

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

SUBJECT: MPC CONCEPTUAL DESIGN

PRESENTER: ALDEN M. SEGREST

**PRESENTER'S TITLE
AND ORGANIZATION: MANAGER, MPC IMPLEMENTATION
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**PRESENTER'S
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**DALLAS, TEXAS
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MPC Conceptual Design

- **MPC Design Concepts**
- **Fuel Acceptance Design Approach**
- **Fuel Characteristics - Minimum Requirements**
- **MPC Fuel Acceptance**
- **MPC Implementation**

MPC Design Concepts

Reference Concepts

Size	Capacity	Criticality Approach	Reactors Served
125 Ton MPC	21 PWR	w/Burnup Credit	88
	40 BWR	w/o Burnup Credit	
75 Ton MPC	12 PWR	w/o Burnup Credit	14
	24 BWR	w/o Burnup Credit	

Alternative Concepts

125 Ton MPC	17 PWR	w/o Burnup Credit	88
	24 PWR	w/Burnup Credit	

Fuel Acceptance Design Approach

- **Establish minimum requirements**
- **Use of cost effective design features to exceed minimum requirements**
- **Use lower capacity design where necessary**

Fuel Characteristics Minimum Requirements

Parameter	PWR	BWR
Length (inch)	180	180
Width (inch)	9x9	6x6
Weight (pounds)	1,720	730
Age (years)	10	10
Enrichment (wt. percent)	3.75	3.75
Burnup (MWd/MTU)	40,000	40,000
Decay heat (watts/assembly)	675	317

Fuel Characteristics Considerations

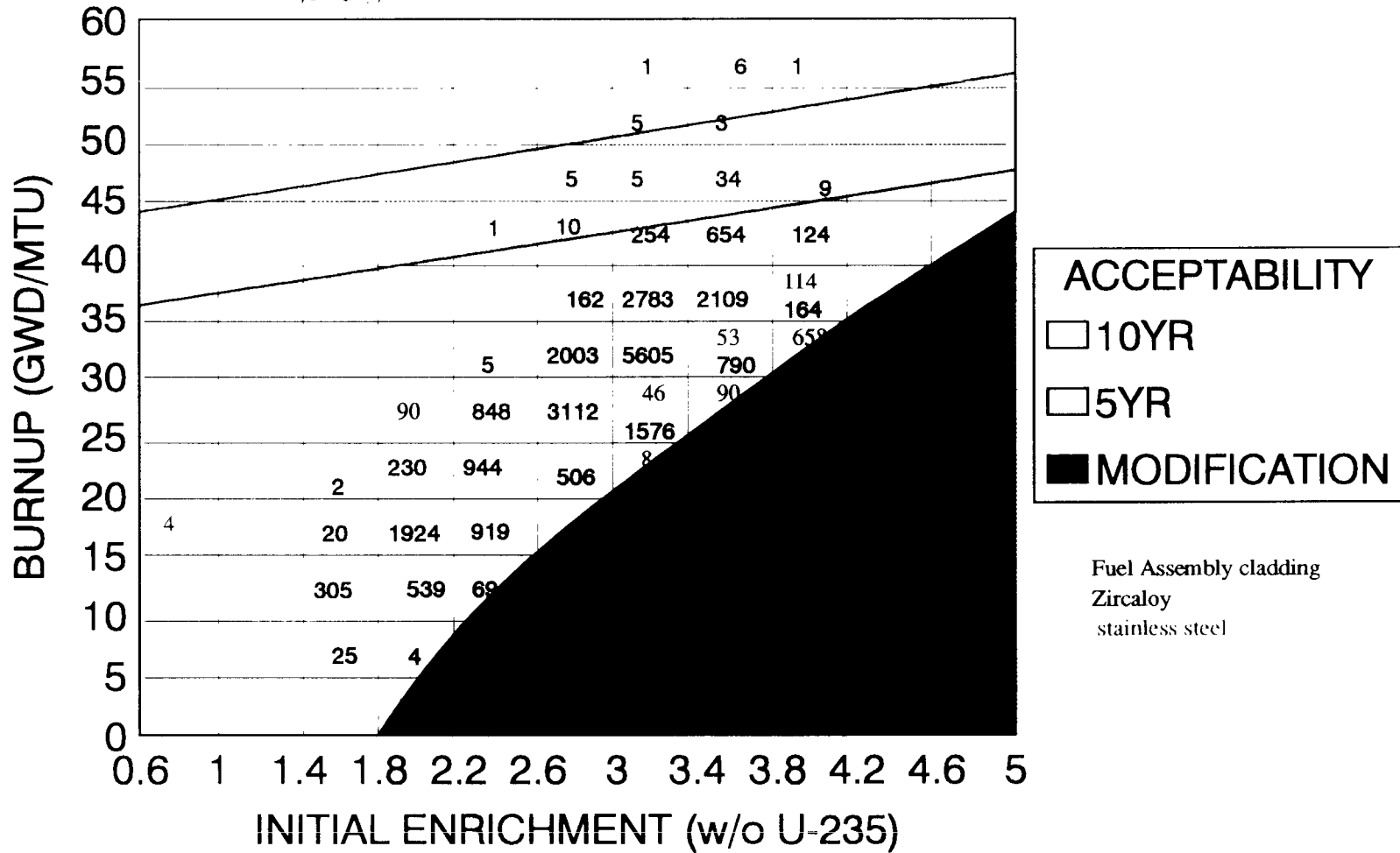
- **Accommodate multiple assembly types and a wide range of enrichments and burnup characteristics**
- **Minimize decay time restrictions with goal to maximize number of assemblies qualifying at 5-years out-of-reactor consistent with standard contract**

Exceeding Minimum Requirements

- **Extensive use of aluminum allows storage acceptance for most SNF at 5-year cooling**
- **Transportation cask radiological shielding can be easily tailored to accommodate most SNF at 5 to 10-year cooling**
- **MGDS should be capable of accommodating 10 to 20-year cooled SNF in large capacity MPCs (21 to 24 PWR assemblies)**

STORAGE ELEMENT

125 TON, 21 PWR MPC FUEL ACCEPTANCE CRITERIA



* Assumes thermal constraints are limiting.

Fuel Characteristics Accommodating Outliers

- **Thermal** - **Lower capacity MPCs and decay time**
- **Criticality** - **Lower capacity MPCs, derating, or development of alternative designs**
- **SS Cladding** - **Further study with canisterization a possibility**

MPC Implementation for Storage

- **Provide certified design of MPC**
- **Provide licensed design of storage unit**
- **Acceptance in 1998**