

# RADIOACTIVE WASTE MANAGEMENT FACILITIES AND ASSESSMENT OF THEIR SAFETY IN ESTONIA

Lust, Merle<sup>1</sup>; Muru, Karin<sup>2</sup>

<sup>1</sup>University of Tartu, Institute of Physics, Riia 142, Tartu, ESTONIA

<sup>2</sup>Radiation Safety Department, Environmental Board, Kopli 76, Tallinn, ESTONIA

## INTRODUCTION

Estonia gained independence again in 1991. This poster gives overview of the safety assessments of the radioactive waste management facilities. Republic of Estonia has managed to solve the problems related to the historical radioactive waste sites and has worked a lot in area of the policy development. The following steps also include starting of the process of the final disposal for radioactive waste in Estonia.

## LEGISLATION AND DEFINITIONS

Definitions according to Radiation Act (2004):

- radioactive waste management: all types of activity, including decommissioning, related to the pre-treatment, treatment, conditioning, carriage, storage and interim or final disposal of radioactive waste;
- radioactive waste management facility: a facility specifically intended for the receipt of radioactive waste from the producers thereof, and the collection, treatment, conditioning and interim or final disposal of radioactive waste.

Environmental Impact Assessment is required for radioactive waste management facilities, as they are considered in the legislation as activities with significant environmental impact.

Radiation safety assessment for radioactive waste management facility must take into account:

- The environmental impact caused from radioactive contamination of the facility;
- The effective dose to the population;
- The equivalent dose and effective dose to the occupationally exposed workers.

## TAMMIKU

RADON-type radioactive waste storage in Tammiku site was built in 1960s and closed down in 1996. The first generic safety assessment was performed in 1994 by SSI, Sweden. Assessment concluded that drinking water could cause doses up to several mSv per year and the main radionuclides causing the dose were Sr-90 and Ra-226. More detailed safety assessment based on ISAM methodology was performed in 2002 by the Institute of Physics, University of Tartu, Estonia.

In order to secure the environmental safety of the site, the Environmental Impact Assessment process was started in 2006. Alternatives considered were:

- Transport of waste to Paldiski, commissioning waste in Paldiski and storing it there
- Waste will be treated in Tammiku and the storage containers will be transported for storage in Paldiski
- Tammiku facility will be closed as final depository
- No changes/activities

Environmental Impact Assessment was approved in 2007 and the first alternative – conditioning and storing the waste in Paldiski, decommissioning of Tammiku facility was chosen. Radiation practice licence for this activity was issued in 2008. The work started in 2008, all radioactive waste was removed from site to interim storage in Paldiski by the end of 2011. The application of radiation practice licence for decommissioning of Tammiku is currently under review by the Environmental Board.

## PALDISKI

The facility with 2 reactors in Paldiski was established in early 1960s for training the USSR navy personnel for the operation of submarine nuclear reactor's systems. After closure the spent fuel was transported back to Russia in 1994 and the reactors compartments were prepared for storage.

Feasibility study for evaluation of various options for the reactor compartments management was performed in 1999-2001. Based on that study Environmental Impact Assessment of the long-term storage of the Paldiski Sarcophagi and Related Dismantling Activities was prepared in 2006. The considered alternatives were following:

- Maintain the present situation;
- Upgrade the sarcophagi for long-term (minimum 50 years) safe storage of the reactor compartments. Long-lived waste would be retrieved to separate storage;
- In-situ disposal of reactor compartments after removal of LL-RW;
- Full dismantling of the reactor compartments and long-term storage/disposal of the resulting conditioned waste.

It was decided to upgrade the sarcophagi for long-term storage and to start preparations for the final disposal.

The interim storage for radioactive waste was constructed at the same site and taken into operation in 1997. Preliminary long-term radiological safety assessment for interim storage was completed by Institute of Physics, University of Tartu, in 2000. Safety Assessment of Interim Storage, following the requirements of the legislation, was prepared in 2009.

## SILLAMÄE

Site was used for processing ores, containing naturally occurring radionuclides. During the Soviet time the waste depository, the tailing pond, was built for storing the waste. The tailing pond remediation project, launched in 1999, was finished in 2008. The new radioactive waste management option was needed. The Environmental Impact Assessment of NORM-waste management was approved in 2004. However due to the economical situations, the amounts of arising waste have fallen and there was new safety assessment of the clearance option for waste performed in 2009.

## DISCUSSION AND CONCLUSIONS

National development plan for radiation protection 2008 – 2017, approved by the Government 17.04.2008. This foresees the approval of radioactive waste management strategy. The work has started and in 2009 the assessment of the radioactive waste streams in Estonia was performed. The following steps needed are:

- The approval of radioactive waste management strategy;
- Evaluation of the dismantling options of the reactor compartments and the safety assessment;
- Evaluation of the disposal options and preparations for the Environmental Impact Assessment of it.

## ACKNOWLEDGEMENTS

This work has been partially supported by graduate school „Functional materials and technologies“ receiving funding from the European Social Fund under project 1.2.0401.09-0079 in Estonia.