

P. Alforsati's

*Presentation to the NWTRB
Universal Container System
For Spent Fuel Storage, Transport, and Disposal*

Presentation to the NWTRB Universal Container System

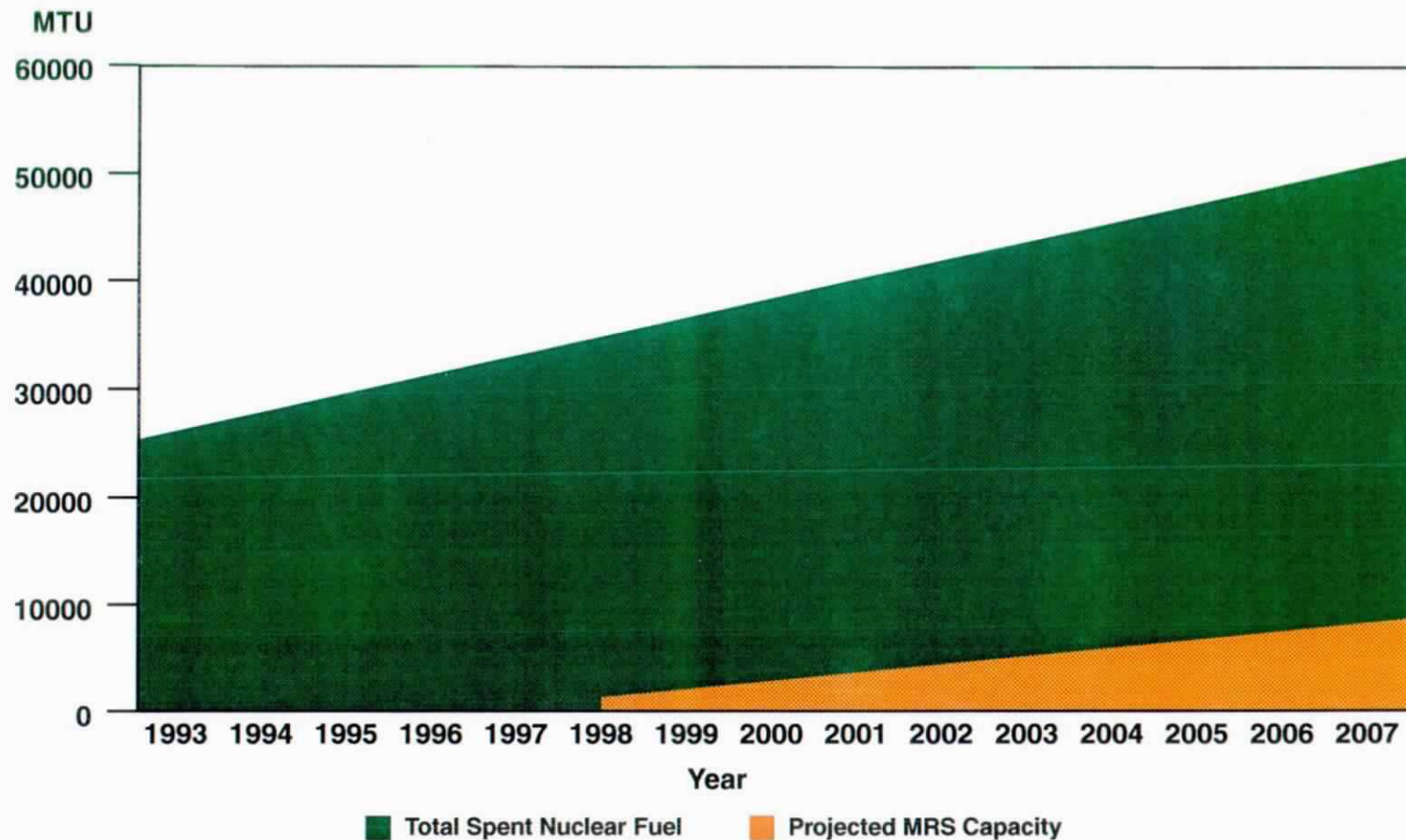
For Spent Fuel Storage, Transport, and Disposal

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M. L. Smith
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Background

