CHAPTER 1

INTRODUCTION AND GENERAL DESCRIPTION OF INSTALLATION

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LIST OF ACRONYMS

BGE	Baltimore Gas and Electric Company
CCNPP	Calvert Cliffs Nuclear Power Plant
DSC	Dry Shielded Canister
HSM	Horizontal Storage Module
ISFSI	Independent Spent Fuel Storage Installation
NUHOMS	Nutech Horizontal Modular Storage

1.0 INTRODUCTION AND GENERAL DESCRIPTION OF INSTALLATION

1.1 INTRODUCTION

Baltimore Gas and Electric Company (BGE) began commercial operation of the Calvert Cliffs Nuclear Power Plant (CCNPP), Units 1 and 2 on May 8, 1975 and April 1, 1977, respectively. Since then, these two 2700 MWT units have generated millions of KWH in a safe and reliable manner. In so doing, these units have discharged more than 1350 spent fuel assemblies. These assemblies are currently stored in a common storage pool. The need to provide additional on-site storage facilities to permit continued operation is discussed in Chapters 9, 10, and 11 of the Environmental Report.

In order to provide spent fuel storage until the Department of Energy begins to accept title to spent fuel under the requirements of the Nuclear Waste Policy Act of 1982, as amended in 1987, BGE has built and will operate an Independent Spent Fuel Storage Installation (ISFSI) in compliance with Title 10 Code of Federal Regulations Part 72. Baltimore Gas and Electric Company has chosen the Nutech Horizontal Modular Storage® (NUHOMS)-24P dry storage system designed by Transnuclear West (formerly Nutech Engineers, Inc.) to be used for the Calvert Cliffs ISFSI. The NUHOMS-24P system is more fully described in Reference 1.2. The location of the ISFSI on the Calvert Cliffs site is shown on Figure 1.1-1.

Calvert Cliffs Nuclear Power Plant has reanalyzed the ISFSI to use Transnuclear NUHOMS-32P Dry Shielded Canisters (DSCs) to optimize its dry spent fuel storage capacity. The NUHOMS-32P DSC system stores eight more spent fuel assemblies than the NUHOMS-24P DSC using the same external and internal shell dimensions. The NUHOMS-32P DSC storage capacity is optimized by reducing the space between the locations of each fuel assembly and by slightly reducing the size of the storage locations.

Chapter 12 is a dedicated discussion of the use of the NUHOMS-32P DSC design at CCNPP. Unless otherwise explicitly stated the information on the NUHOMS DSCs provided throughout this Updated Safety Analysis Report is applicable to both the NUHOMS-24P DSC and the NUHOMS-32P DSC.

The major difference between the NUHOMS-32P DSC and the NUHOMS-24P DSC is the internal basket assembly. The DSC is loaded into a transfer cask for transporting to and from the horizontal storage module (HSM). The same transfer cask is used for on-site transfer of either a NUHOMS-24P DSC or a NUHOMS-32P DSC. Likewise, the same HSM design is used for the storage of either a NUHOMS-24P DSC or a NUHOMS-32P DSC.

The NUHOMS system provides safe interim storage for irradiated fuel assemblies. The fuel assemblies are confined in a helium atmosphere by a stainless steel canister. The canister is protected and shielded by a massive concrete module. Decay heat is removed by thermal radiation, conduction, and convection from the canister to an air plenum inside the concrete module. Air flows through this internal plenum by natural draft convection.

The canister containing irradiated fuel assemblies is transferred from the spent fuel pool to the concrete module in a transfer cask. The cask is precisely aligned and the canister is inserted into the module by means of a hydraulic ram.

The NUHOMS system is a totally passive installation that is designed to provide shielding and safe confinement of irradiated fuel. The DSC and HSM have been designed to withstand certain accidents.

