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OUTLINE OF THE RADIOACTIVE WASTE MANAGEMENT STRATEGY AT THE NATIONAL RADIOACTIVE WASTE DISPOSAL FACILITY «EKORES»

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Abstract

The national Belarus radioactive waste disposal facility "Ekores" was started in 1964 and was designed for radioactive waste coming from nuclear applications in industry, medicine and research. It is located in the neighbourhood of Minsk (2 Mil. people) and it is the only one in this country. In 1997 the Government initiated the project for the facility reconstruction. The main reconstruction goal is to upgrade radiological safety of the site by creating adequate safety conditions for managing radioactive waste at the Ekores disposal facility. This covers modernising technologies for new coming wastes and also that the wastes currently disposed in the pits are retrieved, sorted and treated in the same way as new coming wastes.

The reconstruction project developed by Belarus specialists was reviewed by the IAEA experts. The main provisions of the revised project strategy are given in this paper. The paper's intention is to outline the technical measures which may be taken at standard «old type Soviet Radon» disposal facility so as to ensure the radiological safety of the site.

1. EXISTING «EKORES» RADIOACTIVE WASTE DISPOSAL FACILITY

This facility is a typical old-type Soviet RADON facility. The first generation radioactive waste disposal repository was commissioned in 1964 and comprised 2 concrete lined trenches, up to 4 meters deep. A variety of solid radioactive waste has been buried in these trenches without any previous sorting or treatment. At the current rate the total activity of the waste disposed in the trenches amounts to 17, 6 TBq.

In 1977 the trenches were closed up and the second generation radioactive waste disposal facility was put into operation. This comprised laundry, garage for transport vehicles, 2 below surface, reinforced concrete vaults for solid radioactive waste (SRW) and 4 "S-shaped wells» for spent source storage. According to the design the total activity of wastes to be disposed in the vaults is 7,4 TBq/a, with a specific activity of 3,7 MBq/kg.

Each vault was covered by a lightly constructed building to provide environmental protection and acceptable working conditions to operate the facility throughout the year.

No waste processing has been taking place at the Ekores. In 1989, internal reactor components and irradiated fuel from the nearby research reactor were buried in the storage vault. This comprises around 2kg of ' U in 10 purpose-built stainless steel containers.

The total activity of the waste disposed of at the Ekores facility vaults is 352,8 TBq, counting 01.01.1999.

There are around 150,000 spent sources in the wells for spent source storage with a total activity of approximately 1327 TBq. The principal radionuclides are ^{60}Co and ^{137}Cs.

It is evident that in it's present condition Ekores does not meet radiation safety standards and could be considered as a source of potential hazard for public and the environment. At the same time there are only around 4 to 5 years capacity remaining at the facility at the current rate of solid waste arisings. In trying to take the necessary steps to improve the situation the Ekores reconstruction project has been developed.

2. FUTURE RADIOACTIVE WASTE DISPOSAL FACILITY «EKORES»

The reconstruction conception is that all the wastes at the Ekores facility are identified, packaged and labelled to be sure that the waste storage conditions meet safety requirements. This also gives more flexible possibility to relocate the waste to a new disposal repository after it is constructed (the plan is over 20 years).

The first task of Ekores reconstruction is to implement the advanced technology for waste managing. This is being realised within the framework of IAEA Technical Co-operation Projects BYE/004/02 and RER/ 056 over the period 1997 - 2000.The first reconstruction stage covers also expanding the capacity of Ekores site.

The radioactive waste management strategy which follows from this project is shown as a scheme in the Figure 1.Three new buildings are planed to be constructed: waste sorting, treatment and packaging building A, new spent source storage building B, new drum storage building C. A site drainage system, decontamination centre, new laundry, laboratory and administrative block are included into the project to be realised in 2000-2002.

The proposed waste management strategy is applied to waste arisings over the next 20 years. It splits the wastes into three categories: liquid radioactive waste, solid radioactive waste, and spent sources.