- **Expanded Interim Storage Required At Utility Sites**
- **MRS Capacity Limited By Law to 10,000 MTU**
- **MRS Completion Date Uncertain**
- **Storage - Transportation - Disposal Technologies Need Integration and Simplification**

Comparison Of Total Spent Nuclear Fuel to Projected MRS Capacity



Result of Conventional DOE Plan ---

- **Utility At Reactor Storage Problems Not Resolved**
 - **Even If MRS Operates In 1998 And Repository Operates In 2010 More Utilities Will Probably “Pay Twice”**
- **Total Handling System From Reactor Spent Fuel Pool To Repository Is Complex And Costly**

EEI/UWASTE Universal Container Systems Task Force

- **Established To Study Integrated Storage, Transport, Disposal System**
- **Developed Concept Paper Recommending DOE Development Of UCS**
- **EEI/UWASTE Steering Committee Adopted Resolution Supporting Development of UCS**

EEI/UWASTE Resolution

DOE should proceed with design and development of a Universal Container System (UCS) as part of an integrated system of spent nuclear fuel storage, transport, and disposal. The MRS and repository designs should be reviewed to determine how the cost and complexity of these systems can be reduced with a UCS container, and the designs of these systems modified, as appropriate, based on the use of the UCS.

If this design, licensing, and development program is successful; these UCS containers should be integrated into the DOE waste program. DOE should offer to provide these containers to utilities beginning no later than January 31, 1998, at a rate greater than the spent fuel generation rate. Use of these UCS containers by utilities should be strictly optional and not required by DOE. Spent fuel acceptance by DOE under the contract will occur when the spent fuel is removed from the utility site and shipped to the MRS or repository whether the utility chooses to use the UCS containers or ship spent fuel to DOE in conventional transport casks.

DOE is strongly encouraged to develop the UCS containers by employing private industry and nuclear utilities in cooperative agreements for container design, licensing and demonstration.

DOE Decision On UCS

“It now appears that a multiple purpose and standardized container system for spent fuel receipt, storage, transport, and disposal can be developed to reduce costs, minimize required handling of spent fuel assemblies, and provide more efficient storage at both an interim site and nuclear plant sites.”

Requirements For Effective UCS ---

- **DOE Provide Containers (Or Rights To Containers) To Utilities Independent of MRS and Repository Schedules**
 - **By 1998 At Latest**
 - **On An Oldest Fuel First Priority Basis**
 - **At A Rate Above The Industry Spent Fuel Generation Rate**
- **At Reactor Use Of Containers Optional With Utilities**
- **Utilities Could Trade Rights To Receive Containers**
- **Spent Fuel Acceptance By DOE Would Occur Upon Shipment From Utility**

Recommended UCS Implementation Strategy

- **DOE Should Utilize Cooperative Agreements With Utilities And Vendors**
 - **A Proven Successful Approach**
 - **Provide Utility Input For Compatibility**
 - **Include Successful NRC Licensing For Storage And Transport**