The fuel assemblies to be stored in the ISFSI are located in the Calvert Cliffs spent fuel pool and were irradiated only in the Calvert Cliffs reactors. Twenty-four fuel assemblies are stored in each NUHOMS-24P DSC, 32 fuel assemblies are stored in each NUHOMS -32P DSC, and one DSC is stored in each concrete module. The license allows construction and operation of a total of 120 modules. These modules will be built incrementally, as needed, to match BGE's requirements for additional storage. Operation of the facility will continue for up to 20 years under the initial license and continue under license renewal as necessary until a permanent facility is available for spent fuel disposal. As defined in Table 1.2-2 of Reference 1.2, the minimum design life of the facility is 50 years.

1.2 GENERAL DESCRIPTION OF INSTALLATION

1.2.1 GENERAL DESCRIPTION

The ISFSI provides for the horizontal dry storage of irradiated fuel assemblies in a concrete module. The principal components are a concrete HSM and a stainless steel DSC with an internal basket which holds the fuel assemblies. Each HSM contains one DSC. Each NUHOMS-24P DSC contains 24 fuel assemblies. Each NUHOMS-32P DSC contains 32 fuel assemblies.

Despite Department of Energy's obligations under the Nuclear Waste Policy Act of 1982, as amended, to begin accepting fuel on January 31, 1998, BGE's current best estimate for the earliest date to ship spent fuel for permanent disposal is the year 2013. The license allows for construction and use of up to 120 HSMs. The provision for 120 HSMs will provide the minimum storage capacity needed to carry Calvert Cliffs to approximately 2026.

The initial phase of construction includes 48 HSMs. Additional modules can be added as required on separate foundations without impact to the preceding or subsequent modules. Analyses for structural and foundation requirements provide for constructing modules in a 2x6 array. The layout of the ISFSI is shown on Figure 1.2-1.

In addition to these primary components, the Calvert Cliffs ISFSI also requires transfer equipment to move the DSCs from the spent fuel pool (where they are loaded with spent fuel) to the HSMs where they are stored. This transfer system consists of a transfer cask, a hydraulic ram, a truck, a trailer, and a cask skid. This transfer system interfaces with the existing Calvert Cliffs spent fuel pool, the cask handling crane, and the site layout (i.e., roads and topography).

1.2.2 PRINCIPAL SITE CHARACTERISTICS

The ISFSI is located on the CCNPP site near Lusby, MD. Baltimore Gas and Electric Company owns and operates two 2700 MWT nuclear generating units on the Calvert Cliffs site. The ISFSI is located outside the protected area, but within the owner controlled area approximately 2300' southwest of the plant (Figure 1.1-1).

1.2.3 PRINCIPAL DESIGN CRITERIA

The principal design criteria and parameters for the Calvert Cliffs ISFSI are shown in Table 1.2-1. A detailed description of the criticality safety, shielding, structural, and decay heat removal features of the storage system is presented in the following Chapters and in Reference 1.2.

Design features of the NUHOMS system important to safe operation are outlined in Reference 1.2 and USAR, Chapter 12. Changes to any of these design features will be implemented only after conducting a safety review in accordance with 10 CFR 72.48.

1.2.4 OPERATING AND FUEL HANDLING SYSTEMS

The major operating systems of the ISFSI are those required for fuel handling in the Auxiliary Building and transport of the transfer cask and DSC from the spent fuel pool to the ISFSI. The primary design parameters for these systems are listed in Table 1.2-2. The majority of the fuel handling operations involving the transfer cask which take place in the Auxiliary Building (i.e., fuel loading, drying, trailer loading, etc.) utilize standard techniques at Calvert Cliffs for spent fuel shipment. The remaining operations (canister seal welding, transfer cask-HSM alignment, and DSC transfer) are unique to the ISFSI.

1.2.5 SAFETY FEATURES

The principal safety features of the ISFSI are inherent in the design of the DSC and the HSM. These safety features include protection of the spent fuel from the consequences of extreme environmental phenomena, redundant DSC closure welds to ensure containment, and a range of operational design features to maintain occupational dose as low as reasonably achievable. Additional details of the safety features of the NUHOMS System are presented in Reference 1.2 and USAR, Chapter 12.

