



REMEDIATION AND DECOMMISSIONING OF RADIOACTIVE WASTE FACILITIES IN ESTONIA.

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The nuclear training facility at Paldiski was constructed in the early 1960's by the former USSR Navy. The hull sections of Delta and Echo class submarines each housing a full-sized ship reactor were installed in the main building of the site for training of navy personnel in safe operation of the submarine nuclear reactor systems. The first reactor was commissioned in 1968 and the second in 1982, while both was shut down in 1989. After Estonia's re-proclamation of independence in 1991 the responsibility for the clean up and decommissioning of the Paldiski site became a subject of negotiations between Russia and Estonia. As the result Estonia took the ownership and control of the site in September 1995. Before the take over the Russian authorities defuelled the reactors and transported the spent fuel to Russia, dismantled the hull sections not related with reactor systems, seal-welded the hull sections housing the reactor vessels with their primary circuitry and enclosed those in reinforced concrete sarcophagi. The auxiliary facilities and radioactive waste were left intact.

Main goals of the Conceptual Decommissioning Plan [1] for the Paldiski facilities, developed under the auspices of the Paldiski International Expert Reference Group (PIERG, a group established at the request of the Estonian government to advise local authorities to maintain the decommissioning and waste management at Paldiski) were defined as following:

- ✓ Establishing the waste management system and a long term monitored interim storage, corresponding to internationally accepted safety standards and capable to condition, receive and store all the waste generated during decommissioning of the facility;
- ✓ Reductions of the extent of radiologically controlled areas as much as possible, in order to minimise maintenance requirements.

To achieve these goals the following main tasks were addressed in the short and medium term site management action plans:

- ✓ Rearrangement of site for the needs of decommissioning and waste handling, e.g. creation of a waste treatment and conditioning facility, construction of an on-site interim storage for conditioned radioactive waste;
- ✓ Conditioning of solid operational waste in the dry storage and liquid waste tanks;
- ✓ Dismantling of contaminated installations;
- ✓ Declassification and demolition of useless facilities;
- ✓ Development of detailed decommissioning plans for the reactor systems.

In the following short information is presented on the radioactive waste management and decommissioning projects carried out by ALARA Ltd at Paldiski after taking custody of the site.

Project on conditioning of operational solid waste

During the site operations solid radioactive waste was disposed in an on-site storage facility, SWS, which consisted of a concrete structure, divided into 10 cells. The former site operator

has used three of these cells for storage of radioactive waste. Waste had been dumped into the facility without any conditioning or packaging and without any recorded inventory. The estimated waste volume in the SWS was about 100 m³, including eight heat exchangers and 20 control rods from the repair and maintenance campaign of the reactor no 1. The project started in 1996 with a radiological characterisation of the waste and continued with waste retrieval and conditioning. Depending on the radiological conditions, both remotely operated technique and manual retrieval was practiced. In summer 2000 the project was completed with demolition of the building after a full decontamination and declassification of the facility. During the project total 0.04 manSv was received by 16 persons, the maximum dose burden for a single person being 7.6 mSv. A more detailed description of this project was summarised in papers to international conferences WM'98 and ICEM'99 [2,3].

Project on conditioning of waste in liquid waste storage tanks

Liquid radioactive waste was stored in the tanks of the Liquid Waste Treatment Facility (LWTF) and in the Liquid Waste Storage (LWS) facility. Most of water volume was processed in the frames of the Estonian-Finnish cooperation project using a mobile wastewater purification unit NURES (IVO International) and was discharged into the environment in 1995.

In 1999 a solidification project was started under the Swedish - Estonian co-operation program on radiation protection and nuclear safety with the aim to condition the bottom sludge remaining in the tanks after the water purification project. The solidification equipment consisted of a vacuum unit for retrieval of waste, remotely operated hydraulic crane for operations with the suction nozzle of the vacuum unit inside the tanks and a concrete mixer for cementation of the waste. The actual solidification work started after the winter season in March 2000, in total 39 conditioned waste packages (1.6m³ each) have been produced during the project by the end of 2000. The project is scheduled to finish in 2002.

Project on dismantling of the Liquid Waste Treatment Facility (LWTF)

Dismantling work of the LWTF started in early summer 2000. The project plan followed the recommendations of given in a relevant EC PHARE project [4]. Before the actual dismantling work a detailed radiological survey followed by decontamination of all floor and wall surfaces was carried out. In addition, all asbestos insulation from equipment and pipes was removed. In 2000 the dismantling of conventional technological systems (heating, ventilation, conventional sewage, water supply, cables, etc.), both inside and outside of the radiological control areas was completed. Presently the preparations for dismantling of contaminated technological systems are in progress. According to the plan, the main work should be completed in 2001.

REFERENCES

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