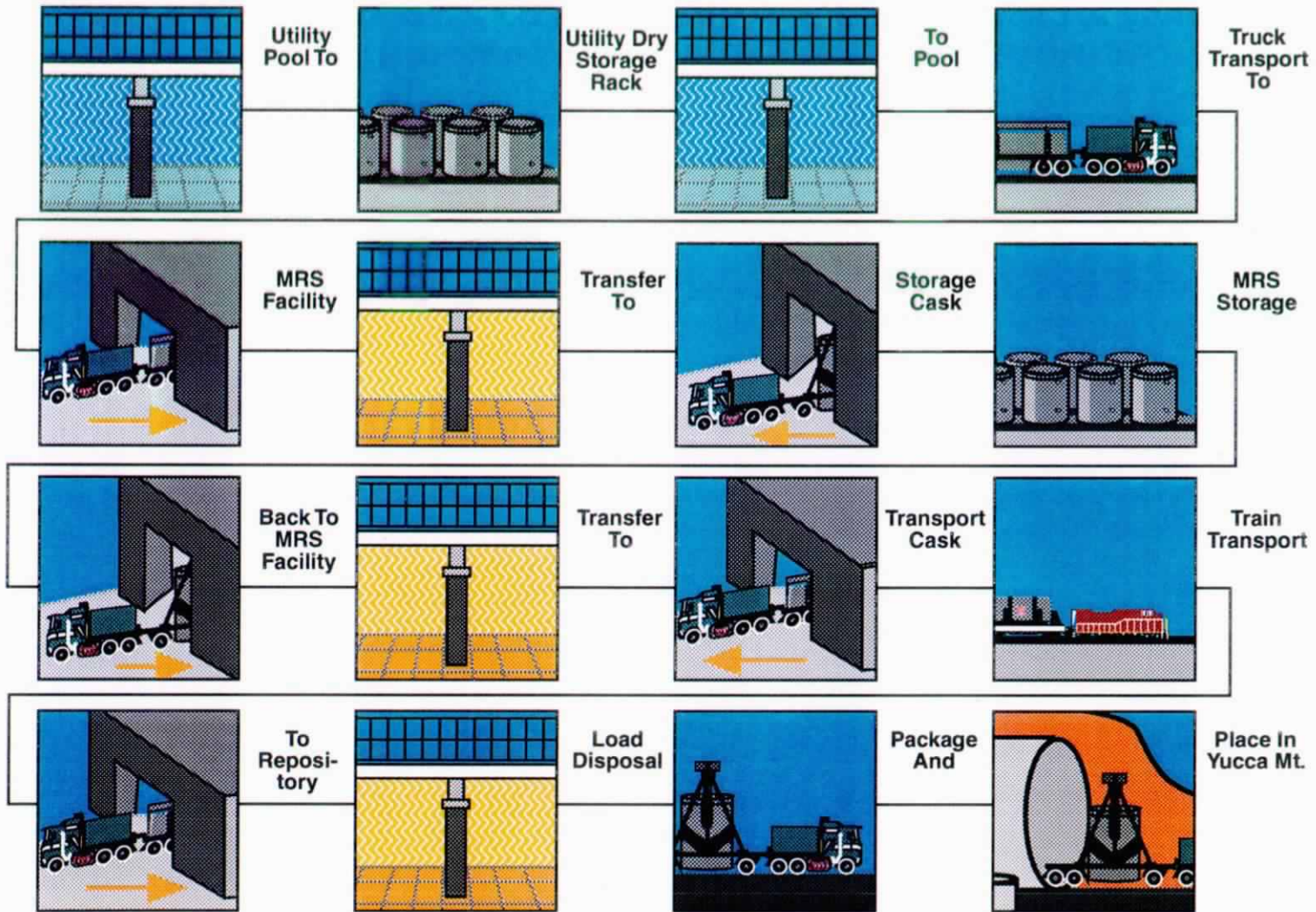
- **DOE Should Proceed With Container Licensing As Part Of Repository Licensing**
 - **Focus Repository Design On Drift Emplacement**
 - **Use Prototype Containers For Early Heater Tests In Repository To Demonstrate Thermal Performance**

Conventional DOE Plan

- **Specialized Containers Required For**
 - **Utility Site Storage**
 - **Transportation To MRS and Repository**
 - **MRS Site Storage**
 - **Disposal At The Repository**

- **Handling of Each Assembly Required Several Times**
 - **Each Spent Fuel Assemble Must Be Loaded And Unloaded From These Specialized Containers**
 - **All Spent Fuel Must Be Handled In Special Underwater Or Hot Cell Facilities**

