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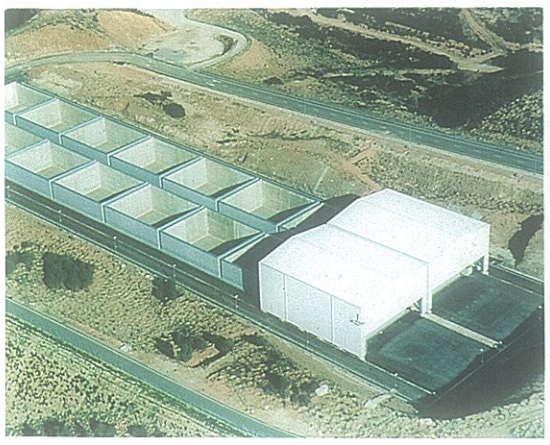
LONG - TERM RADWASTE STORAGE CENTER

EL CABRIL

P. ZULOAGA

The new El Cabril installation is one of the most modern long-term, medium- and low-level radwaste storage centers in the world. Its basic purpose is on one hand to ensure immediate and deferred protection of people and the environment, and on the other hand to allow the site to be reused without radiological type restrictions once the maximum monitoring period of 300 years has elapsed. In addition, the center has enough capacity to store all

Aerial view of the El Cabril Storage Center. Detail of one of the platforms.



medium- and low- level waste generated in Spain in the next twenty years, plus the waste currently located in the three surface modules of the old installations.

In order to achieve the above mentioned goals, El Cabril has been designed and built to satisfy two requirements: first, to isolate the waste packages from water (both surface and underground); and second, to limit radiological activity on the site in the event of possible human intrusion once the above mentioned monitoring period has ended so that the impact is socially acceptable.

It must be stressed that the intrusion hypotheses, and not those due to possible infiltration of water that could reach the waste, are the ones that limit the activity that can be confined in a surface or shallow storage system.

STORAGE SYSTEM

The storage system procedure is to immobilize waste drums (most of them 220 liter) in reinforced concrete, cube-shaped containers, the overall dimensions of which are 2.25 by 2.25 by 2.20 meters. The whole unit is a 24-ton block.

This container is put into a reinforced concrete structure (cell), the overall dimensions of which are 24 by 19 by 10 meters. Each cell can hold 320 containers; the containers are placed very close to each other, except in a center strip left to absorb manufacturing tolerances or to position the blocks.

In all, 28 storage cells have been built on two separate concrete slabs: 16 and 12 cells, respectively. In turn, the cells built on each platform form two parallel lines (8 and 8 on one, and 6 and 6 on the other).

Each row has a mobile portal that is mounted and moves on rails, and that supports a 32-ton, remote controlled crane for container handling. With this mobile roof, operations can be performed while both the containers and structures are protected from rain water.

When one of the cells is completely filled, the center strip is filled to immobilize and make the 320 blocks rigid. The structure is then covered with a top-closing slab, and finally the whole assembly is waterproofed with a synthetic cover and the portal is moved to the adjacent cell.

CONTROL NETWORK

It should be noted that the bottom plate of the cells, i.e. the floor, is the cells' primary element. It is 0.6 meters thick at the edges and 0.5 meters thick in the center, and is covered by one waterproof, polyurethane cover and another 10-20 centimeter thick porous concrete layer.

This plate's function is to collect any water filtration that may occur and direct it toward a piping network (the so-called control network) installed in inspection galleries built under the storage cells. Each slab has a drain in the center, and it is connected to the network by means of transparent holding tanks. It suffices to inspect these tanks to detect any infiltration and to know in which structure it has occurred. It is thus possible to adequately supervise storage system operation and ascertain at all times the cause of abnormal amounts of water, as well as eventual water contamination. This network leads into a final, 100 cubic meter tank.

When the El Cabril exploitation period ends, the 28 storage cells will be covered with a nearly impermeable cover made of several alternating layers of impermeable and drainage materials. Finally, a vegetable layer will be added on which native species will be planted.

Thus a system built with three barriers is provided. The first barrier is the drum and the container that isolates it, which will reduce the radionuclide release rate, even in the hypothetical case of water reaching the drums.

The second barrier is formed by the storage structures, the cover, and the infiltration control network, which limits water access to the packages and also controls and treats the water in the event that it does come into contact with them.

