THE AGP-PROJECT
CONCEPTUAL DESIGN FOR A SPANISH HLW FINAL DISPOSAL FACILITY

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ABSTRACT

Within the framework of the AGP Project a Conceptual Design for a HLW Final Disposal Facility to be eventually built in an underground salt formation in Spain has been developed. The AGP Project has the character of a system analysis. In the current project phase I several alternatives has been considered for different subsystems and/or components of the repository. The system variants, developed to such extent as to allow a comparison of their advantages and disadvantages, will allow the selection of a reference concept, which will be further developed to technical maturity in subsequent project phases.

INTRODUCTION

In Spain the Empresa Nacional de Residuos Radiactivos SA (ENRESA) has been charged with the responsibility for the management of all kinds of radioactive wastes. ENRESA, created by Royal Decree in 1984, has several projects on the way for the management and final disposal of LLW, ILW and HLW from the nuclear power and the uranium mining industries as well as from the industrial and medical use of radioisotopes.

As a part of its global radioactive waste management strategy ENRESA has launched the AGP-Project, a joint task with its German partner company, the DBE, and involving also the Spanish architect-engineering company Empresarios Agrupados (EA).

THE AGP-PROJECT - AN OVERVIEW

The purpose of the Project "Almacenamiento Geológico Profundo" (AGP-Project) is to produce a conceptual design for a spent fuel and other HLW final disposal facility to be eventually constructed in Spain in a rock salt formation, in the case that salt is selected in the future as final disposal medium (also granite and clay are being considered). Preliminary work was started by mid 1989; in may 1990 the project team started working on the final repository conceptual design.

The project constitutes a system analysis of several final disposal concept variants. Two types of repository rock salt formations are being considered, **bedded salt** and **domal salt**. Also two different underground disposal techniques, namely **drift** and **borehole** emplacement, and closely related with them three types of waste container are being studied. The basic case anticipates the drift emplacement of the spent fuel in heavy self-shielding casks, loaded with four or (in an advanced variant) seven intact fuel elements. As a further possibility the disassembling of the spent fuel is being considered, which allows roughly to double the waste carrying capacity of the mentioned casks. A conceptual view of the so called Custos Type I Cask is shown in Fig. 1. The cask offers the possibility of obtaining a Type B(U) transport certification thus allowing the direct loading of spent fuel at the power plant site.

Since drift disposal with such a self-shielding casks requires shaft transport of heavy loads in the range of 70 to 90 metric tons, which at project beginning was not proven technology, a substantially different alternative has been planned as a back-up concept. It considers the borehole disposal of unshielded cylindric canisters with a diameter of about 0.45 m and a length of 1.2 m containing the chopped rods of 0.5 PWR fuel elements. Including the shielding overpack necessary for the transport to underground the total weight of the transport unit amounts to approximately 28 metric tons.

For the mentioned variants the complete final disposal system is being planned at a conceptual stage. The scope of the project comprises the design of the waste conditioning facilities to be located on surface, of the underground repository mine, of the installations and equipment for the shaft transport of the waste packages as well as of the waste handling and emplacement equipment, including backfilling and sealing of the underground openings.

THE SURFACE FACILITIES

The conceptual design of the surface facilities for the fabrication of the corresponding waste packages have been already finished, the design of the other repository subsystems is in on the way. The highlights of the performed surface facilities design are among others:

- strict consideration of safeguards,
- completely separated flow paths for transport and final disposal containers,
- modular design of the waste conditioning hot cell complex,
- in-deep optimization of heavy equipment movement routes.

The surface facilities includes all necessary installations for the fabrication of the waste packages mentioned above as well as all the needed to construct and operate the repository mine. The most important part of them is the actual waste conditioning facility with the hot cell complex, where the waste is transferred from the transport cask to the final disposal cask, and, according to the different variants, also in some cases disassembling of fuel elements and fuel rod chopping