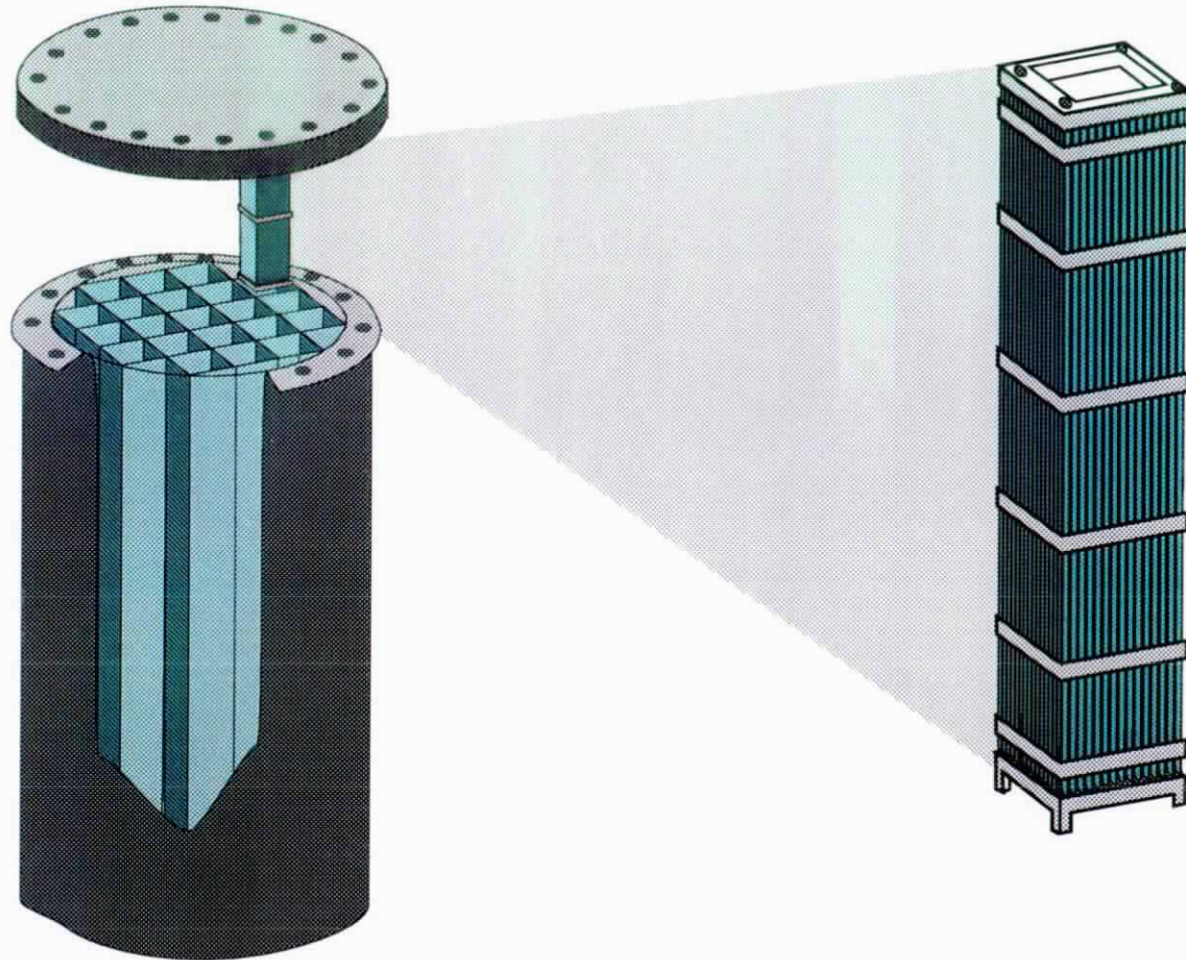
Conventional DOE Plan



UCS System Proposal

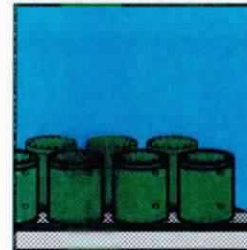
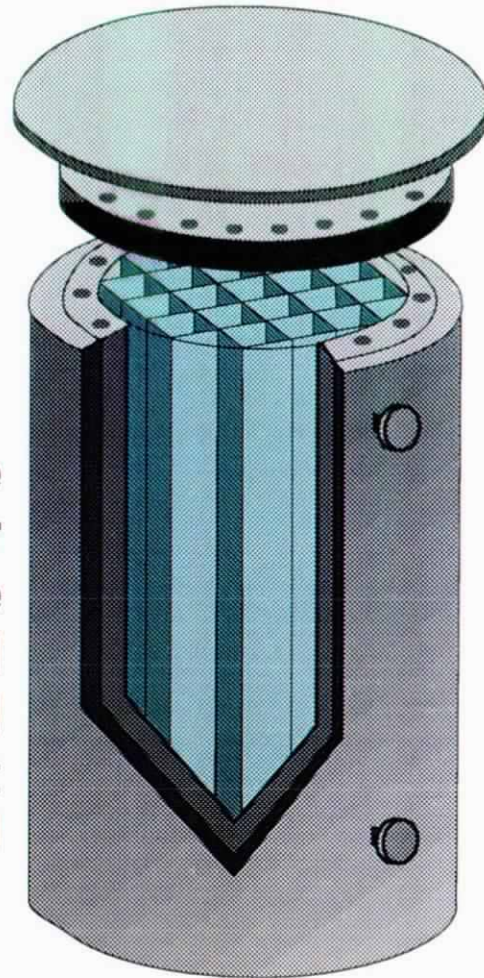
- **An Integrated Systems Approach For Spent Nuclear Fuel Storage, Transport, and Disposal**
- **Load Spent Fuel Into A Universal Container System At The Reactor Or MRS And Leave The Spent Fuel In That Container**
- **Use Overpacks For Storage, Transport, And Disposal**

Universal Container And Fuel Assembly

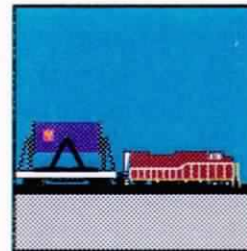


Universal Container Overpacks Are Used For

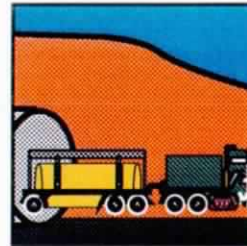
**Concrete
Overpack For
Storage
Replaced
With Metal
For Transport
And Disposal**