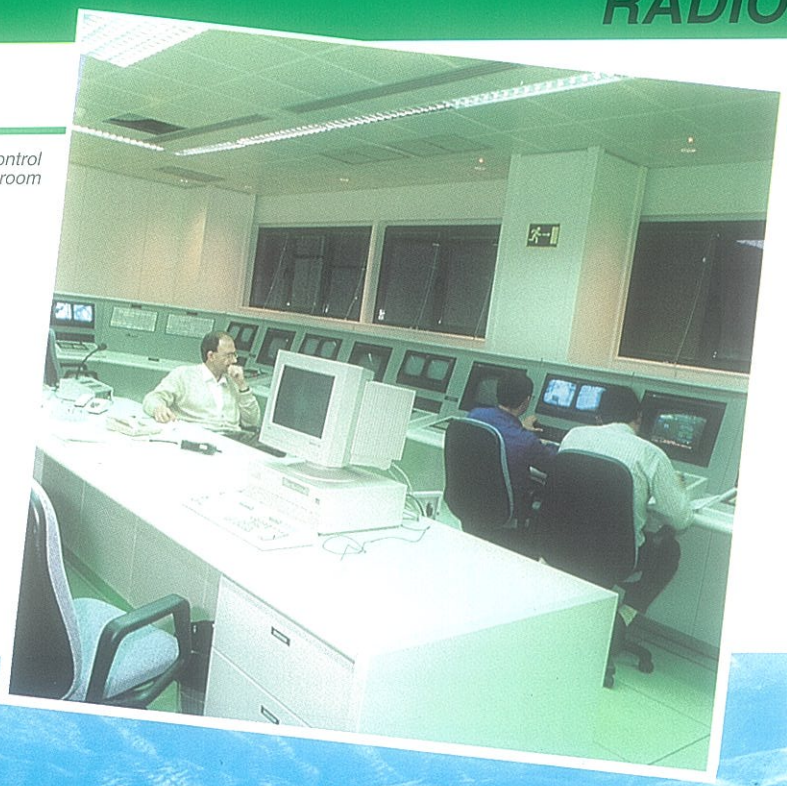
Finally, the third barrier is the ground on the site, which would dampen the impact of a possible release in the event of accident or hypothetical total degradation of the first two barriers.

93% of all waste arriving at the center comes from Spanish nuclear power plants (gloves, clothing, and small parts and process waste) and from the Juzbado (Salamanca) fuel element factory; the remaining 7% comes from small producers (industries, hospitals, laboratories, and research centers).

El Cabril is located in the province of Cordoba 130 kilometers to the northwest of the capital, in the municipal district of Hornachuelos (Sierra Morena). The tw most important towns, Fuenteovejuna and Hornachuelos, are located 30 and 43 kilometers away.

The new installations occupy 20 hectares and are divided into two zones: the auxiliary building area and the waste storage area, which borders on the Montesina stream and Los Morales stream (an affluent of the first). The two waterways control the hydrogeological operation of the site.

Gripper of the bridge crane in the compacting building.



Control room

General aerial view

INSTALLATIONS

In addition to the storage zone, El Cabril has a series of buildings (nine in all) that contain the waste characterization and conditioning services, as well as auxiliary buildings for normal center operations. There is also a sewage water treatment plant and an incinerator.

The installations are accessed from the industrial security building, which is where the central surveillance station and fire fighting services are located.

Waste characterization is performed in a laboratory designed and built for this purpose, and which is also used for research work intended for approval of the low-level waste management. For operating reasons and to minimize personnel doses, this laboratory has been divided into two buildings - one inactive and one active.

The first one is used for nonactive trials and tests on characteristics similar to the different waste drums withdrawn by ENRESA. In the active building, on the other hand, tests are made on real packages. Their purpose is to exactly determine the typology and physical, chemical and radiological qualities of this waste, which must be short-lived and low-level.

The other basic service is conditioning. All treatment operations are performed in the building built for this purpose: waste classification, trituration, separation, and drying. This is also where the drums are transferred to the storage containers to immobilize and seal them, with the aid of remote control driven bridge cranes.

In addition, this building contains an incinerator to burn biological and organic waste, and a compacter with a force of 1,200 tons to reduce cans to the technically advisable size. It also houses the control room, from where most of the systems described above and the storage area maintenance equipment are operated and controlled. Finally, this control room centralizes all information regarding installation operation.

The remaining buildings house radiological protection and medical services, dressing rooms, laundry, environmental monitoring laboratory, administration, and workshops, maintenance and others such as transformation yards, electrical distribution, cooling and heating units, and the above indicated sewage water plant.