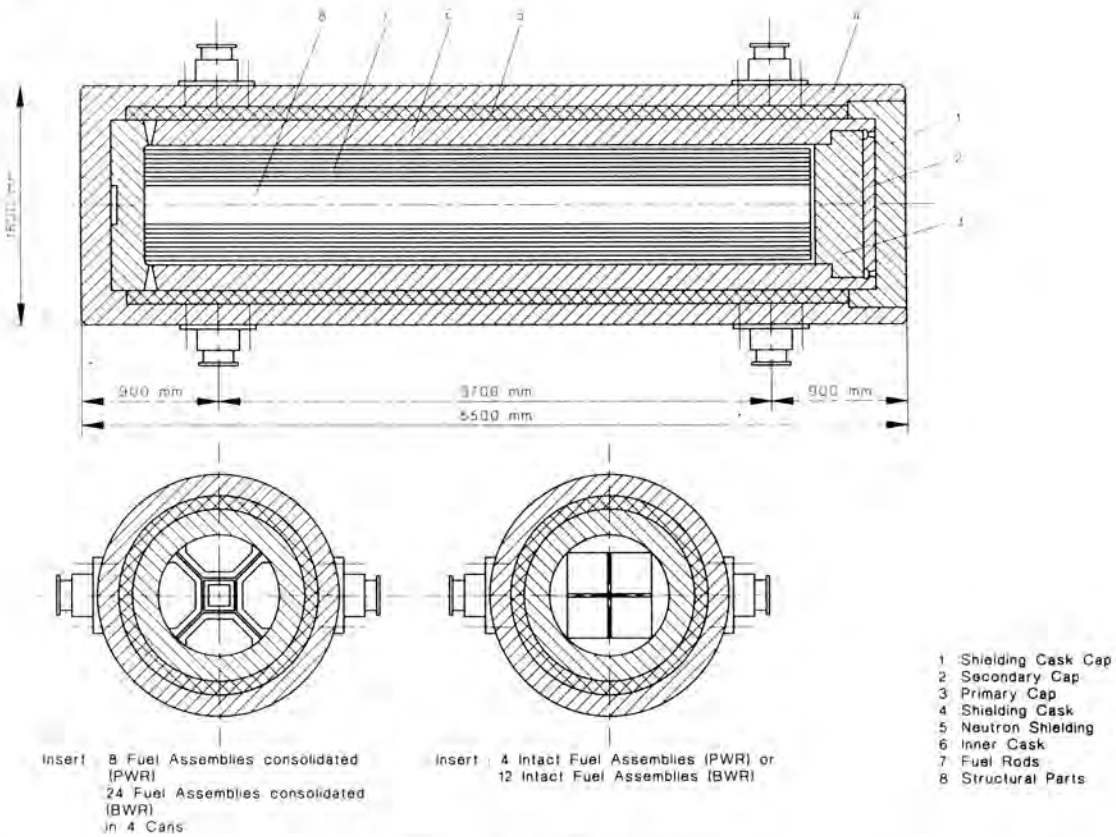

Fig. 1. Custos type I cask.

takes places. The conditioning facility comprises as major elements a reception area and buffer storage for incoming spent fuel transport casks, the hot cell complex where the spent fuel is processed and loaded into the corresponding Custos cask, and the final control and shaft buffer storage area. An artist view of the surface facilities for the so called Custos Type I Variant is shown in Fig. 2.

THE UNDERGROUND FACILITIES

Also with regard to the underground repository several alternatives are being studied. There are two host rock formations under consideration, domal salt and bedded salt as well as two different disposal techniques, borehole and drift disposal. A total of 9 different repository concepts have been devised, the basic or reference case being the spent fuel drift disposal in bedded salt. The highlights of the performed underground facilities design are among others:

- strict consideration of safeguards,
- completely separated waste container transport routes and transport activities related with repository mining,
- modular design of the waste emplacement fields,
- in-deep optimization of cask and other heavy equipment movement routes.

For the reference case it has been assumed that a salt layer of about 150 m thickness and with suitable extension is available for the construction of the underground repository. The