2.1. Liquid radioactive waste

There are no current stocks of liquid radioactive wastes (LRW) at "Ekores". Small amounts of very low level LRW which are produced from the present laundry and decontamination centre are sampled and discharged under current authorisation.

Future LRW is expected to arise from five separate sources. These are:

- from waste producers outside the "Ekores" site ;
- from the new laundry to be constructed at the "Ekores" site ;
- from the new decontamination centre to be constructed at the "Ekores" site ;
- from the new drainage facilities to be constructed at the "Ekores" site ;
- from waste retrieval and sorting operations at the "Ekores" site.

The left-hand side of the Figure 1 shows the proposed route for LRW from external waste producers. Wastes will be transferred to new Building A, sampled, conditioned to pH7 (if required) then treated with a biological agent prior in order to remove surface-active agents (soaps). These wastes will then be physically mixed with cement and allowed to set in a 200 litre drum. The 200 litre drum containing cemented LRW will then be moved to new Building C for storage.

LRW produced by the new laundry will be consigned to a holding tank where the LRW will be sampled. Depending on the sample results, the LRW will then be either discharged under authorisation as very low level LRW, or will be consigned to new building **A** to be treated as described above. It is assumed that LRW from the other sources will be treated in the same way as the above mentioned two.

2.2. Solid radioactive waste

Future SRW requiring treatment and storage at the site will arise from two sources: new coming wastes and SRW which will arise from waste retrieval operations. It is proposed to sort all SRW into two separate streams : compactible SRW and non-compactible SRW.

Compactible wastes will be placed into mild steel 200 litre drums, and each drum compacted, capped with grout and consigned for storage in the new building C.

Non-compactible wastes will be placed into a 200 litre drum during sorting then directly grouted in place and consigned for storage.

SRW stored in the current pits are to be retrieved and sorted as it is adopted for new coming SRW.

As for fissile material which is known to be present in the pits, it is proposed that retrieval operations remove the intact containers and transport them to an approved fissile material storage facility. It is expected to obtain the services of international (IAEA) experts to make safety assessment and to develop a detailed plan for appropriate management of this kind waste. The packages of treated SRW will be temporarily placed in approved storage until the pit is empty. The surface of the pit should then be decontaminated, monitored and then subjected to a structural survey. If the pit is assessed to be suitable for continued use, then it should be modified to the same standard as new Building C. On completion of modifications, the pit should be used for storage of the drums of cemented SRW. It is considered that once SRW is recovered from the more modern pits, there will then be a requirement to undertake a similar exercise with the pits, closed in 1977, as this will have been shown to be the best practice.

2.3. Spent sources

There are now no plans to remove the spent sources currently stored at the S-shaped wells at the «Ekores» facility. New coming spent sources are to be placed into three separate categories, each of which has a different strategy.

Sources with half-lives less than 2 years are placed to temporarily storage in new Building B until enough of them have been gathered to fill a source container. This container is to be made from stainless steel and will be stored within shielding. Once filled, it will be transported to the new Building A, where it will be cemented within a 200 litre drum. The drum will then be moved to Building C where the sources will be stored for at least 20 years (ten half lives of longest-lived nuclides). There should effectively be zero activity remaining after this period.

Sources with half-lives greater than 2 years but less than approximately 30 years include mainly Co-60, Cs-137 and Sr-90/Y-90. The strategy is to separate these sources into different types, then store them within a retrievable source store of a similar design to the existing "well-type" source stores currently in use. An outline design for such a retrievable store exists and the development work is planed to be conducted in order to prove the design.

Sources with very long half-lives, much greater than 30 years consist mainly of "smoke detector" type sources, containing Pu-239, Am-241, both can be handled without beta/gamma shielding. Current sources of this type are temporarily stored at the "Ekores" site above ground, awaiting the construction of new facilities.

It is proposed to construct store facilities within the new Building B, in order to store these sources.