

NPP A1 SPENT FUEL POND DECONTAMINATION / DISMANTLING

Nuclear regulatory requirements

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Abstract. The pilot nuclear power plant A-1 was a HWGCR (heavy water gas cooled reactor) with channel type reactor KS 150 (refuelling during operation) and power output of 143 MW_e. This NPP began operation in 1972 and was shutdown in 1977 after an integrity accident of the primary coolant system. The NPP A-1 has been under decommissioning since 1979 and extensive decommissioning works have been carried out since 1995.

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The spent fuel pond is a very important part of NPP A-1 and requirements of the Nuclear Regulatory Authority (NRA) concerning the prioritisation of various decommissioning activities during first phase have been dictated by the strong demand to increase the safety features and decrease radioactive inventory.

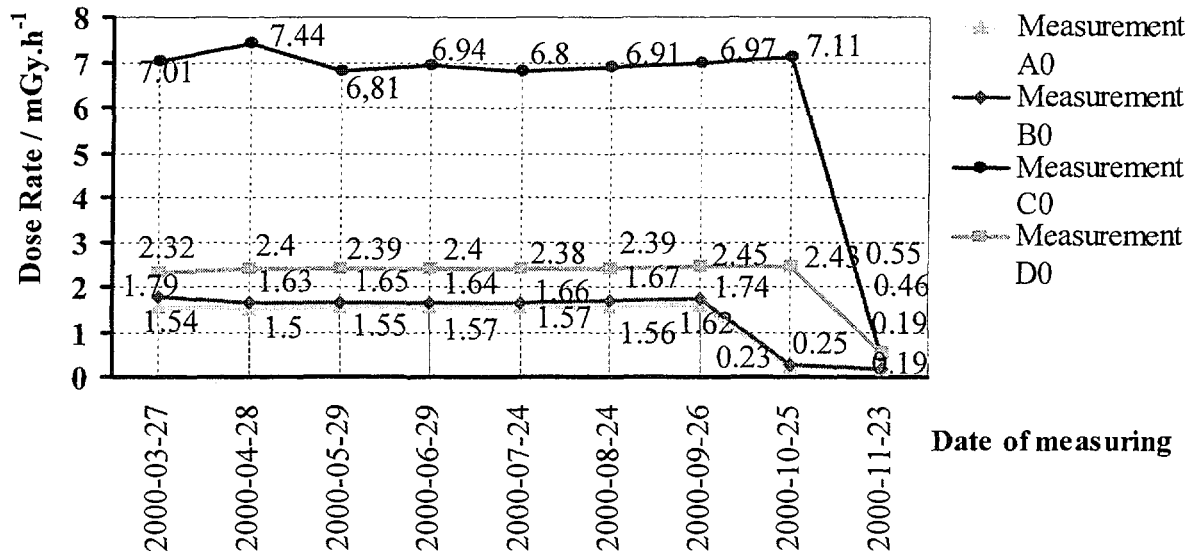
As the waste management strategy has been significantly changed and a complex waste management system is under operation now, NRA pays attention to the following goals of the first phase (1995-2008), which are focused on the spent fuel pond:

- to transfer (nearly 10^{17} Bq) the remaining 132 spent fuel assemblies to the Russian Federation or to improve the safety of its storage.
- Spent fuel was drained, repacked and transferred to the Russian Federation in 1999.
- to improve the safety standard for storage of radioactive wastes and enable their conditioning and disposal;
- to improve radiation protection of staff (Figure 1); and
- to remove contamination and prepare some parts for dismantling.

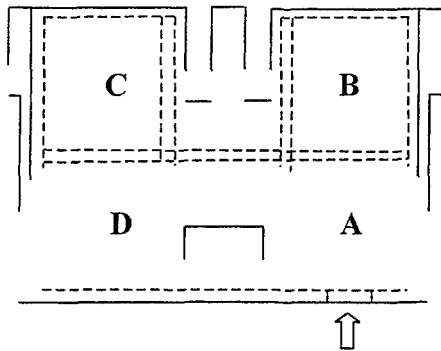
The inorganic spent fuel coolant, "Chrompik" - aqueous solution of $K_2Cr_2O_4$, resp. $K_2Cr_2O_4$ (2-3%) with an activity of more than 2×10^{15} Bq including drained sludge, was transferred to a new storage tank in 1997-2001. The organic coolant "Dowtherm" - mixture of diphenyloxyde and diphenyl (2×10^{12} Bq) is being processed by incineration since 2000. A new dry storage facility, originally constructed for the case of cancellation or interruption of spent fuel transport, was commissioned in 2000 and used in 2001 for storage of highly contaminated canisters (PDS) with remaining sludge - PDS without fuel after drainage of Chrompik. Additional shielding, placed on the spent fuel pond ground floor after the spent fuel, removal reduced dose rates at working places approximately 10 times.

