

NUCLEAR LIFTING - S1464 19 November 2009

**RAISING AND RECOVERY OF THE RUSSIAN FEDERATION NAVY NUCLEAR POWERED SUBMARINE *KURSK***

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In early 2001 John Large was engaged jointly by a Dutch salvage consortium Smit-Mammoet and the Russian Federation Government to assess and advise on the nuclear and radiological hazards associated with the salvage and recovery of the nuclear powered submarine *Kursk*. For this, Large assembled a team of UK-based experts in nuclear submarine, nuclear safety and risk assessment, weaponry and radiological management fields.

The team's first task was to assess the nuclear and radiological hazards, using the original design information and data for the boat, its reactors and weaponry. This was done by determining the damage to and potential instability of the nuclear reactors and weapons from records giving clues as to why and how the submarine sunk in Autumn of 2000, from the forensic evidence available from the seabed, and drawn from inspection of the sister submarine the *Urel*. The second task for the team was to assess the salver's recovery plans, determining how these activities would impact upon the nuclear and radiological systems of the damaged submarine. The third task was 'hands-on' with practicable involvement of the team members on board the salvage flotilla to provide in situ interpretation of the radiological monitoring systems and, importantly, immediate advice should an adverse nuclear situation develop.

A key factor in the nuclear safety case and overall success of the salvage was the reliability of raising the 11,000 tonne deadweight hulk, complete with its two fully-fuelled nuclear reactors and remaining weapons systems on board, from 110 meter seabed depth to be strapped to the underside of a transport barge and readied for a 60 km sea voyage for transfer to a floating dock anchored in a fiord of the Kola Peninsula.

John Large will explain how the nuclear safety case was developed in the few months preceding the lift and salvage, the hitches and difficulties encountered in preparation for and during the lift and recovery operations, and the final phase of placing the *Kursk* into the floating dock. Particular attention will be given to how the information gaps relating to this military hardware and its weapons systems were bridged; the problems of resolving the old Soviet-based safety culture to the probabilistic approach of the West; and on complex lifting systems developed to raise the submarine in the deteriorating weather conditions at the foundering location within the Arctic Circle.

The contribution will be fully illustrated and include video clips showing the technically challenging but ultimately successful recovery operations of the *Kursk* in October 2001 – a world-first salvage of a nuclear-powered submarine.

