COMMISSION BRIEFING

ON

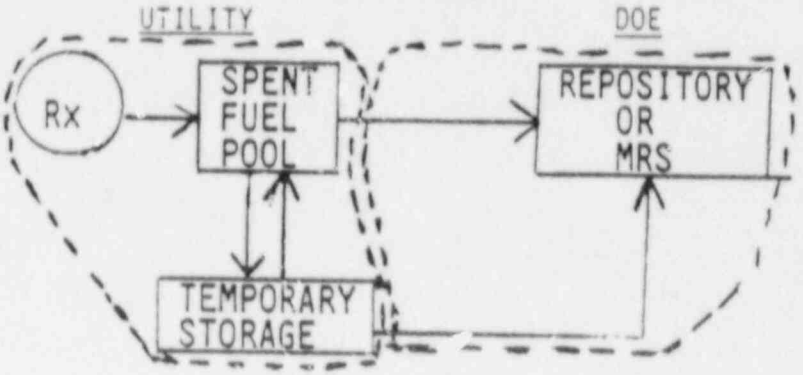
CASK DESIGNS FOR

SHIPPING AND STORING OF NUCLEAR MATERIALS

OCTOBER 19, 1988

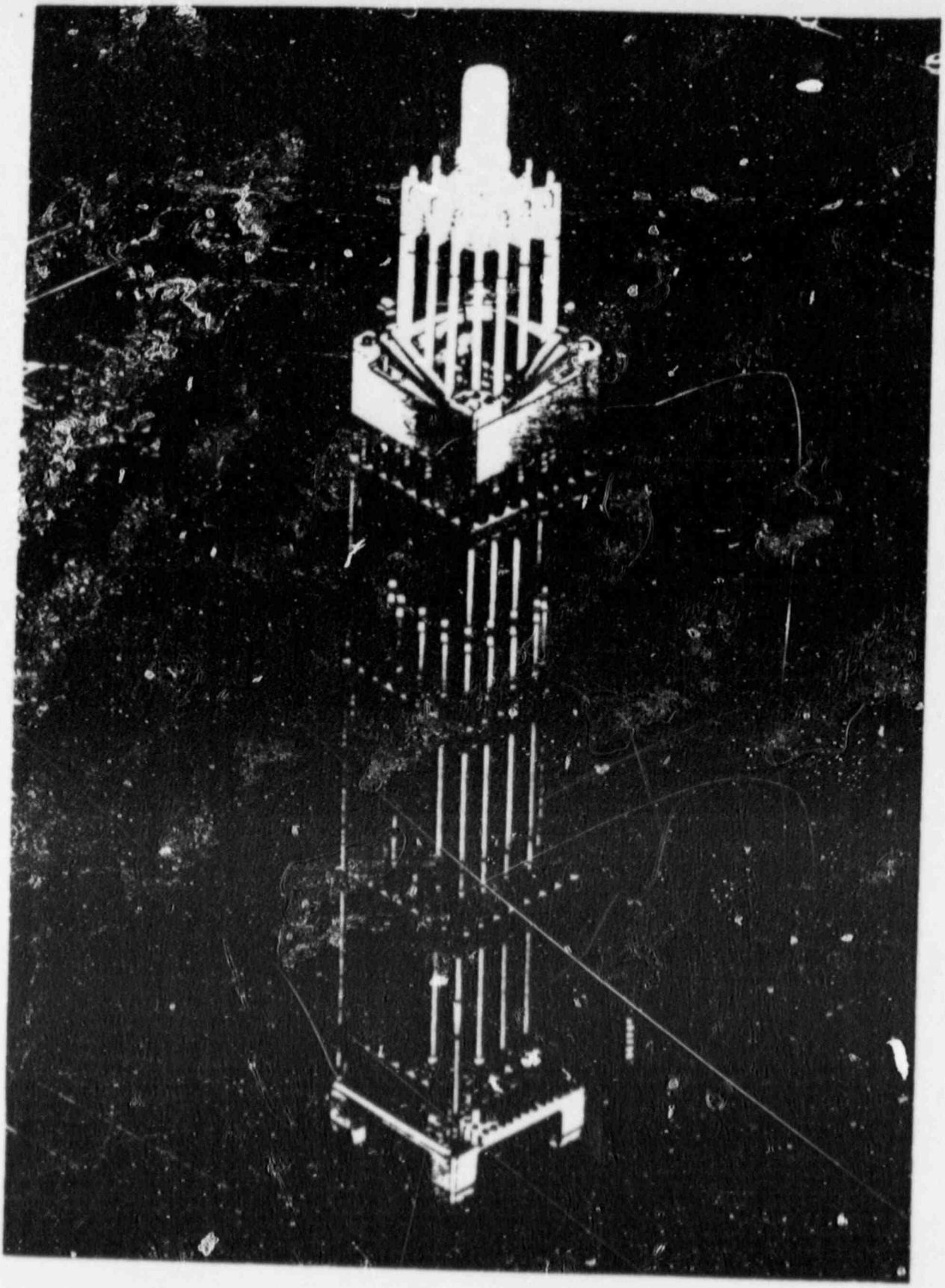
DFD2
1/1

THE SYSTEM


UTILITY
DOE
Rx
SPENT FUEL POOL
REPOSITORY OR MRS
TEMPORARY STORAGE

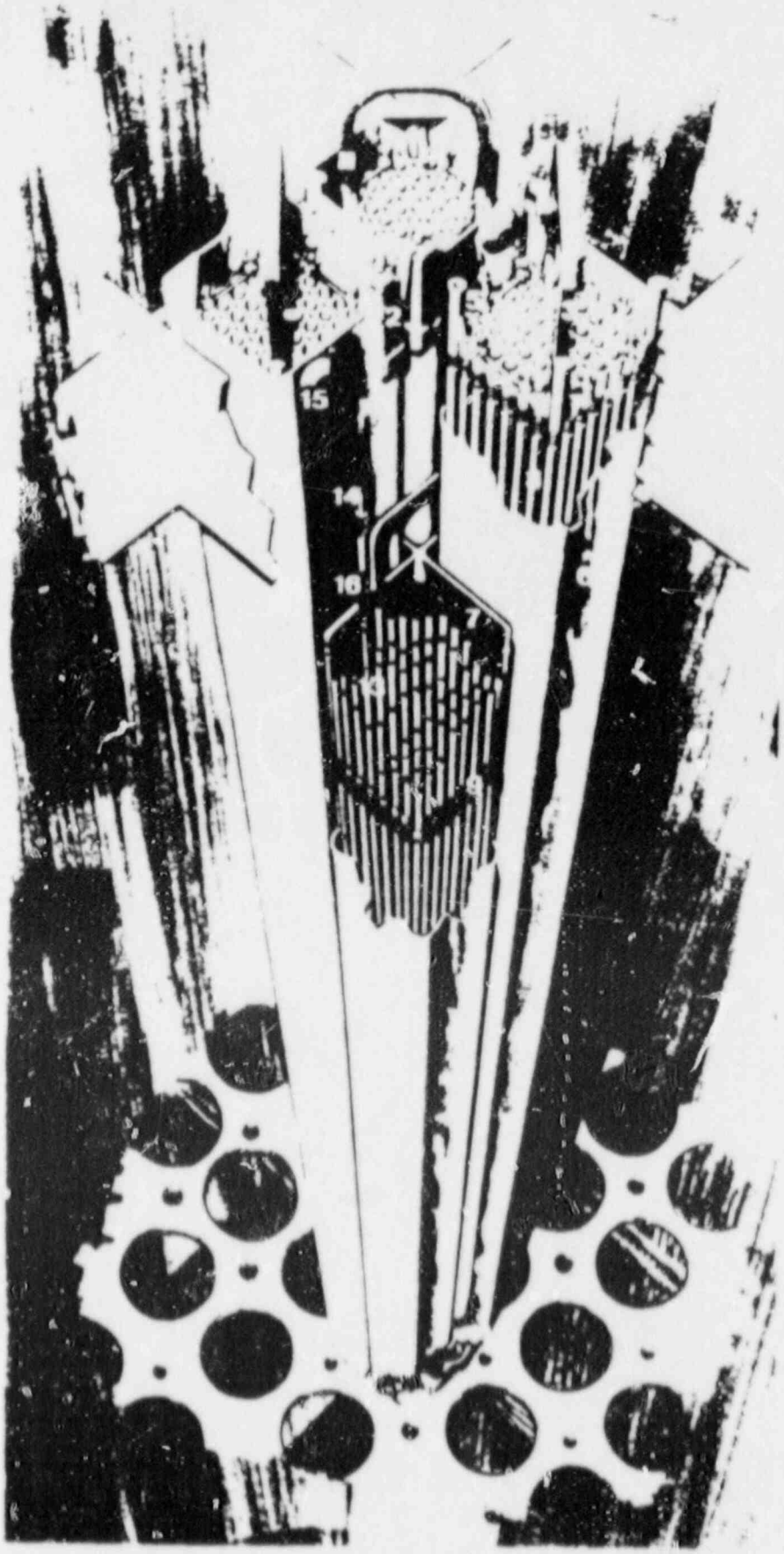
SPENT FUEL STORAGE REQUIREMENTS IN YEAR 2003

- TOTAL SPENT FUEL DISCHARGED: 54,000 MTHM
- MAXIMUM REACTOR POOL STORAGE CAPACITY (WITH RERACKING): 43,000 MTHM
- ADDITIONAL STORAGE CAPACITY REQUIRED: 11,000 MTHM
- SPENT FUEL DISCHARGE RATE: 2,300 MTHM/YR



EL ASSEMBLY

BWR 6 FUEL ASSEMBLIES & CONTROL ROD MODULE



GENERAL ELECTRIC

LWR FUEL ASSEMBLIES

PWR	TYPICAL DIMENSION (RANGE)
WIDTH	8.4 INCHES (7.6 - 8.5)
LENGTH	13.3 FEET (11.4 - 16.6)
WEIGHT	1,482 LBS (1,096 - 1,515) (0.464 MTHM)