1.2.6 RADIOACTIVE WASTE AND AUXILIARY SYSTEMS

No radioactive waste is generated during normal storage operations and, because of the passive nature of the ISFSI, no auxiliary systems are required for storage. The DSC Vacuum Drying System, used during initial canister closure operations, is an auxiliary system which pumps contaminated water from the DSC to plant processing systems or back to the spent fuel pool. It is also used to evacuate the DSC and backfill it with helium. The existing Calvert Cliffs Auxiliary Building processing systems are used to handle water and gasses which are drained and vented from the cavity of the DSC during the drying process.

TABLE 1.2-1
DESIGN PARAMETERS FOR THE CALVERT CLIFFS ISFSI

GENERAL DESIGN REQUIREMENTS

Capacity (Fuel Assemblies/Canister)	NUHOMS-24P DSC 24 Pressurized Water Reactor Assemblies NUHOMS-32P DSC 32 Pressurized Water Reactor Assemblies
Reference Fuel Assembly Parameters:	
Burnup: Max. Assembly Average	47,000 MWD/MTU
Initial Enrichment (Maximum)	4.5 w/o U^{235}
Initial Uranium Content	NUHOMS-24P 386 kg/Assembly (Nominal) NUHOMS-32P 400 kg/Assembly (Maximum)
Decay Heat Power (Maximum)	0.66 kW/Assembly
Cooling Time	As Required for Decay Heat Limit
Fuel Rod Array	Combustion Engineering 14x14
Assembly Weight (Maximum)	1,450 lbs
Maximum Assembly Envelope	8.25 inches by 8.25 inches
Effective Multiplication Factor:	
Normal	NUHOMS-24P $K_{eff} < 0.95$ NUHOMS-32P $K_{eff} < 0.95$
Off-Normal	NUHOMS-24P $K_{eff} < 0.98$ NUHOMS-32P $K_{eff} < 0.95$
Internal DSC Atmosphere	Helium
Ambient Temperature	Range -3°F to 103°F
Solar Heat Load: Maximum	127 Btu/hr-ft^2
Average	82 Btu/hr-ft^2
Maximum Dose at HSM Surface During Storage (Away from Openings)	20 mrem/hr
Maximum Dose at HSM Door and Penetrations	100 mrem/hr
Peak Long-Term Clad Temperature	635°F
Peak Short-Term Clad Temperature	1,058°F
Credit for Burnup Criticality Analysis	NUHOMS-24P Based on 1.8% equivalent initial enrichment NUHOMS-32P – N/A[a]
Maximum Assembly Length (Includes Radiation Growth)	less than 158.0"
Active Fuel Length	136.7"

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[a] See Section 12.3.3.4.

TABLE 1.2-2
PRIMARY DESIGN PARAMETERS FOR THE DSC TRANSFER SYSTEM

[References 1.4, 1.7, and 1.8]

SYSTEM	PARAMETER	VALUE
Transfer Cask	Nominal Cavity Diameter	68"
	Nominal Cavity Length	173.5"
	Payload	95,000 lbs (Maximum)
	Decay Heat Rejection (Maximum)	21.12 kW (0.66 kW/Assembly) (NUHOMS-32P DSC)
	Shielding (Surface Dose, Combined Neutron and Gamma, Away from Penetrations)	200 mrem/hr (Maximum)
Transfer Cask Handling	Liftable by Yoke Using Crane Rotates on Lower Trunnions Vertical to Horizontal when Lowered by Crane	109.25 tons Gross Lift (Maximum)
Transfer Cask Skid	Payload	215,000 lbs (Maximum)
Transfer Trailer	Payload (Cask + Skid)	240,000 lbs (Maximum)
	Dead Weight	40,000 lbs (Maximum)
	Gross Vehicle Weight	280,000 lbs (Maximum)
	Limiting Cask Height	80" (Maximum)

1.3 GENERAL SYSTEMS DESCRIPTIONS

The following subsections briefly describe the principal systems and components and their operation. The major systems, subsystems, and components of the Calvert Cliffs ISFSI are shown in Table 1.3-1.

