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## **PUBLIC SERVICE OF RADIOACTIVE WASTE MANAGEMENT FOR SMALL PRODUCERS**

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### **ABSTRACT**

By Governmental decree of May 1999, the Agency for radwaste management (ARAO) was authorized as a state public service for managing radioactive waste from small producers. By this decree the ARAO also became the operator of the Central Interim Storage intended for radioactive waste from industry, medicine and research, located in Brinje near Ljubljana. In this paper the current situation will be presented, together with plans for improving public service and the necessary refurbishment and modernization of the storage facility. Execution of the proposed measures, modifications and a modernization will ensure proper and safe storing of all radioactive waste from small producers produced in Slovenia, thus fulfilling the requirements for full operation of the public service of radioactive waste management.

### **1 INTRODUCTION**

Since 1986, individual producers/generators of radioactive waste in medicine, industry and in research activities have the possibility of storing the waste in the Central Interim Storage, situated at the Research Reactor Center in Brinje near Ljubljana. Due to the lack of formal and administrative requirements and financial provisions the management of radioactive waste had until recently been free of charge but incomplete.

In 1999, the governmental Decree on the Mode, Subject and Terms of Performing Public Service of Radioactive Waste Management (Official Gazette of RS, 32/99) was published, addressing the issue of managing the radioactive waste from industrial, medical and research applications. By this decree, a special state public service for managing this waste was established and its implementation was assigned to the Agency for radwaste management (ARAO). As part of the public service the operation of the Central Interim Storage for Radioactive Waste from small producers in Brinje was from the previous operator "J. Stefan" Institute transferred to ARAO.

## **2 FIRST STEPS FOR PUBLIC SERVICE IMPLEMENTATION**

The scope of the public service as defined by the Decree includes:

- collection of the waste from small producers at the producers' premises and its transportation to the storage facility for treatment, storing and disposal,
- acceptance of radioactive waste in case of emergency situations on the premises, in case of transport accidents or some other accidents,
- acceptance of radioactive waste in cases when the producer is unknown,
- management (collection, transport, pre-treatment, storing, together with QA and radiation protection measures) of radioactive waste,
- treatment and conditioning of radioactive waste for storing and disposal, and
- operating of the Central Interim Storage for low and intermediate level (LIL) radioactive waste from small producers.

ARAO has started with preparation of all necessary pre-requirements for implementing the public service in the foreseen extent. As a first step, the national register/inventory of radioactive sources, substances and wastes from small producers was prepared. A comprehensive data-base on waste producers, radioactive wastes from different applications, their specific activities and other relevant data was established, representing the basis for future systematic collection of radioactive wastes from small producers. The national register is continuously updated with new data.

In 2000 the tariff system for managing the radioactive waste was prepared and approved by the Government. By adopting the pricelist for different services regarding radioactive waste the "producers pay" principle was introduced also for waste generators from medicine, industry and research.

The waste acceptance criteria for accepting the waste to the storage were developed. The procedure instructs the producers how to prepare and pack the waste to be accepted to the storage, and what to do if the waste is not acceptable or only conditionally acceptable for storing. It also gives the instructions to the personnel of the storage on how to define or control the acceptance of the waste package.

Simultaneously, the preparation of all other necessary procedures and instructions for implementing the public service of radioactive waste management in full scope are being prepared. They can be grouped in the following broader areas:

- Continuous information to waste producers on waste acceptance requirements,
- Acceptance and transport of radioactive waste,
- Emergency planning,
- Radiation protection,
- QA of public service,
- Operating the Central Interim Storage for small producers,
- Occupational safety and fire protection.

## **3 CENTRAL INTERIM STORAGE IN BRINJE**

The Central Interim Storage facility in Brinje, located in the vicinity of the TRIGA research reactor, is the only facility in Slovenia for LIL solid radioactive waste from small producers. The facility was constructed in 1984 and put into operation in 1986 as part of the

Research Reactor centre managed by the J. Stefan Institute (Figure 1). Since mid-1999 it has been operated by the ARAO.