BWR	
WIDTH	5.2 INCHES (4 - 6.5)
LENGTH	14.3 FEET (6.8 - 14.7)
WEIGHT	562 LBS (328-619) (0.174 MTHM)

EXISTING SPENT FUEL CASKS

MODEL	CAPACITY	WEIGHT-LBS.	No. BUILT
NL-1/2	1-PWR OR 2-BWR	50,000	5
TN-8L	3-PWR	80,000	2
TN-9	7-BWR	80,000	2
IF-300	7-PWR OR 18 BWR	140,000	4
NL-10/24	10-PWR	195,000	2

DOE OCRWM CASKS

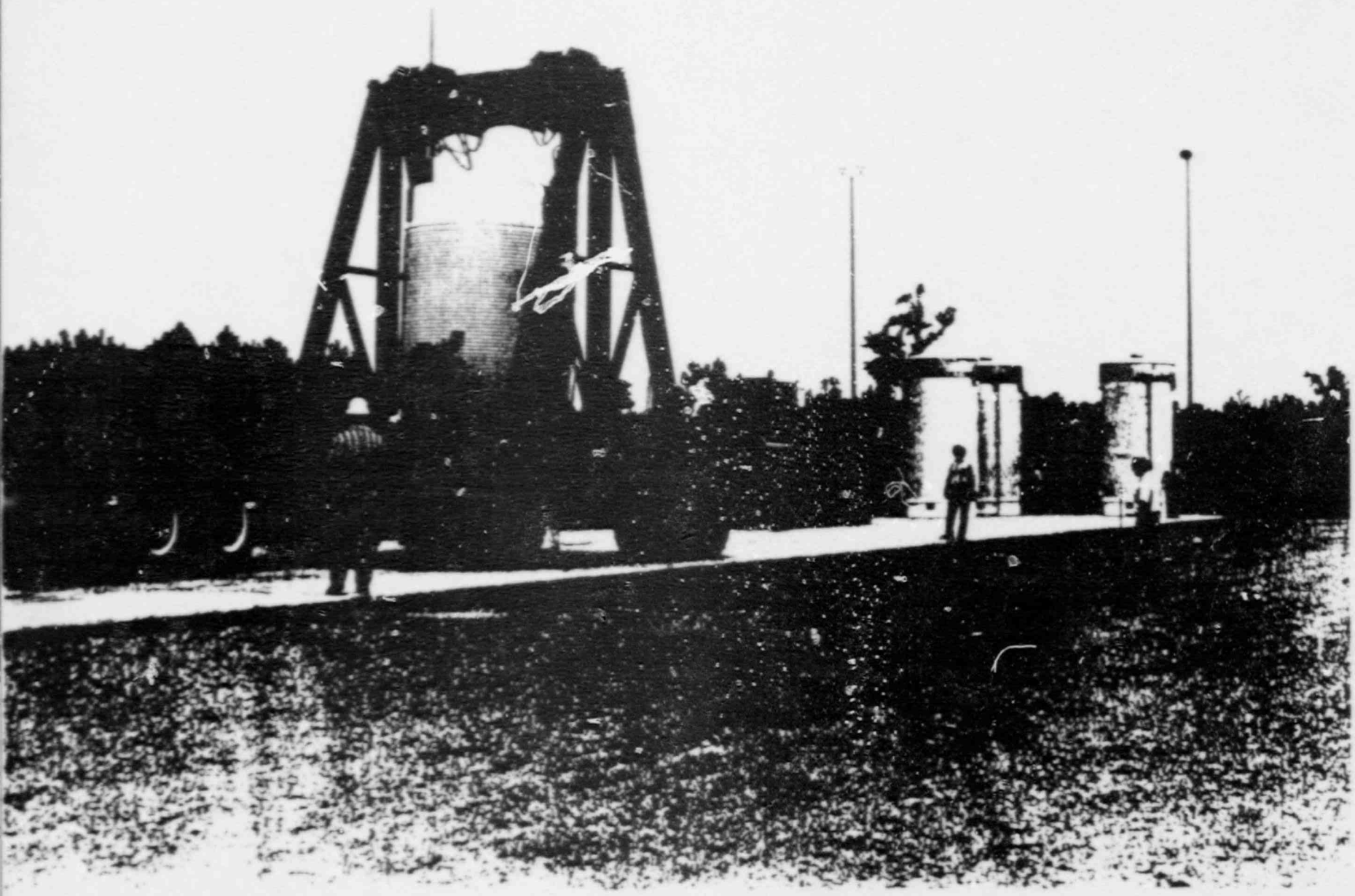
COMPANY	MODE	CAPACITY
GA TECH	TRUCK	4 PWR 9 BWR
WESTING.	TRUCK	4 PWR 9 PWR
NUC. ASSUR.	RAIL/BARGE	26 PWR 52 BWR
NUC. PKGG.	RAIL/BARGE	21 PWR 48 BWR
B&W	RAIL/BARGE	24 PWR 49 BWR

