

RECLAMATION OF A UNDERGROUND STORAGE OF RADIOACTIVE WASTE –PIT 7.1

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1. INTRODUCTION

The «Pit 7.1», known also as «The Monolith», is a reinforced concrete prismatic structure, composed by four squared section wells. The Monolith dimensions are: width 1.56m, length 5.81m, depth 6.45m (total 59m³).

Near the monolith, a drain pumping system was realized to collect the groundwater.

The Monolith was the result of a program of waste disposal in the ground, carried out in the '70s and '80s, that saw metallic drums disposed of in each of the wells (Figure 1). Such drums contained in particular: heads and foots of the fuel assemblies, technological waste derived from hot cells decontamination, pool water purification system filters and resins for a total activity of 10TBq. All materials were generated by «Nuclear Tests» activities at the ITREC plant.

After completion of the disposal, the Monolith was completely buried and a concrete slab was built on top of it, as commonly in use at that time. The disposal was seen as final and no recovery was planned or envisioned.

However, the Ministerial Decree of July 2006 ordered the reclamation of Pit 7.1 as a preparatory activity of the overall dismantling of the ITREC Plant.

2. METHDOS

The preparatory activities carried out are as follows:

- 1) Hydraulic isolation of the monolith by a series of secant foundation piles placed deep in the clay layer in order to insulate the monolith from groundwater;
- 2) Construction of a capping beam;
- 3) Construction of both a static and a dynamic containment composed by a steel structure to support a PVC tent and a ventilation system to ensure the necessary air pressure differential needed to prevent possible leakage of contamination;
- 4) Implementation of a radiological monitoring system composed by an environmental Gamma Monitoring system and α , β , γ monitoring system of the off-gas place on the extracion pipe of ventilation system.

The Italian Control Authority (ISPRA) licensed the Operational Plan in 2013 to carry out both excavation activities aimed at uncovering the monolith and probing activities in order to ascertain the structural characteristics of monolith and the drums' positioning.

All the removed soil was placed in prismatic containers (1 or 3 m³) and radiologically characterized. To carry out the investigation about the mechanical property of the monolith, a partial sacrifice of the external layer made of plaster was needed. During such activities, a percolation of liquid from inside of the monolith occurred. The liquid was collected analyzed and found to be radioactive. Consequently, the soil which was interested by the percolation event was reclaimed and disposed of.

The hypothesis of absence of free liquids, which was part of the project's assumptions, revealed itself to be incorrect after the anomalous event. Therefore, indirect investigations were carried out to delineate the different materials (steel, concrete, water) present inside the monolith, such as those involving ultrasonic tests.

1. RESULTS The chromatographic map showed on the right gives indications about the nature of materials: 1)Positioning of drums; 2)The concrete and steel rebars, showing separation between the wells and boundary structures (brown color); 3)The possible presence of water (violet color)

Such surveys included:

- 1) External visual surveys by partial scarifying of the plaster. The scarifying of plaster was the same activity which procured the leaking of contaminated ; windows were opened where the indirect investigations suggested the possible presence of liquid.
- 2) Internal visual surveys through drilling holes in the monolith to allow the insertion of cameras. In order to control possible liquid leakages, the holes have been drilled in the structure with a downward inclination and valves were inserted into the. These activities demonstrated an absence of liquid along the lines of the vertical cutting such as future activities of cutting may take place in safe conditions.

1. **CONCLUSIONS** The recovery of the Monolith is an ongoing process. Future steps include segmenting longitudinally the monolith by diamond wire, cutting the basement horizontally and placing each well in a shielded and waterproof quarterdeck. All these operations will be carried out inside a dynamic system of confinement. Eventually, the debris resulting by such activities will be moved and stored in a specific on-site storage facility known as Building 9.3.

Country or International Organization

Sogin S.p.A. - Italy

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