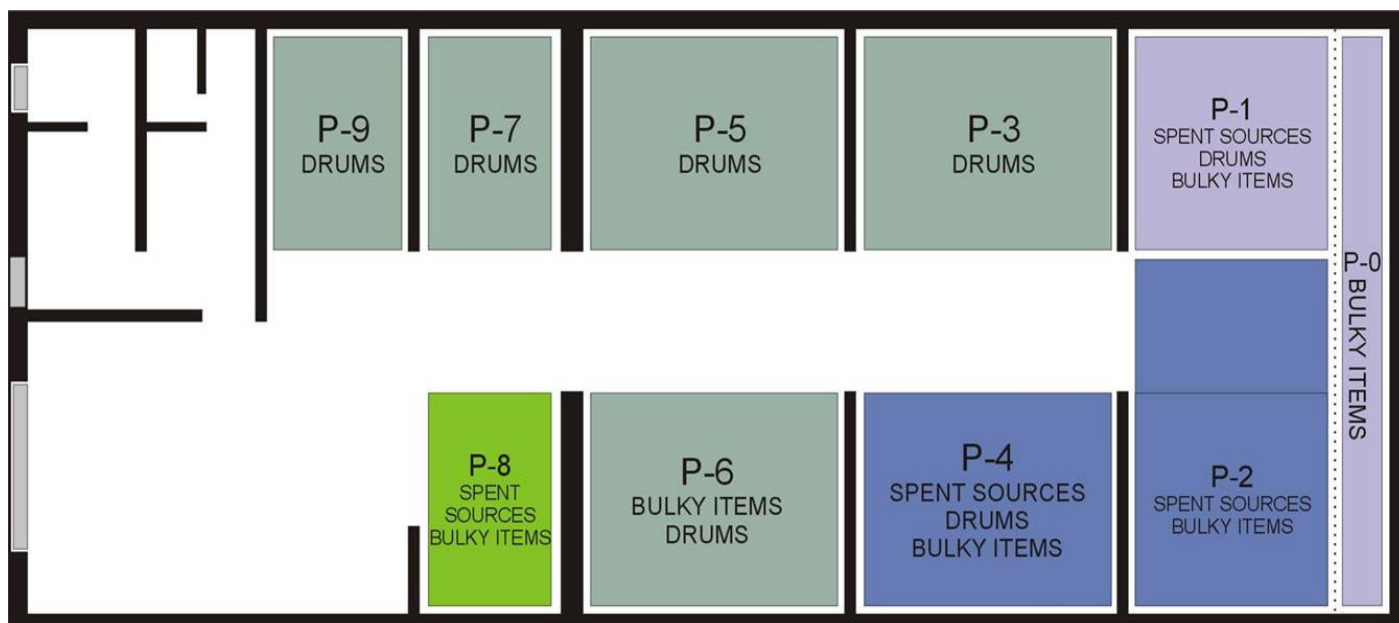


**Figure 1:** Central Interim Storage for small producers – inside and the front side.

The interim storage facility is a near-surface concrete building covered with soil. The building is subdivided by concrete walls into nine storage sections and an entrance area (Figure 2). One section for radioactive waste is deepened compared to the floor of other sections, and is intended for more active spent sources, such as spent radium applicators. The facility is equipped with a ventilation system and physically protected by an alarm system.

The useful capacity of the storage is about 500 m<sup>3</sup>. Currently around 60 to 70 m<sup>3</sup> of mostly solid waste is held in the storage. There are also some small amounts of liquid radioactive waste which need to be treated. About 25 % of the radioactive wastes are long-lived, including radionuclides such as Am-241 (smoke detectors) and Ra-226 (in the past used for medical therapy). Although the quantity of stored waste is rather small, the waste is placed only at one level, therefore all sections of the storage are practically filled with waste. The storage capacity is not optimally used.

The detailed examination of the facility showed that refurbishment of the facility is also needed. The deficiencies of the facility were documented, and the proposal for the refurbishment and modernisation of the storage has been prepared and presented in two documents: The final safety report for the storage - current situation, and the Plan for remediation and modernisation of the Central Interim Storage for Radioactive Waste in Brinje. Both documents were submitted to the regulatory body for approval already in 2000. Additionally, possibilities for waste treatment and conditioning of waste from medical, industrial and research activities, so far not provided, are now being investigated.



**Figure 2:** Layout of the Central Interim Storage in Brinje.

#### 4 WASTE INVENTORY

The waste in the storage is divided according to the type of packaging into three categories: waste packed in drums, contaminated or activated bulky items, and spent sealed sources.