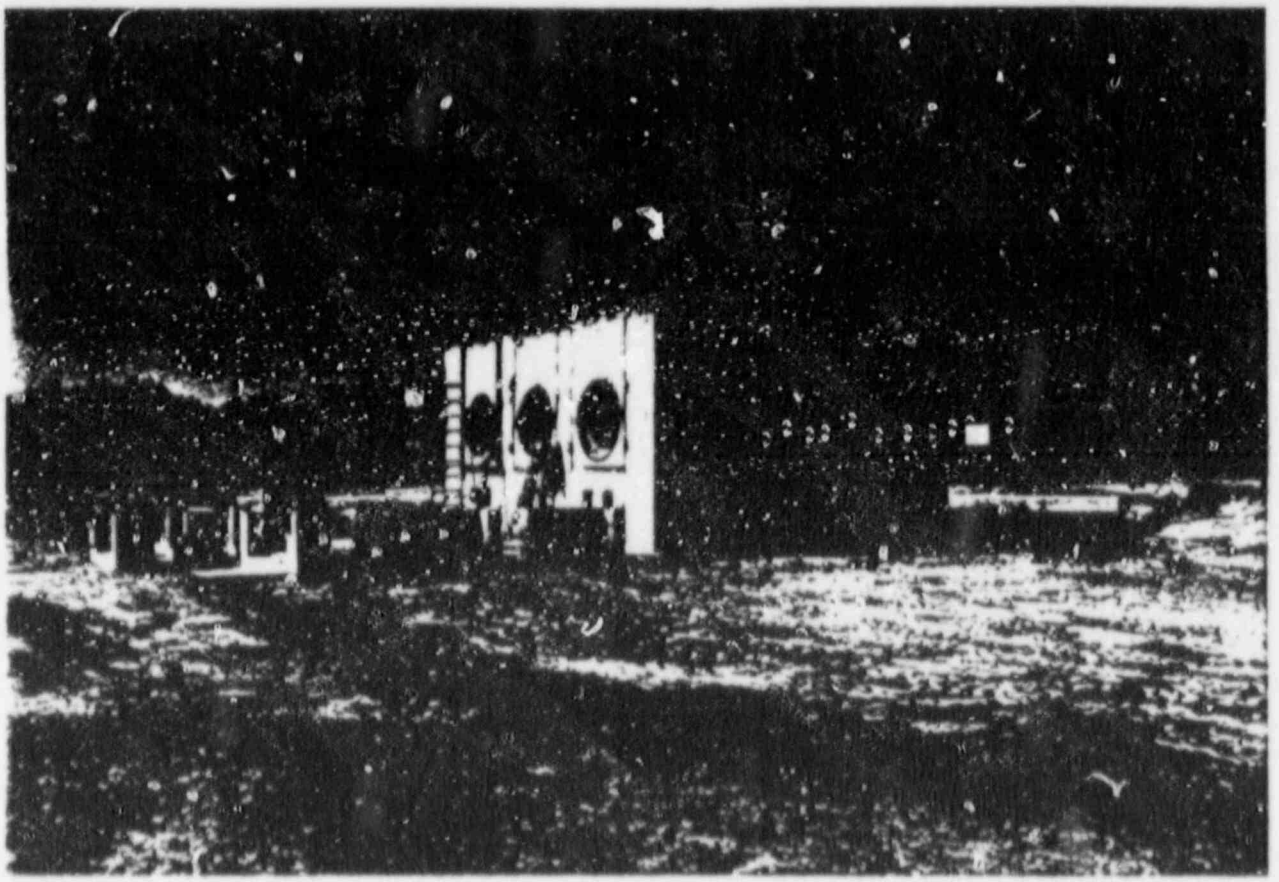
ALTERNATIVES FOR ADDITIONAL CAPACITY

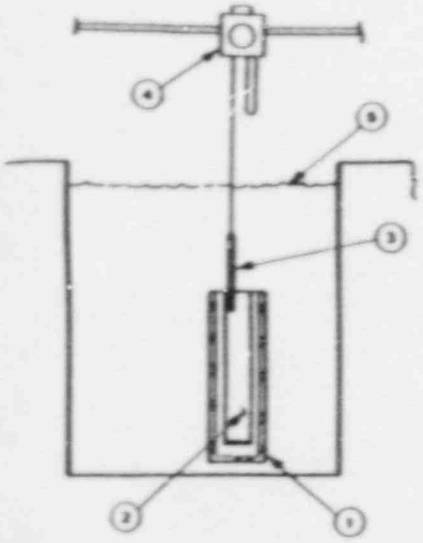
- Trans-Shipment (Intra-Utility)
- Fuel Rod Consolidation (Storage in Reactor Pool)
- Dry Storage