1.3.1 SYSTEMS DESCRIPTIONS

The components of storage at the ISFSI are the DSC and the HSM. Additional systems required for the DSC closure and transfer include the transfer cask, the skid and skid positioning system, the trailer, the hydraulic ram system, and the DSC vacuum drying system.

1.3.1.1 Dry Shielded Canister Design

1.3.1.1.1 NUHOMS-24P DSC

The design of the generic NUHOMS-24P DSC is described in detail in Reference 1.2. The Calvert Cliffs DSC is very similar to the referenced design with revisions as necessary to accommodate a slightly different fuel assembly design. The main component of construction of the DSC is a stainless steel cylindrical containment vessel.

The component subassemblies of the NUHOMS-24P DSC are listed in Table 1.3-1 and shown on Figure 1.3-1. The internal basket assembly is comprised of 24 guide sleeves supported by spacer disks at intervals corresponding, for the most part, to the fuel assembly spacer grids. For a few of the fuel assemblies, the spacer grids were found not to be in complete alignment with the NUHOMS-24P DSC spacer disks. Such misalignments were evaluated structurally, and found to be able to withstand normal and cask drop loads. Support rods maintain the spacer disk location. All canister structural components are fabricated from type 304 stainless steel, except the spacer disks and support rods may be fabricated from aluminum coated carbon steel. Lead gamma shielding is used in both the top and bottom end shield plugs.

The principal differences between the Calvert Cliffs NUHOMS-24P DSC and the generic DSC design are: the addition of one spacer disk for a total of nine to accommodate the Calvert Cliffs fuel which has nine spacer grids; thinner spacer disks with wider ligaments; an additional 1/2" of lead in both shield plugs; and a shorter overall length accounting for the shorter fuel assembly design.

Criticality safety for the NUHOMS-24P DSC, during wet loading operations, is maintained through the geometric separation of the fuel assemblies within the internal basket assembly, the inherent neutron absorption capability of the stainless steel guide sleeves, and the proper selection of sufficiently depleted fuel assemblies.

1.3.1.1.2 NUHOMS-32P DSC

The NUHOMS-32P DSC design increases the number of stainless steel guide sleeves to 32 (one for each spent fuel assembly) and uses an egg-crate design made of stainless steel and aluminum (borated and unborated plates) to support the guide sleeves. This egg-crate design is similar to the Transnuclear TN-68 basket assembly currently in use at a number of nuclear plants. Both the guide sleeves and the egg-crate components run the full length of the DSC cavity. This allows the guide sleeves to be in contact with the egg-crate components over the whole length of the DSC cavity versus only at spacer discs in the NUHOMS-24P DSC design. As with the NUHOMS-24P DSC design, the basket assembly is not attached to the DSC shell walls or cover plates.

Other differences are the relocation of the vent and siphon ports. They have been moved from the DSC shell wall (in NUHOMS-24P DSC) to the DSC top shield plug (in NUHOMS-32P DSC) to improve the welding, blowdown, and vacuum drying operations. The NUHOMS-32P DSC lifting fixture device is different than the lifting eyes of the NUHOMS-24P DSC (Reference 1.9). The top shield plug for the NUHOMS-32P DSC is different than the NUHOMS-24P DSC top shield plug. The design change to the top shield plug involves a reduction in the lead shield thickness, and an increase in the outer steel plate thicknesses.

Criticality Safety for the NUHOMS-32P DSC is maintained through fixed neutron absorbers in the NUHOMS-32P basket and increasing the soluble boron in the spent fuel pool water to a concentration of 2,450 ppm.

