

Remediation of the Andreyev Bay Naval Base; Present Contamination Status and Future Monitoring Strategy

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The Andreyev Bay shore technical base (STB) is a former naval installation and the largest nuclear legacy site in northwest Russia. Established in the late 50-ties and early 60-ties, this naval facility performed activities related to the refuelling of Soviet Northern Fleet nuclear-propelled vessels as well as being a temporary storage site for SNF and solid and liquid radioactive wastes (SRW and LRW) arising as a result of civilian and military nuclear-propelled vessels operations and maintenance. A large inventory of spent nuclear fuel (SNF) and radioactive waste (RAW) are located at the site, and since an accident in 1982 large amounts of radioactivity have been released from the storage facilities. Remediation of Andreyev STB has been the subject of international cooperation for many years. Great Britain, Italy, Norway, Sweden and the European Bank for Reconstruction and Development (EBRD) have collaborated with the Russian government to secure the site, improve the infrastructure at the site, plan for new management strategies/facilities for SNF and demolish old buildings that were deemed an environmental hazard. On the basis of an agreement between the Russian Federal State Enterprise “SevRao” and the Norwegian Radiation Protection Authority (NRPA) a study to map the gamma dose rates and the surface radionuclide concentrations in the contaminated parts of the site, as well as an overview and general knowledge of the area regarding geological and hydrogeological conditions was performed in the period 2002-2004. The aim of the study was to enable the provision of more effective radiological protection for personnel undertaking future operations at the site and to assess the radiation dose hazards present at Andreyev STB and to clarify the risks associated with the existing contamination and the continued storage of spent fuel and radioactive waste at the site. The first phase of the Norwegian program to survey the Andreyev Bay provided the basis for a map of the dose rate levels and levels of radionuclide contamination in the lower site area. Dose rates up to approximately 3 mSv/ hr were measured on the site, in additions to radionuclide concentrations (Bq/ kg) as high as $10 \cdot 10^6$ for Cs-137 and $4 \cdot 10^6$ for Sr-90. On this basis, Andreyev STB presents unique radiological challenges.

NRPA together with FMBA, IBPh and SevRao plan to use the existing data, put it into an electronic form, and map it onto Andreyev STB site and around. This electronic map could then be used to support interpretation of the data for assessment purposes. In addition the system could be used to explain the distribution and nature of the contamination.

The system could be used (and extended) for broader understanding of radionuclide contaminant migration potential, if combined with information on landscape, hydrology and geochemistry. (This potential has been recognized in the 2006 work on measurement of sorption characteristics of Andreyev soils.)

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