DRY STORAGE TOPICAL REPORTS APPROVED WITH SER

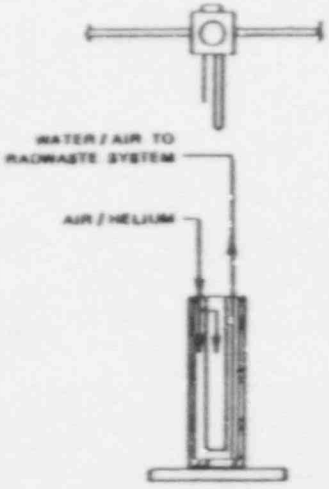
- GNSI CASTOR V/21 NODULAR CAST IRON CASK DESIGN; 21 PWR ASSEMBLIES
- WESTINGHOUSE MC-10 FERRITIC STEEL CASK DESIGN; 24 PWR ASSEMBLIES
- NAC, S/T STAINLESS STEEL CASK DESIGN; 26 PWR ASSEMBLIES
- NUTECH, NUHOMS STAINLESS STEEL CANISTER/CONCRETE MODULE DESIGN; 7 PWR ASSEMBLIES/CANISTER
- FOSTER-WHEELER MODULAR VAULT DRY STORAGE, CONCRETE STRUCTURE; 83 PWR OR 170 BWR/MODULE



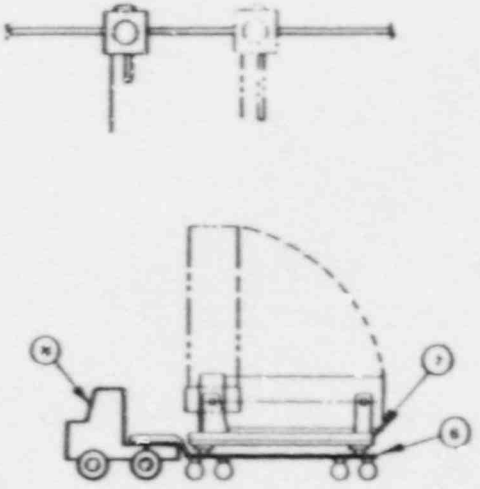




CASK LOADING

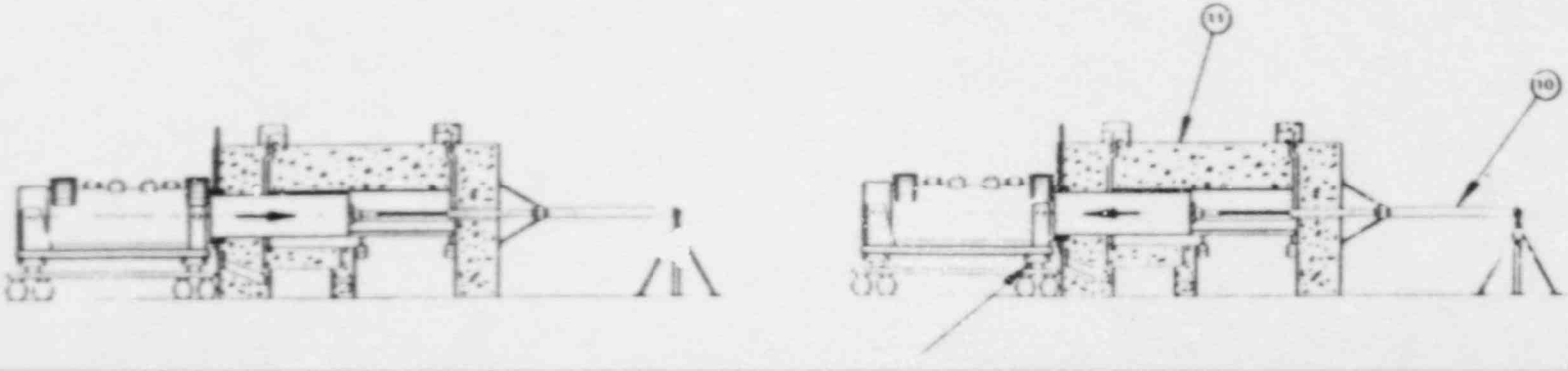


CASK / CANISTER DRYING AND SEALING



SKID LOADING

1. TRANSPORT CASK
2. DRY SHIELDED CANISTER
3. IRRADIATED FUEL ASSEMBLY
4. OVERHEAD CRANE
5. IRRADIATED FUEL STORAGE
6. TRANSFER TRAILER
7. SKID
8. TRUCK
9. HYDRAULIC POSITIONERS
10. HYDRAULIC RAM
11. HORIZONTAL STORAGE MODU
12. HORIZONTAL ROLLERS