All the major steps for loading and unloading a DSC (welding, vacuum drying, etc.) are the same for the NUHOMS-24P DSC and the NUHOMS-32P DSC systems. The DSC is loaded into a transfer cask for transporting to and from the HSM. The same HSM design is used for the storage of either a NUHOMS-24P DSC or a NUHOMS-32P DSC.

1.3.1.2 Horizontal Storage Module

The Calvert Cliffs ISFSI employs HSMs constructed in units of 12 configured in a 2x6 array. The HSM major design features are similar to the design presented in Reference 1.2. Major design features include items such as the overall module layout, size, wall thicknesses, DSC support rails layout and location, and air inlet and outlet configurations and sizes. There are differences in the HSM design details compared to those presented in Reference 1.2, including the following:

A. The DSC rail support beam at the front of the module in the Reference 1.2 design was eliminated for simplification of the rail support scheme. The front end of the rails were changed to be supported directly by the front wall of the module using anchored angles similar to those used to support the rail support beams at the middle and rear of the module.

B. The amount of shear reinforcement was changed to be consistent with the specific design parameters applicable to the Calvert Cliffs ISFSI HSMs.

C. The foundation size was reduced to simplify construction.

D. The DSC seismic restraint was redesigned to make it significantly lighter than the Reference 1.2 design and therefore easier to handle. This reduces personal radiation exposure for placement of the restraint in the module after insertion of the DSC.

E. The DSC support rails were redesigned from WT 6x115 to WF 8x40 to employ a more efficient section which reduces weight, resulting in reduced material and construction costs.

F. The DSC support assembly cross-member section was redesigned from W 10x68 to W 8x48 to employ a more efficient, lighter weight section.

G. The module rebar design was revised to eliminate unnecessary rebar.

H. The HSM door design was revised to incorporate additional radiological shielding material.

The HSMs are constructed in place at the ISFSI with pairs of 2x6 arrays placed end to end. The arrangement of the HSMs at the ISFSI is shown in Figure 1.2-1. Each array of 12 HSMs is constructed on a common reinforced concrete foundation slab. The HSM is designed to provide neutron and gamma shielding to achieve a nominal 20 mrem/hr contact dose rate. Nominal contact dose rates at the HSM access door and vents are designed to be less than 100 mrem/hr.

Three foot thick end walls provide shielding on the sides of each HSM array. The front walls of the HSMs are thickened to 3-1/2’. Two foot thick interior common walls provide shielding between modules to prevent scatter in adjacent modules during DSC loading and retrieval. The roof slab for the HSMs is 3’ thick. An internal slab and roof caps are provided to shield the ventilation inlet and outlet openings.

The HSMs are independent, passive systems for the dry storage of irradiated fuel assemblies. Therefore, the HSMs are designed to ensure that normal operation and credible hazards do not impair their function. To this end, the HSMs are designed to withstand the following loads:

A. Winds and Tornado (including missile impact) — Regulatory Guide 1.76

B. Seismic — CCNPP Updated Final Safety Analysis Report, Section 2.6

C. Flood — CCNPP Updated Final Safety Analysis Report, Section 2.5

D. Snow and Ice — American National Standards Institute A58.1-1982

E. Combined Loads (dead weight, live loads, thermal loads, creep effects) — American Concrete Institute 349-85.

1.3.1.3 Transfer Cask

The transfer cask used with the ISFSI provides radiological shielding during the DSC closure operations and during transfer of the DSC to the HSM. To ensure structural integrity, the transfer cask also provides protection of the DSC against potential natural and operational hazards during transport and transfer of the DSC to the HSM. Both solid neutron and lead gamma shielding are incorporated into the transfer cask design. Figure 1.3-2 shows the major components of the transfer cask. The Calvert Cliffs transfer cask has a solid hydrogenous neutron shield in the outer annulus of the cask, and as a result the liquid neutron shield expansion tank of Reference 1.2 was deleted.

