ENVIRONMENTAL REMEDIATION OF THE TERRITORY OF THE OLD RADIOACTIVE WASTE STORAGE FACILITY IN ALBANIA

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Abstract

In 1999 a new Radioactive Waste Storage Facility (RWSF) was constructed within the territory of Institute of Applied Nuclear Physics (IANP) in Tirana, Albania. The decommissioning process of the old interim storage facility in IANP began as a result of its surroundings from the private houses at a 10-meter distance. Very close to this building people began to build residential houses and even a family putted this building inside the perimeter wall of his new house. In these conditions, the Radioprotection Department of IANP immediately decided to transfer of all radioactive materials existing in this building to the provisional IANP storage. Also, all the radioactive sources in lead containers and solid waste and liquid radioactive waste that was on the surface were moved to this provisional IANP storage. It was measured the dose rate inside and outside the facility, before and after removal of radioactive waste. After the demolition of the old storage building all the loads of construction materials were sent to the municipality waste collection site. Meanwhile, metal doors, electrical and ventilation system were transferred for processing in the new RWSF of IANP. In the end, after cleaning, to all the wastes of the old storage building were made again measurements to assess the remaining dose rate in the environment. Measurements showed that the level of radiation was that of the background level. The territory of the old storage building was used for building residential house and then, some years later, this new house was demolished for building a new 10 floors residential building. Actually, IANP, in all its perimeter, is surrounded by a 2 m high barbed wall and is protected by the state police 24/7 who monitor also the camera system.

Key words: radioactive sources, radioactive waste, storage, decommissioning

1. Introduction

The new centralized Radioactive Waste Storage Facility (**RWSF**) receives LLW/ILW of non-nuclear power plant origin (health care, industry, agriculture, education, research). The old facility has been operating since 1971 with a capacity of 60 m^3, reinforced by concrete / bricks vaults accommodating solid spent sources into drums. The process of decommissioning of this facility in IANP began as result of its surrounding from the private houses at a 10-meter distance. For that reason, the staff of IANP had transferred all plastic bags, lead containers and 200-liter drums conditioned with ^{226}Ra, ^{137}Cs, ^{60}Co into the new Radioactive Waste Management Storage Facility [7].

Institute of Applied Nuclear Physics (IANP) is the only institution in the country in charge for collection, import - export, transport, pre-treatment, treatment, conditioning and temporary interim storage of radioactive sources and radioactive wastes licensed by the RPC as the National Authority. IANP collaborates with National Radiation Protection Commission (NRPC) for all radioactive sources entering Albania and carries out contracts with users for the conditioning of DSRS. The facility is designed based in the IAEA documents and consultancy [5]. There are two principal areas inside facility, Operational area and Temporary Interim Storage area. The centralized storage facility for waste management was designed, constructed and supported financially by Albanian government and equipped by IAEA Project. The license issued from RPC is renovated every five years.

2. Decommissioning of the Old Storage Facility

2.1 First Phase of Decommissioning of the Old Storage Facility

As a result of changes occurring during the transition period in our country a part of the former territory of IANP, where was the old building for the temporary storage of radioactive waste, was captivated by the arrivals of different areas of the country. In these conditions, in October 1998 the Radiation Protection Department of IANP took immediate measures making the transfer of all radioactive materials existing in this building like ^{226}Ra, ^{137}Cs, ^{60}Co etc, to the provisional IANP storage. It was measured the dose rate inside and outside the facility, before and after removal of radioactive waste which resulted as below.

Before the movement of radioactive sources and waste:

2.1.1 Inside the building in positions:

a) At the entrance to the metal door. The dose rate D = 45mR / h

b) In the middle of the building at 1 m height. The dose rate D = 60mR / h

c) The right edge of the building at 30 cm from the surface. The dose rate D = 75mR / h

Measurements were taken with the Polish radiometer RK-67

2.1.2 In defined positions outside the building

a) Outside of the door metal. The dose rate was D = 20mR / h

b) In both corners of the right part of the building D1 = 30 mR / h (left); D2 = 45mR / h (right)

c) In both corners of the left part of the building D1 = 10mR / h (left); D2 = 25mR / h (right)

These results are in these values for the reason that disused sealed radioactive sources have not been introduced in lead containers. After the transfer of all the sources and radioactive wastes that were on the surface of the floor of this

building was completed were carried out again measurements which gave the following results.

After the transfer of radioactive sources and radioactive waste:

2.1.3 Inside the building in positions

d) At the entrance to the metal door. The dose rate was D = 3.5mR / h

e) In the middle of the building at 1 m height. The dose rate was D = 4.6mR / h

f) The right edge of the building at 30 cm from the surface. The dose rate was D = 5.2mR / h

2.1.4 In defined positions outside the building

d) Outside of the metal door. The dose rate was D = 1.8mR / h

e) In both ends of the right-wing of the building D1 = 1.2 mR / h (left); D2 = 2.8mR / h (right)

f) In both ends of the left wing of the building D1 = 0.8mR / h (left); D2 = 2.2mR / h (right)

2.2 Second Phase of Decommissioning of the Old Storage Facility

Operations in this phase were carried out in collaboration with the radiation protection office personnel. For the realization of this operation it was cooperated closely with the head of the house who had entered the old storage building inside the territory of his new house. For this operation there were engaged a large tonnage crane, a truck, an excavator, two employees and three specialists, two from Institute of Applied Nuclear Physics (IANP) and one from Radiation Protection Office (RPO).