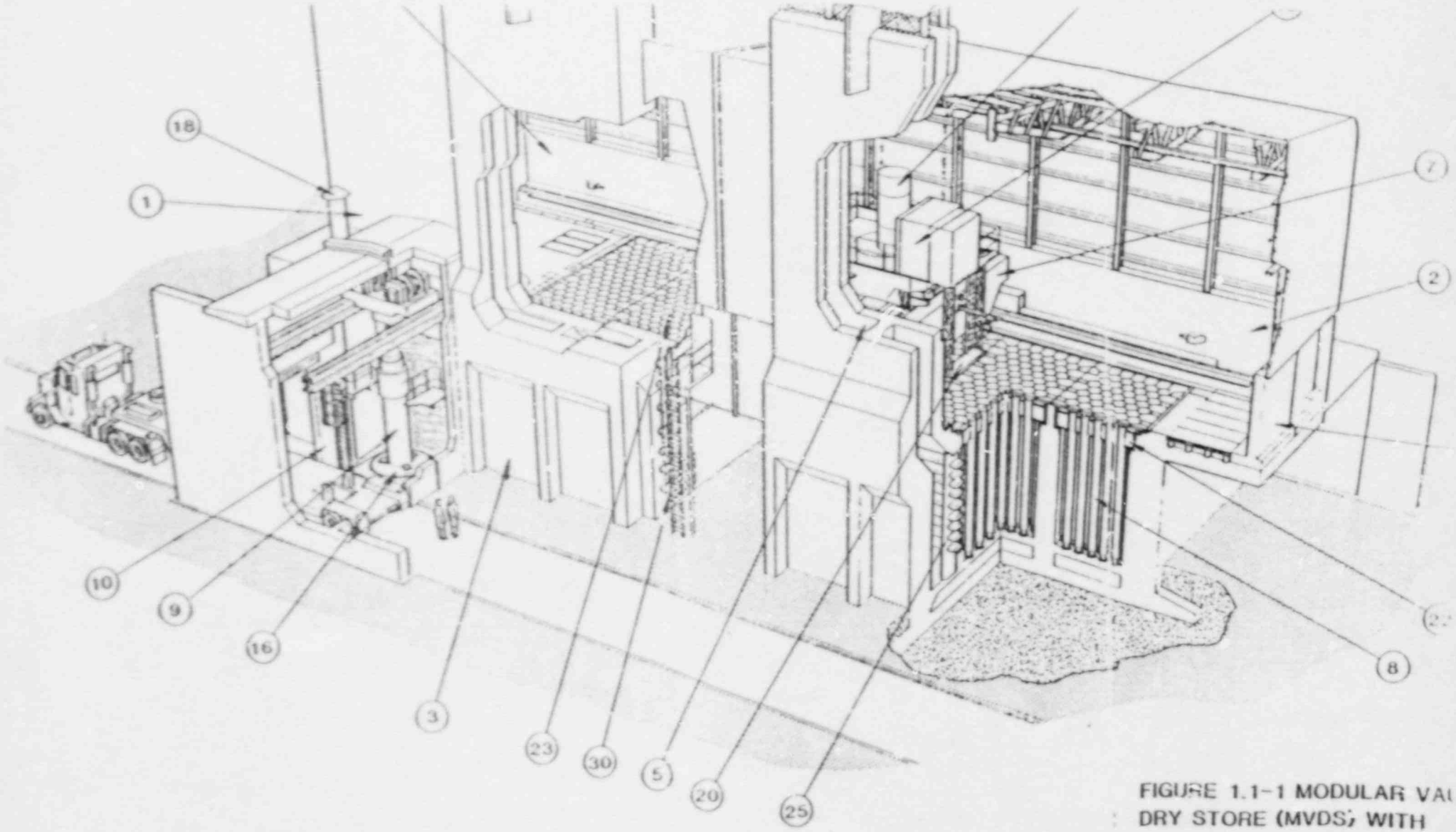


FIGURE 1.1-1 MODULAR VAU
DRY STORE (MVDS) WITH
EXTENSION BUILDING

DRY STORAGE TOPICAL REPORTS UNDER REVIEW

- Combustion Engineering, Dry CAP Ferritic Steel Cask Design; 24 PWR or 60 BWR Assemblies
- Transnuclear, TN-24 Ferritic Steel Cask Design; 24 PWR Assemblies
- NUPAC CP-9 Concrete Cask Design; 9 PWR Assemblies
- NUTECH NUHOMS - SS Canister/Concrete Module Design; 24 PWR Assemblies/Canister
- Other: NAC Consolidated Fuel Cask Design; 28 Canisters (Rods from 56 PWR Assemblies)