1.3.1.4 Transfer Trailer

The transfer trailer is used to transport the transfer cask skid and the loaded transfer cask from the Auxiliary Building to the ISFSI. The transfer trailer is an industrial heavy-haul trailer with pneumatic tires, hydraulic suspension and steering, and brakes on all wheels. The approach slab has adequate space for turning the transport trailer and tow vehicle. Four hydraulic jacks are incorporated into the transfer trailer design to provide vertical elevation adjustment for alignment of the cask at the HSM. The transfer trailer is shown in Figure 1.3-3. It is pulled by a conventional tractor.

1.3.1.5 Transfer Cask Skid and Positioning System

The transfer cask skid is essentially identical in design and operation to previous NUHOMS-24P system transfer cask support skids. The skid is supported on lubricated bearing plates attached to the trailer deck and can be moved horizontally on the bearing plates by the hydraulic actuators of the skid positioning system. The skid is secured to the trailer deck in a travel lock position during cask loading and transport operations. The transfer cask skid is shown in Figure 1.3-4.

1.3.1.6 Hydraulic Ram System

The hydraulic ram consists of a double acting hydraulic cylinder with a capacity of 80,000 lb in either push or pull and stroke of 21'. The ram is supported during operation by a frame assembly attached to the bottom of the transfer cask and a tripod assembly resting on the concrete slab. The operational loads of the hydraulic ram are grounded through the transfer cask. The hydraulic ram system includes a grapple at the end of the piston which is used to engage a grapple ring on the DSC for retrieval operations. Figure 1.3-5 shows the hydraulic ram system.

1.3.1.7 Vacuum Drying System

The vacuum drying system removes water and air from the DSC and fills it with helium. The vacuum drying system has four operational modes: water removal, helium or air forced water removal, vacuum pumping, and helium backfilling.

1.3.1.8 Closure Welding System

The DSC closure welds on the shield plug and the top cover plate are normally placed by a fully remote, automatic welding system. The system includes modular components and is designed for rapid setup. Welding operations are remotely controlled by an operator who views the progress of the weld through closed circuit television. The welding head is designed to permit rapid replacement with either a UT probe, or a plasma gouging torch which can be used to remove the shield plug and top cover plate closure welds. Manual welding may also be used for closure welds. The allowed duration of manual welding is limited by the ambient dose rate at the location of the welding (Reference 1.6).

1.3.1.9 System Operation

See Chapter 5 for a detailed description of the Calvert Cliffs ISFSI System Operation.

TABLE 1.3-1
MAJOR SYSTEMS, SUBSYSTEMS, AND COMPONENTS OF THE CALVERT CLIFFS ISFSI

Dry Shielded Canister

NUHOMS-24P DSC Basket	NUHOMS-32P DSC Basket
Guide Sleeves (24)	Guide Sleeves (32)
Spacer Disks (9)	Egg-Crate
Support Rods (4)	Peripheral Steel Rails
DSC Shell With Bottom Shield Plug	DSC Shell With Bottom Shield Plug
Shield Plug (Top)	Shield Plug (Top)
Cover Plates (Top and Bottom)	Cover Plates (Top and Bottom)
Siphon and Vent Ports	Siphon and Vent Ports
Ram Grapple Ring	Ram Grapple Ring

Horizontal Storage Module
- Reinforced Concrete Walls, Roof, Basemat, and Foundation
- DSC Structural Steel Support Assembly
- DSC Seismic Retainer
- Cask Docking Flange and Tie-Down Restraints
- Heat Shield
- Shielded Front Access Door and Door Supports
- Ventilation Air Openings (One Inlet, Two Outlets)
- Shielded Ventilation Air Inlet Plenum
- Ventilation Air Outlet Shielding Blocks
- Lightning Protection System