The drums contain mostly contaminated cleaning material, paper, glass and plastic items and material with induced radioactivity because of neutron exposure in the TRIGA research reactor. Different contaminated or activated metal tubes and metal pieces that are too big to fit into the drum are stored as special bulky items. Disused sealed ionizing sources are stored in the original shielding containers.

Table 1 presents the quantity of LILW stored at the Central storage facility in Brinje, at the time of taking over the operation of the storage and at the end of 2000. In 1999, together with the storage, 695 different pieces of waste were transferred to ARAO. By the end of 1999, an additional 66 packages of waste, mainly produced during the remediation of the temporary storage in Zavratac, were accepted for storage. In 2000, an additional 13 drums of radioactive waste were stored. At the end of 2000, the total inventory in the storage was 774 different pieces of waste with a total volume of 60-70 m<sup>3</sup>. Although the waste amounts only to 15% of total volume capacity of the storage, the placement of the waste is far from optimal and the capacity utilization is very low. Future improvements are necessary.

The total activity of the waste inventory is estimated at 3700 GBq. The major contribution to the total activity comes from the disused teletherapeutic source of Co-60 with present activity around 3100 GBq. It is expected that the Central storage will receive approximately 2 m<sup>3</sup> of radioactive waste annually.

**Table 1:** Quantity of stored radioactive sources at the end of 2000

<i>Waste type</i>	<i>August 1999 (number)</i>	<i>End of 2000 (number)</i>	<i>Main radionuclides</i>	<i>Estimated activity (GBq)</i>
Drums	177	253	Co-60, Cs-137, Ra-226, Eu-152	3 – 20
Special bulky items	140	141	Co-60	3100
Disused sealed sources	344	346	Co-60, Cs-137, Kr-85, Sr-90	560
*Undefined sources	34	34	-	-
Total	695	774	-	~3700

*\*Undefined sources are those which were found at the inventarization of the storage and which did not have any labeling, and also were not found in the database of previous operator. These items will be classified after detailed examination.*

## 5 FUTURE PLANS

On the basis of detailed examination of the Central Interim Storage in Brinje, practical experiences and foreign examples, plans for improving the radioactive waste management from small producers have been prepared. Some of the activities have already been implemented, but many still have to be accomplished.

So far, the ARAO agency has prepared the national inventory of radioactive waste from small producers. To improve the public service of radioactive waste management, the ARAO has also started with preparation of all necessary procedures and instructions for managing the waste and with planning the activities for the modernisation and reconstruction of the storage facility. The plan for necessary refurbishment and modernisation of the storage has been prepared. It includes renewal of electric installation, water and sewage supply, fire protection assurance, renovation of the hydro-isolation and ventilation system and some other activities.

Simultaneously, the rearrangement of the waste inventory is being prepared. The reduction of waste volume, repacking the waste in new packaging and rearrangement of waste is planned taking into consideration ALARA principle. The first activity - conditioning of radium applicators - was performed just recently. Projects for clearance of already decayed sources, dismantling of smoke detectors and beta sources, repacking of bulky items and corroded drums are under preparation. Preparation of the basic design for treatment and conditioning the waste is also planned.

For the implementation of all the proposed activities, comprehensive administrative procedures are needed to obtain the license from the competent regulatory body. It seems that the time needed for this was initially underestimated. Refurbishment of the facility and modernisation of storage can start only after the approval is given. Meanwhile, the acceptance of waste is limited only to emergency cases, which creates great problems for some waste producers. It is hoped that the refurbishment and modernisation will be accomplished in a reasonable time in order to provide safe and reliable waste management for small producers in Slovenia.

**REFERENCES**

- [1] ARAO-T1520-7/00: Načrt sanacije in modernizacije Centralnega skladišča NSRAO v Brinju, revizija 1, oktober 2000,
- [2] ARAO-T1621/01: Končno varnostno poročilo za Centralno skladišče radioaktivnih odpadkov v Brinju, revizija 1, julij 2001
- [3] Postopki in delovna navodila za delovanje skladišča v Brinju, ARAO- T1520-1 in ARAO-T1521
- [4] Železnik N., Stepišnik M.: Radioactive waste from small producers, sestanek Kluba agencij, Ljubljana, junij 2000
- [5] Uredba o načinu, predmetu in pogojih opravljanja gospodarske javne službe ravnanja z radioaktivnimi odpadki, Ur. L. RS 32/99
- [6] Cenik storitev službe ravnanja z radioaktivnimi odpadki, Ur.l. RS 102/00.