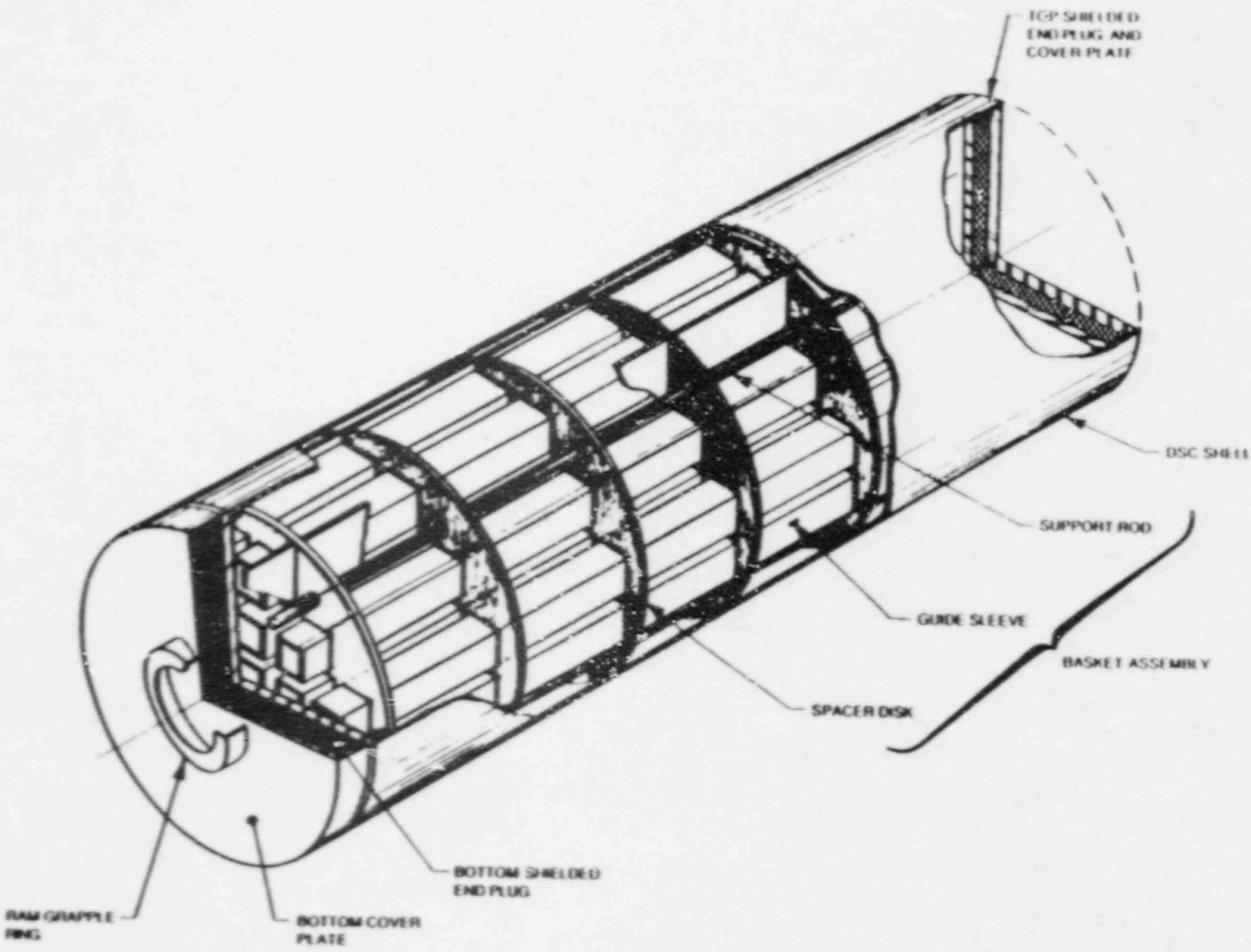


Figure 1.3-1

NUHOMS-24P DRY SHIELDED CANISTER ASSEMBLY COMPONENTS

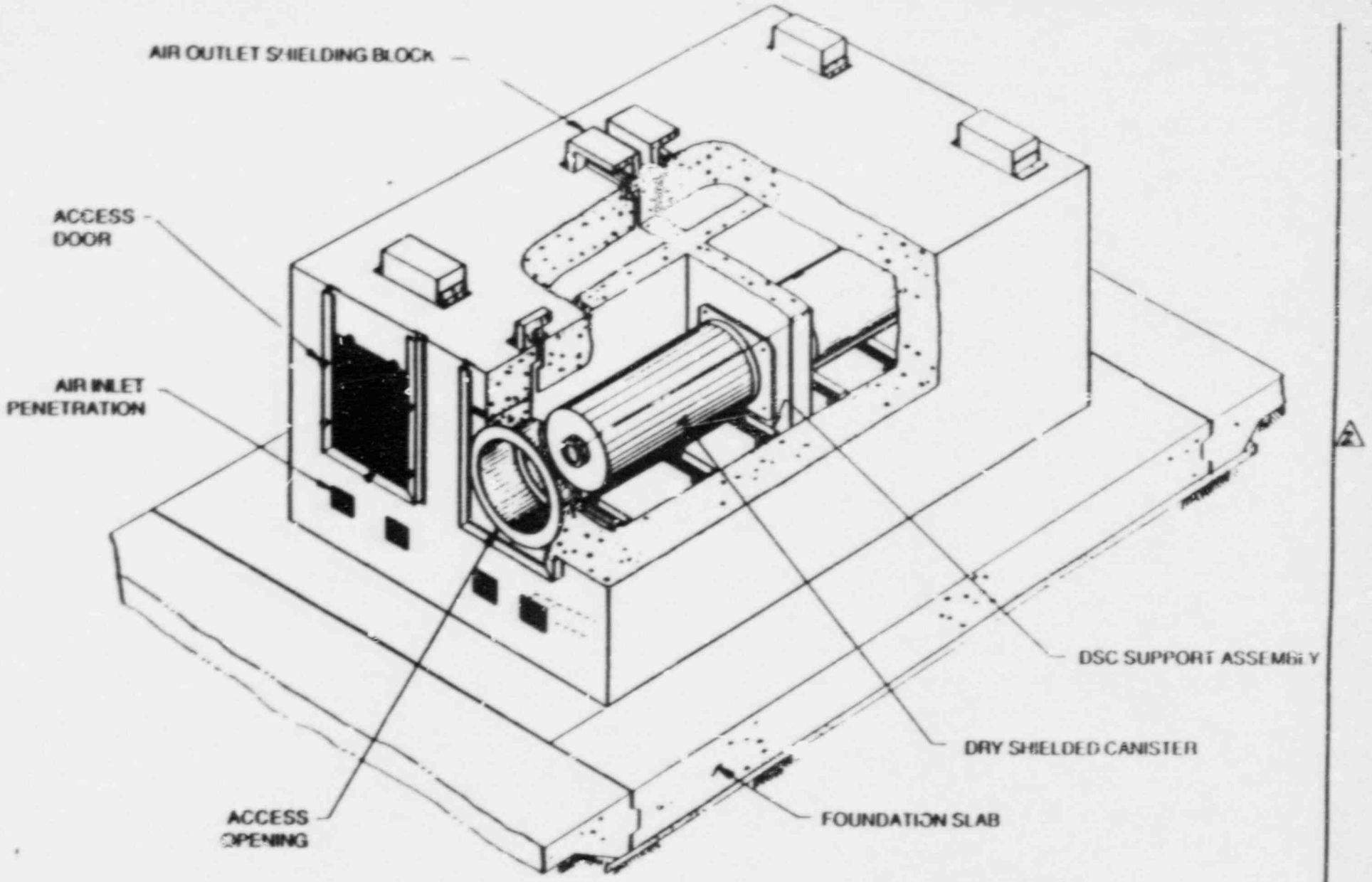


Figure 1.3-1a

NUHOMS-24P HORIZONTAL STORAGE MODULE COMPONENTS

LICENSE APPLICATIONS

SITE	RECEIPT
OCONEE (DPC)	4/88
CALVERT CLIFFS (BG&E)	1/89
ROBINSON 2 (CP&L)	EARLY 89
BRUNSWICK (CP&L)	EARLY 89
PALISADES (CP)	1989
SEQUOYAH (TVA)	1992

PERMANENT DISPOSAL CONSIDERATIONS

- Waste Form
  - Fuel Assemblies
  - Fuel Rods
  - Effective Use of Repository Space (70,000 MTHM at Yucca Mtn.)
- Thermal Loading
  - Control of Corrosion/Reaction
  - Waste Package
  - Geologic Materials
- Substantially Complete Containment
  - Fundamental Assurance of Safe Disposal
  - Package Materials
  - Package Design

CONSOLIDATION COMPARISON

- AT REACTOR
  - DONE IN OPEN POOL UNDER WATER
  - 2 INTO 1.1
  - UNSEALED FOR COOLING
  - CANISTER SHAPED LIKE FUEL ASSEMBLY TO FIT POOL RACK
- AT REPOSITORY/MRS
  - DONE IN HOT CELL
  - ABOUT 12 INTO 1.1 (LARGE)
  - SEALED FOR DISPOSAL PACKAGE
  - PACKAGE DESIGN AND MATERIALS OPTIMIZED FOR DISPOSAL CONTAINMENT

CANDIDATE MATERIALS FOR HLW DISPOSAL PACKAGE

- TYPE 304L STAINLESS STEEL
- TYPE 316L STAINLESS STEEL
- IRON-NICKEL ALLOY 825
