international consortium of major companies established for the planning, construction and subsequent operation of an offshore natural gas pipeline through the Baltic Sea. The initial shareholders, Gazprom (51.7 per cent) and DEG (48.3 per cent) have already made considerable progress on the route survey, identifying only a small number of unexploded ordnance.

Shaping Survey Findings

Detailed surveys have been conducted since 2005 to verify that the installation conditions comply with the initial survey and that any potential on-shelves are suitable for installation. A safety zone will be established around each identified anchor corridor during the clearance works. Detonation sites will be delayed to protect marine life. Nord Stream liaised with a team of marine environment supervisors and investigators to ensure that the survey techniques and mitigation measures were appropriate, Nord Stream liaised with a team of marine environment supervisors and investigators to ensure that the survey techniques and mitigation measures were appropriate.
Nord Stream Munitions Clearance

About 80 conventional munitions have been identified within the security and anchor corridors of the Nord Stream Pipeline route. The company works with relevant authorities around the Baltic Sea and in strict accordance with all applicable legislation in its clearance procedures.

**Clearance Procedures**

1. The ROV (remote operated vehicle) is deployed and begins monitoring.
2. The survey confirms the state of the mine. The ROV is recovered (5) and the marine mammal observers begin monitoring.
3. The clearance plan is finalised and authorities are advised.
4. The ROV lays the firing line (7) and begins monitoring if fish and marine mammals are in the area (8). The ROV lays the firing line (7) and begins monitoring if fish and marine mammals are in the area (8).
5. Passive acoustic monitoring (PAM) is employed to ensure mitigation measures are implemented.
6. Munitions disposal will take place during daylight and in good weather to ensure neutralisation of munitions is effective.
7. Safety of third parties is managed with the Gulf of Finland Mandatory Reporting System. Detonation will be conducted prior to any planned disposal.
8. The detailed effects of the detonation are modelled and monitored for each planned disposal.
9. The ROV visualizes the surface (10). The ROV lays the firing line (7) and begins monitoring if fish and marine mammals are in the area (8). The ROV lays the firing line (7) and begins monitoring if fish and marine mammals are in the area (8).
10. The survey is conducted and authorities are advised. The ROV operates its manipulator arms (11) and begins monitoring if fish and marine mammals are in the area (12). The ROV operates its manipulator arms (11) and begins monitoring if fish and marine mammals are in the area (12).
11. If fish are sighted (13), a fish scare charge will be conducted prior to any clearance operations.
12. The RIB (rigid inflatable boat) accommodates the marine mammal observers and undertakes fish monitoring.
13. The ROV monitors its position for demolition (6). The ROV manoeuvres the frame with the explosives into position for demolition (6).
14. The ROV visually checks the debris (14), and then begins monitoring if fish and marine mammals are in the area (12). The ROV visually checks the debris (14), and then begins monitoring if fish and marine mammals are in the area (12).
15. The ROV lays the firing line (7) and begins monitoring if fish and marine mammals are in the area (8). The ROV lays the firing line (7) and begins monitoring if fish and marine mammals are in the area (8).
16. The survey confirms the state of the mine. The ROV is recovered (5) and the marine mammal observers begin monitoring.

**Mitigation Measures**

- Passive acoustic monitoring (PAM) for marine mammals will be employed to determine if marine mammals are in the area.
- A senior survey to detect fish shoals will be conducted prior to any clearance operations.
- Munitions disposal will take place during daylight and in good weather to ensure neutralisation of munitions is effective.
- Safety of third parties is managed with the Gulf of Finland Mandatory Reporting System. Detonation is delayed if ships are in the safety zone.
- Detonation of explosives will be delayed to avoid impacts on the marine mammals, fish, birds, or any are sighted.

**Protecting Mammals**

A comprehensive marine mammal protection system provides technical back-up for the marine mammal observers. The system detects and deletes shots that could be in the area.

**PAM**

PAM passive acoustic monitoring detects marine mammals by monitoring their vocalisations. The system detects marine mammals to establish the presence of mammals threatened by activities that might be visible to ship traffic.

**TMS and ROV**

The TMS (traffic management system) and ROV support vessel provide protection to the ROV during launch and recovery.

**Seal Scrammer**

The seal scrammer acoustic device works using high intensity sounds that can be heard for many kilometres surrounding the support vessel to move seal colonies to a safe distance from RIBs and ROVs.

**Munition**

Between 100,000 and 150,000 mines were deployed in the Baltic Sea, particularly in the Gulf of Finland during the First and Second World Wars.

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