

LOW AND MEDIUM ACTIVITY NUCLEAR WASTE DISPOSAL CHARACTERISATION LABORATORY

Example of Spanish El Cabril Disposal Centre Laboratory

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ABSTRACT

Low and medium activity radioactive waste generated in Spain by power reactors, research laboratories, etc. is stored in the El Cabril Disposal Centre.

This Centre, based on a French design, provides a characterisation function for the stored waste and corresponding containers.

Technicatome, prime contractor for the French disposal centre, and contributing to the design and construction of the El Cabril Centre, played an important part in the R&D work for this laboratory, and the manufacture of certain items of equipment.

This laboratory, applying experience acquired in France by the CEA, comprises a set of buildings providing for active and inactive test operations.

Introduction

To ensure that waste generated by the nuclear facilities is compatible with the acceptance criteria established by ENRESA (Radioactive Waste Management Authority) for surface storage, the Spanish Waste Management Programme includes a super-control and characterisation phase, applied to actual waste representative of the various waste production sources.

1. Purpose of the Laboratory

Demonstration of the permanent character of waste disposal packaging is a major source of difficulty. Contemporary modelling of what will happen in tens, hundreds or even thousands of years from now is not a simple matter. The characterisation of a container, demanding precise knowledge of its construction, manufacture, and prediction of its behaviour in the course of time, is the task of the Characterisation Centre. Within the framework of a Franco-Spanish cooperation arrangement, and on the basis of experience acquired with the various phases of the fuel cycle, Technicatome prepared the Basis for Design for the ENRESA (Empresa Nacional de Residuos Radioactivos SA) Characterisation Centre on behalf of CEA/DRDD/SCECA.

2. Operations Conducted in the Laboratory

The objective is to dimension the structures used to characterise the waste containers, and execute super-control operations on these containers. The centre includes the following units:

- waste characterisation,
- personnel health and monitoring,

- safety of installations and buildings,
- health physics (control of personnel and raw materials),
- infrastructure (maintenance shop, supply and distribution of fluids), and
- local management of the centre.

Inspection and test operations can be conducted on complete containers, or on samples prepared from complete containers, in the characterisation unit.

These containers are active or inactive. Various physical, mechanical, thermal, radiological, and chemical tests for characterisation of the containers and packaging procedures, are conducted according to the nature of the containers and samples.

3. General Description of the Facilities

The facilities comprising the ENRESA characterisation laboratory are integrated in the general infrastructure of the El Cabril Centre. These facilities are located in two separate buildings.

3.1 Inactive laboratory

To facilitate its utilisation, the first building is located in the free access zone of the centre. This is the Inactive Laboratory.

These premises are used for two types of activity:

- administrative management of result data for the various tests carried out in both buildings, and
- analyses and tests on inactive samples, reproducing the physico-chemical characteristics only of the waste matrices.

3.2 Active laboratory

The second building is located in the controlled zone of the centre, adjacent to the Waste Packaging Shop. This building houses the actual waste super-control facilities.

Application of radiological protection rules and the ALARA criterion, included in the general criteria of the El Cabril Centre, has led to the utilisation of dedicated techniques and resources for the design of the Active Laboratory.

3.3 Manipulation cell

The super-control procedure involves waste sample preparation operations, with risks of contamination and irradiation incompatible with the limits set by the presence of personnel. This is why mechanical operations such as stripping of the concrete matrices, obtaining of samples by dry trepanning of the drums, compression, and exudation tests, etc. must be conducted in the shielded containment of a manipulation cell. Handling of these machines and samples, using remote manipulators, is monitored via shielded windows.

Furthermore, distribution of waste or samples to the test equipment and/or for external tests outside the cell, must also be conducted under remote control from a station equipped with man/machine dialogue consoles, assisted by a closed-circuit TV system.

4. Active Cell Organisation

These requirements, combined with the specific nature of the tests to be conducted, led to the

design of the building as described below.

The active building has a total area of 1200 m² on two floors.

The ground floor includes a radiological control station for checking personnel, and is also used to control personnel access to the premises. The operator(s) then enter a central equipment control zone, also providing access to the various radiological and radiochemical analysis rooms. One wall of the central control zone forms the front face of the manipulation cell, with two operator stations and four remote manipulators. On one side of this wall, the operator can access a room in which samples extracted from actual drums, or actual stripped drums, which may have been irradiated, are subjected to lixiviation tests, and on the other side, to the room in which waste drums and samples are subjected to spectrometric examination. All handling operations can be remotely controlled from the control consoles mentioned above.

The rear zone of the cell communicates with these premises, and also with the Preparation Shop which supplies the waste samples for examination, without interruption of the general containment of the laboratory.

Auxiliary controlled ventilation equipment and other electrical services are located on the second floor.

Conclusions

Construction of the El Cabril Disposal Centre Characterisation Laboratory had the benefit of the extensive experience acquired by Technicatome, resulting from close collaboration with the CEA in connection with a similar laboratory in France.

The largely approved methods applied ensure an excellent level of quality for the containers stored on the disposal site.