- CDA 102 (OXYGEN-FREE, HIGH CONDUCTIVITY COPPER)
- CDA 613 (8% ALUMINUM BRONZE)
- CDA 715 (70 Cu-30Ni)

STAFF ANALYSIS OF TWO ALTERNATIVES

- BASED ON OCONEE APPLICATION
- 3 PLANTS/2112 PWR ASSEMBLIES
- 10 YEAR COOLED FUEL, STORED FOR 20 YEARS
- IF-300 SHIPPING CASK
- RISK BASED ON NUREG-0612 (GI A-36)
- NUHOMS-7 ASSUMED SHIPPABLE
- NUHOMS-24P ASSUMED UNSHIPPABLE

RESULTS	SHIPPABLE CANISTER	UNSHIPPABLE CANISTER
	NUHOMS-7	NUHOMS24P
DOSE	532 MAN-REM	204 MAN-REM
RISK (P 6.25 REM)	2×10^{-6}	3×10^{-6}
COST	$58M	$34M

CONCLUSIONS

- Most Spent Fuel Will Travel From Reactor Pools to Repository/MRS
- Fuel Variety and Site Variety Dictate Cask Variety
- Only Modest Safety/ALARA Benefits Available in Dry Storage Options
- Final Disposal Cask Will Probably Be Repository-Specific, Reliable Complete Containment at Stake
- NRC Should Review Variety of Cask Designs - As Compatible as Reasonably Achievable

RANGE OF FUTURE ACTIONS

RULEMAKING

- Part 71 - Transport Certification
- Part 72 - Separate Storage Licensing
  - Covers MRS Also
  - Revision For General License At Reactors In Process
- Part 60 - HLW Disposal

LICENSING

- Duke Power Company - Oconee
- CP&L - H. B. Robinson, Brunswick

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