Measurements were carried out, by using two different radiometers which gave the following results.

2.2.1 Inside the building in different positions

g) The RPO device, at 1 m height without concrete caps of the channels where were stored the spent sources and radioactive waste. The dose rate was 400 μR / h

h) The IANP device, Radiometer RK-67 at 20 cm height, without concrete caps of the channels where were stored the spent sources and radioactive waste. The dose rate was 3.5 mR / h

Then began the operation of transferring all remaining radioactive waste in the channels of this building, by transferring them at the new storage facility at IANP. It was built for processing and interim storage of waste and disused sealed radioactive sources, and then in this building was made their conditioning by the radioprotection department [3]. In October 2000 was finished the operation of transferring all remaining radioactive waste and spent

sources that were in the trenches of the old building, by bringing them at the new storage facility at IANP. In April 2000 was finished the construction of the new RWSF supported financially by Albanian government and equipped by IAEA Project. It was 500 m far from the Old Interim Storage Facility. It was constructed in an uninhabited part of the territory of the Institute and radiation signs alert any person who may approach the building [1],[2],[6]. The dimensions of this building presented in picture Nr.1 below are 17x16x3.2 m and two layers of 200 liters drums can be stacked.

Figure 1. New Radioactive Waste Storage Facility

After transferring all radioactive waste began the demolition of the old storage building. Loads of all construction materials such as bricks, plaster, concrete, iron, metal sheets, pipes, etc., after being measured for contamination were sent to the municipality waste collection site. Meanwhile metal doors, electrical and ventilation system were transferred for processing in the new RWSF of IANP. In the end after cleaning all the wastes of the old storage building were made again measurements to assess the remaining dose rate in the environment. Measurements showed that the level of radiation was that of natural level.

The territory of the previous old storage building was used for building new house and then some years later this new house was demolished for building a new 10 floor palace.

IANP, in all its perimeter, now is surrounded by a 2 m high barbed wall and is protected by the state police 24/7 who monitor also the camera system [8].

3. Safety Assessment of the New RWSF

The building of the waste storage facility is considered suitable for the waste processing and storage.

The site of the building is considered suitable in terms of possible external effects; the close vicinity of population to the site is not considered to represent a problem for safety. Building structures are stable and endurable to withstand degradation processes over the operation period envisaged and also disruptive events (earthquakes) that may occur during the operational period. There are passive safety features:

- protecting against floods by passive drainage systems and concrete barriers;
- the building and in particular the roof will prevent water entering into the storage facility;
- safety inside the storage facility does not rely on active systems like ventilation (which is only needed in the waste processing section of the building during the work);
- wastes are protected by several physical (embedding in concrete, building structure, fences around the institute) and organisational (access control) barriers;

The layout of the building is in accordance with generic IAEA design and suitable for the planned operations [5]. The storage capacity will be sufficient for the needs of Albania over the anticipated operation period of 30 years. Radiation protection of public and workers is ensured using this building for waste processing and storage [1],[2],[6]. The building is equipped with entrance and exit for emergency situations. Visible signs of radioactivity are located, inside and outside this building. Lighting system inside the building and outside is very efficient. The building is equipped with elements of high security system. Inactive area is separated from the operational areas with a high security door. Entry and exit in the premises of the operational area and in other areas is done by inserting the input code (PIN). Movement of staff inside the premises is under continuous monitoring of the cameras, which are connected to the central system for monitoring the movements in the main entrance. Acoustic signal and data on the light is strong and immediate functional if any foreign person touches or violates these environments [8]. Retention rate and readiness in an emergency is carried out by high security system that is already in this building.

4. Conclusions

Management and treatment of radioactive waste is not a static process. Review of programs that deal with the problems for radioactive waste storage facilities is a permanent task of the staff working in this field. Rhythms of activities with radioactive sources in a near future in our country will be added, and, our study for them provides filling and closing of the works in the premises of temporary storage in IANP planned for the year 2030. For this reason, is

needed to undertake a study on the location and construction of a permanent storage of radioactive waste in our country. This study should be undertaken taking into account the guidelines and recommendations of the IAEA for the design and construction of such buildings [5]. For the DSRS should be provided for their return to the manufacturer and in cases where return is not provided or is not feasible, and in other cases of unknown origin, the treatment of these radioactive waste or DSRS will be performed by IANP. Acceptance of these DSRS will be made on the basis of a draft agreement between IANP and interested companies. The experience of countries such as Turkey, Hungary, Czech Republic, Spain, France, and England, which have consolidated such activities, must be in consideration of specialists working in this field in our country for years to come.

References

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