Cask Lifting Yoke

Transfer Cask
- Cask Structural Shell Assembly
- Bolted Top Head Assembly
- Upper Lifting Trunnions
- Lower Tilting Trunnions
- Lead Gamma Shielding
- Solid Neutron Shielding
- Ram Access Penetration Cover Plate
- Ram Access Penetration Shield Plug Assembly
- Ram Mounting Frame

Transfer Trailer and Skid
- Heavy Industrial-Grade Trailer
- Cask Support Skid
- Skid Positioning and Alignment System

Hydraulic Ram System
- Hydraulic Cylinder
- Rear Tripod Support Frame
- Grapple Assembly

Vacuum Drying System

Automated Remote Closure Welding System

1.4 IDENTIFICATION OF AGENTS AND CONTRACTORS

The prime contractor for design, analysis, and component supply for the Calvert Cliffs ISFSI was Transnuclear West (formerly Nutech Engineers, Inc.), of Fremont, CA. The ISFSI is owned and operated by BGE. Construction of the ISFSI is the responsibility of an approved construction contractor. Licensing support, geotechnical engineering, and Quality Assurance Program revisions were performed by Duke Engineering & Services, Inc., utilizing Duke Power Company personnel experienced on the Oconee Nuclear Station ISFSI. Subsurface investigations at the ISFSI were performed by Law Engineering Testing Company.

1.5 MATERIAL INCORPORATED BY REFERENCE

The Topical Reports for the Nutech Horizontal Modular Storage Systems for Irradiated Nuclear Fuel, (NUH-002, Revision 1A, July 1989) Reference 1.2, and (NUH-001, Revision 1A, June 1986) Reference 1.3, are hereby incorporated into this document by reference and referred to by Section in Table 1.5-1.

TABLE 1.5-1
SECTION REFERENCE FOR NUHOMS TOPICAL REPORTS

TITLE	REPORT NO.	SUBMITTAL DATE	SAR SECTIONS IN WHICH REFERENCED
Topical Report for the Nutech Horizontal Modular Storage System for Irradiated Nuclear Fuel, NUHOMS-24P, Nutech Engineers, Inc.	NUH-002, Revision 1A, July 1989	July 14, 1989	1.1, 1.2, 1.3, 1.5, 1.6, 3.1, 3.2, 3.3, 4.1, 4.2, 4.7, 7.1, 7.2, 7.3, 7.4, 8.1, 8.2
Topical Report for the Nutech Horizontal Modular Storage System for Irradiated Fuel, NUHOMS-07P, Nutech Engineers, Inc.	NUH-001, Revision 1A, June 1986	June 27, 1986	7.1

1.6 REFERENCES

1.1 Deleted

1.2 Topical Report for the Nutech Horizontal Modular Storage System for Irradiated Nuclear Fuel, NUHOMS-24P, Nutech Engineers, Inc., NUH-002, Revision 1A, July 1989

1.3 Topical Report for the Nutech Horizontal Modular Storage System for Irradiated Fuel, NUHOMS-07P, Nutech Engineers, Inc., NUH-001, Revision 1A, June 1986

1.4 Letter from Mr. G. C. Creel (BGE) to Director, Office of Nuclear Material Safety and Safeguards (NRC), dated December 20, 1990, Response to NRC's Comments on the Safety Analysis Report (SAR) for BGE's License Application for Calvert Cliffs Independent Spent Fuel Storage Installation (ISFSI)

1.5 Deleted

1.6 CCNPP Calculation CA05924, Calvert Cliffs ISFSI/NUHOMS-24P Radiation Dose Rates for Cask Loading and Transfer

1.7 CCNPP Calculation CA06297, Transfer Thermal Analysis, 103°F Ambient

1.8 CCNPP Calculation CA06329, NUHOMS-32P – Transfer Cask Structural Analysis

1.9 CCNPP Drawing 84227SH0001, NUHOMS-32P DSC Parts List