Figure 1: Monitoring of dose rates at some sectors in the spent fuel pond at NPP A-1: 0 m from ground floor

(Decontamination, Additional shielding and Measurements were performed by f. Alldeco Ltd.)



Sectors in spent fuel pond:



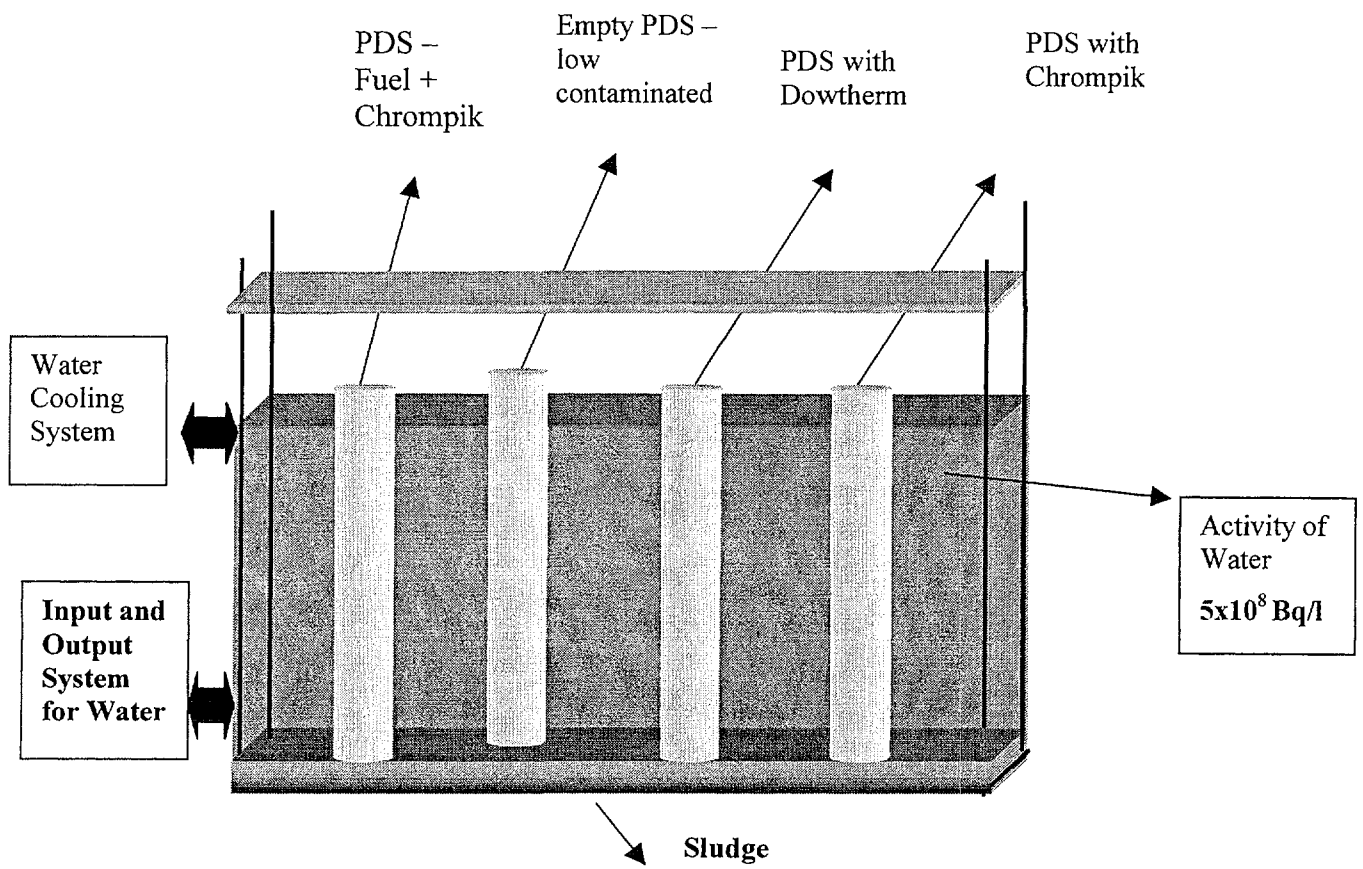
500 m³ of spent fuel pond water (10¹⁴ Bq) were decontaminated using selective sorbents in several steps during 1996 – 1999 thereby reducing the contamination significantly (by more than 99.9 %).

The decontamination of the remaining canisters and their fragmentation will be carried out following Dowtherm removal and/or incineration.

Internal parts of the spent fuel pond are continuously decontaminated and sludge will be removed and processed. The water level is continuously decreased, remaining water will be processed in accordance with decontamination works and removal/ conditioning of sludge.

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