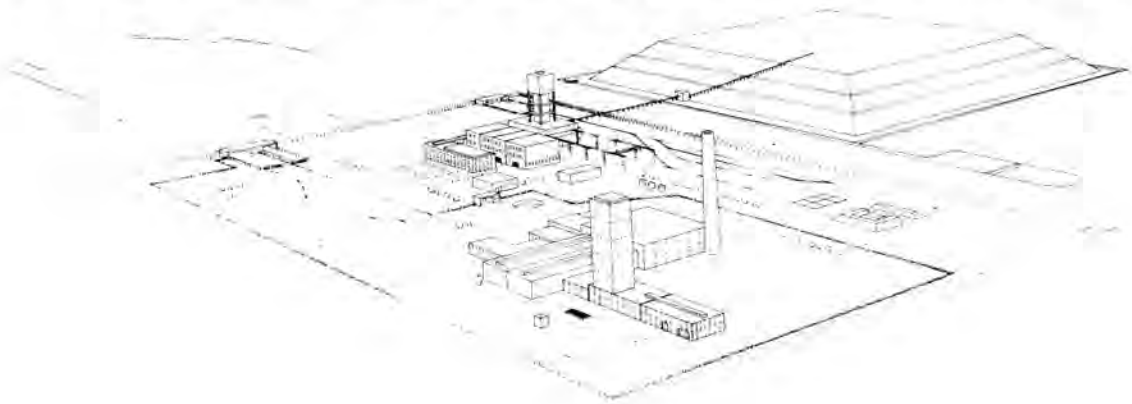

Fig. 2. Surface facilities - custos type I variant.

repository has been planned to accommodate all the spent fuel expected to arise from the power plants now in operation in Spain, i.e. some 11850 PWR and about 8150 BWR fuel elements. Besides of this, a separated emplacement area has been devised for the emplacement of ILW from power plant and surface facilities decommissioning. An artist view of the underground facilities for drift disposal in bedded salt (so called BDD variant) is shown in Fig. 3.

CONCLUSIONS AND PERSPECTIVE

The current phase of the AGP-Project is scheduled to end by mid 1992 and to deliver the conceptual design of a reference concept and several additional variants. Besides of this, the AGP-Project is expected to deliver important input to other ENRESA activities, such as the siting and R&D projects.

The close project cooperation between ENRESA, DBE and Empresarios Agrupados has proven very valuable for all participants. The performance of the binational engineering team, which includes five german and five spanish professionals working in germany and additional support from the ENRESA staff at his Madrid headquarter has been very satisfactory, indeed a good example of practical international cooperation in our field.

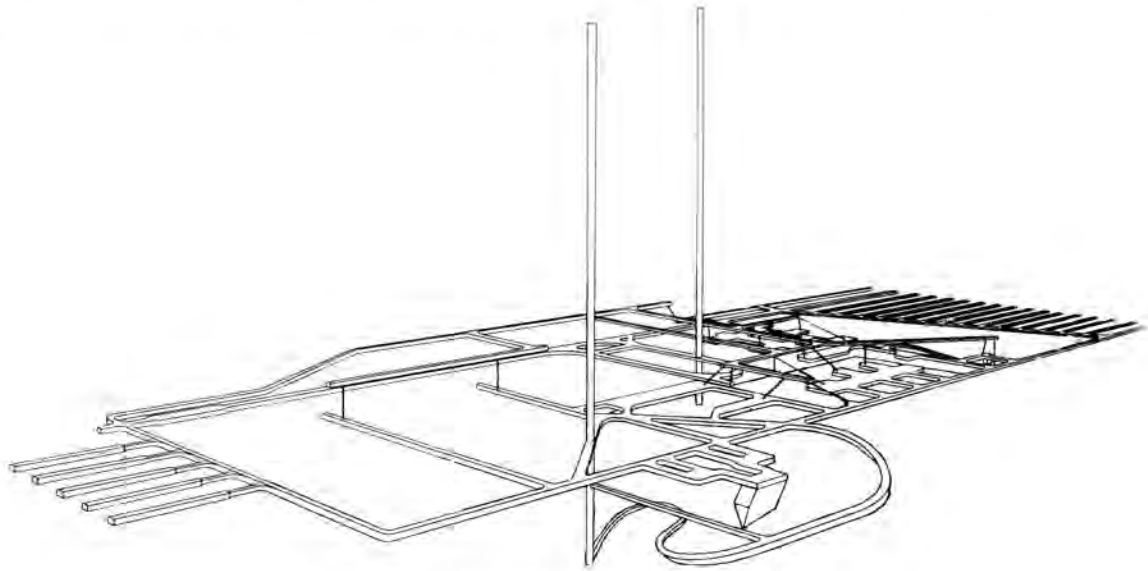

Fig. 3. Underground facilities - BDD variant.