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Multi-Purpose Canister (MPC) Implementation Program Conceptual Design Phase Report

Volume I - MPC Conceptual Design Summary Report

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Final Draft

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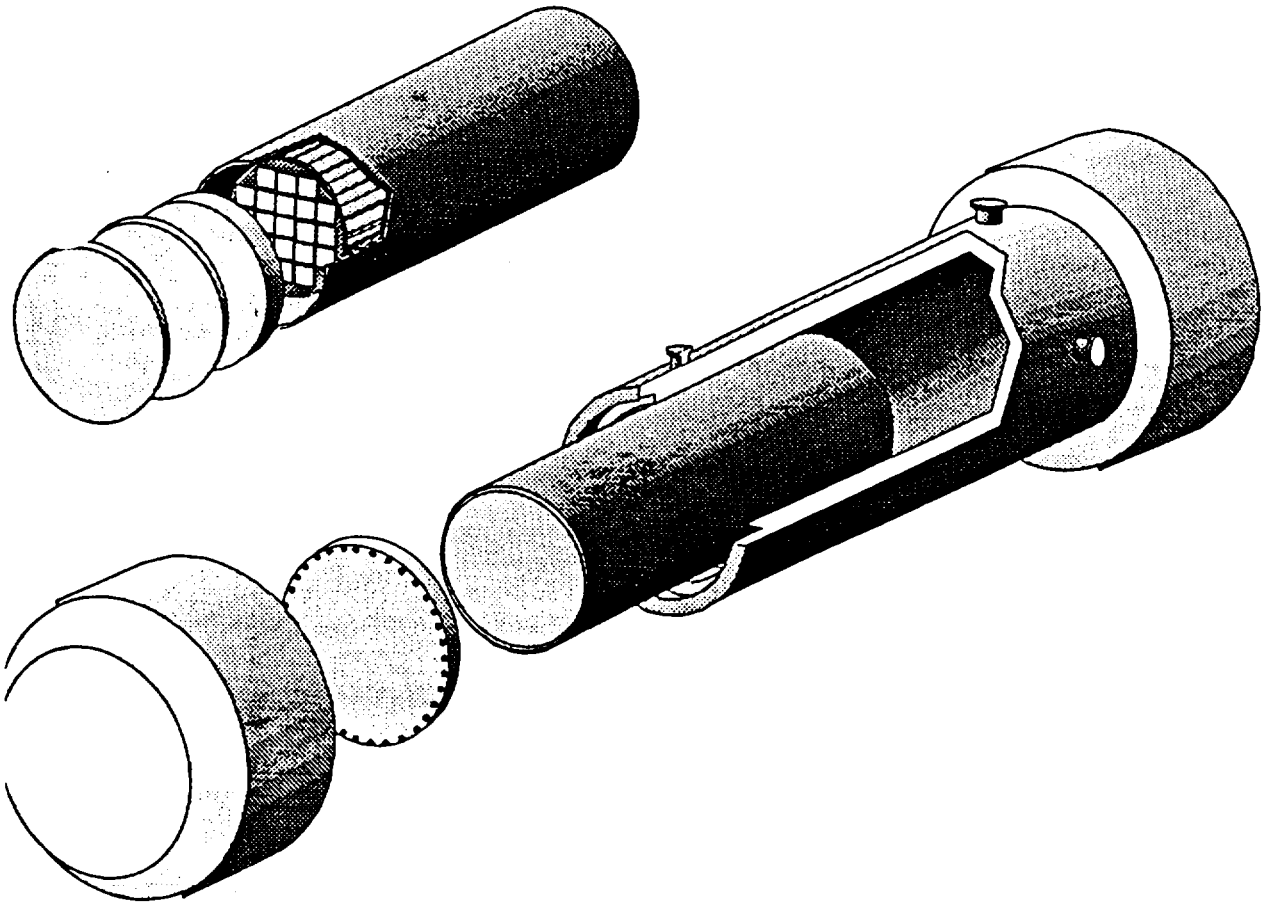

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4. MPC SYSTEM DESIGN CONCEPTS

This chapter summarizes the results of the conceptual designs for the MPC, the transportation casks, the MRS, and the utility transfer system. The conceptual design report describes the approach taken to address the various structural, thermal, criticality safety and radiological protection considerations important to MPC system design, and addresses issues that affect MPC capacity.

4.1 MPC DESIGN

The MPC is a triple purpose sealed container for SNF which provides dry storage, transportation, and disposal capabilities. MPCs are provided with two lids which are welded to provide a dry inert environment for SNF and are overpacked separately and uniquely for the various system elements of storage, transportation, and geologic disposal. The MPC is based on existing technology adapted to the specific requirements of the multi-purpose environment, and is intended to be licensed under 10 CFR 72 for storage, 10 CFR 71 for transportation, and be compatible with 10 CFR 60 for disposal. The requirements of 10 CFR 72 and 10 CFR 71 are well-known, and the task of simultaneously satisfying the storage and transportation regulations has been explored for several commercial cask products, although no dual-purpose cask products have been licensed to date. Existing cask designs for storage and transportation do not incorporate repository disposal requirements, which have not been defined at the present time.

The major design considerations for the MPC are to provide reasonable cost for storage, high strength and criticality control for transportation, and low fuel cladding temperatures for disposal. The conceptual MPC designs provide these features, and meet all other requirements for dry storage and transportation. It is expected that a license for storage and a license for transportation may be obtained that would not require opening the MPC after storage and prior to transportation to an MRS or the repository. With the exception of the burnup credit issue, no new regulations or regulatory interpretations are needed for on-site storage or for transportation.

The MPC is designed in two versions: a large MPC which satisfies a 125-ton crane hook weight limit, and a medium MPC which meets a 75-ton crane hook weight limit. These weight limits were selected based on individual Purchaser handling capabilities. The MPC capacity, crane hook weight estimates, and the total package weight on rail are provided in Table 4-1. All MPC versions are designed for transportation in a Type B, Fissile Class I transportation package. The presently projected maximum capacity of the large MPC is 21 PWR assemblies with the use of burnup credit. A 40 BWR assembly version of the large MPC was also designed. The medium MPC has a capacity of 12 PWR assemblies or 24 BWR assemblies. The medium PWR and both BWR MPC basket designs do not rely upon the use of burnup credit.