Storage

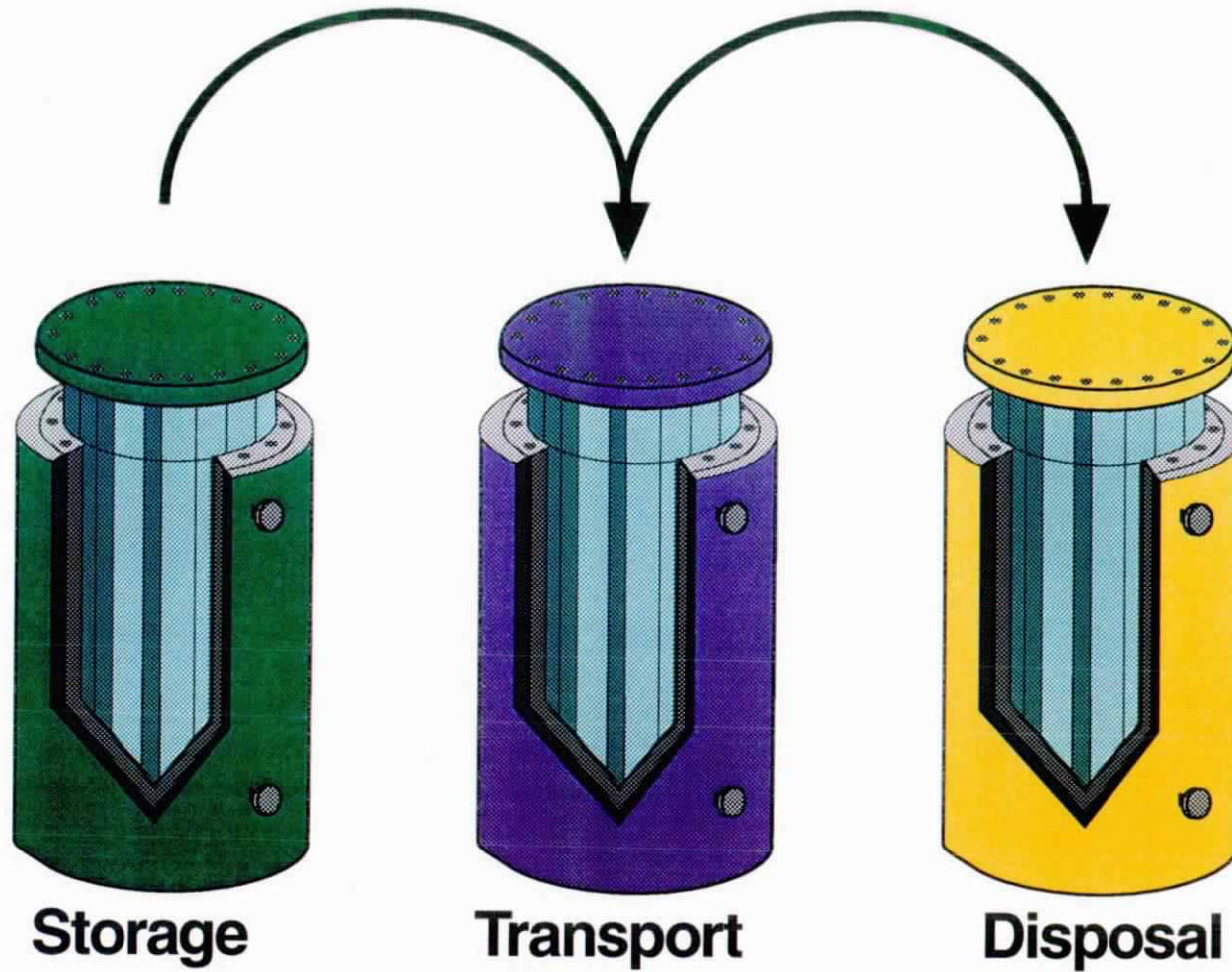


Transport



Disposal

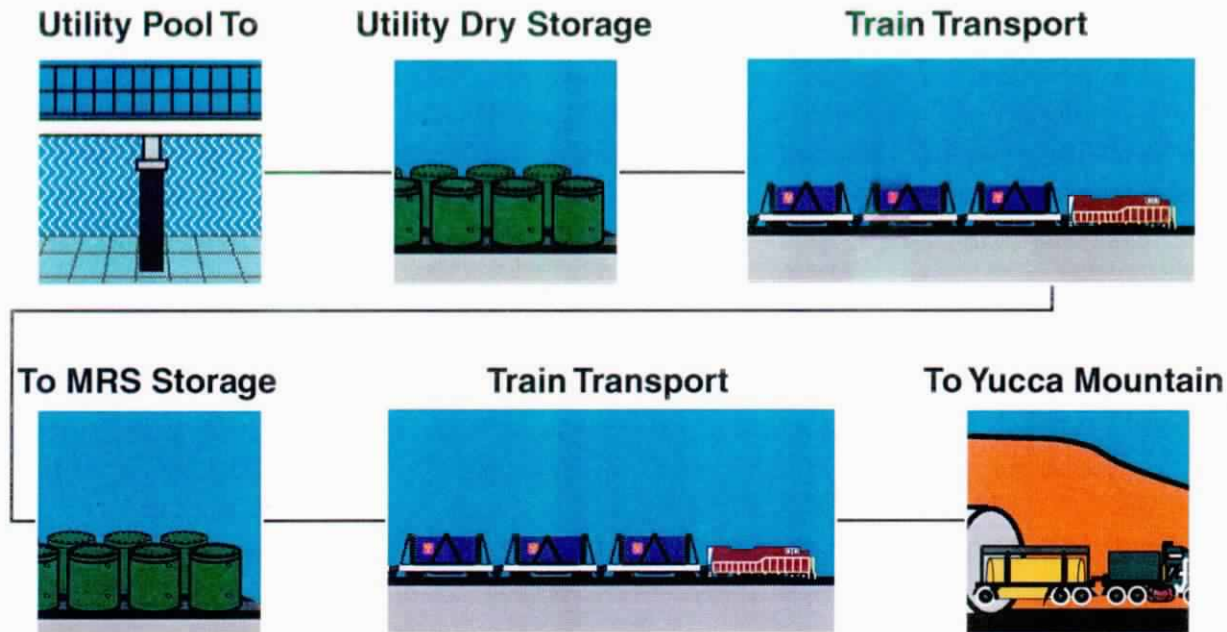
Universal Container Overpacks



Universal Container System

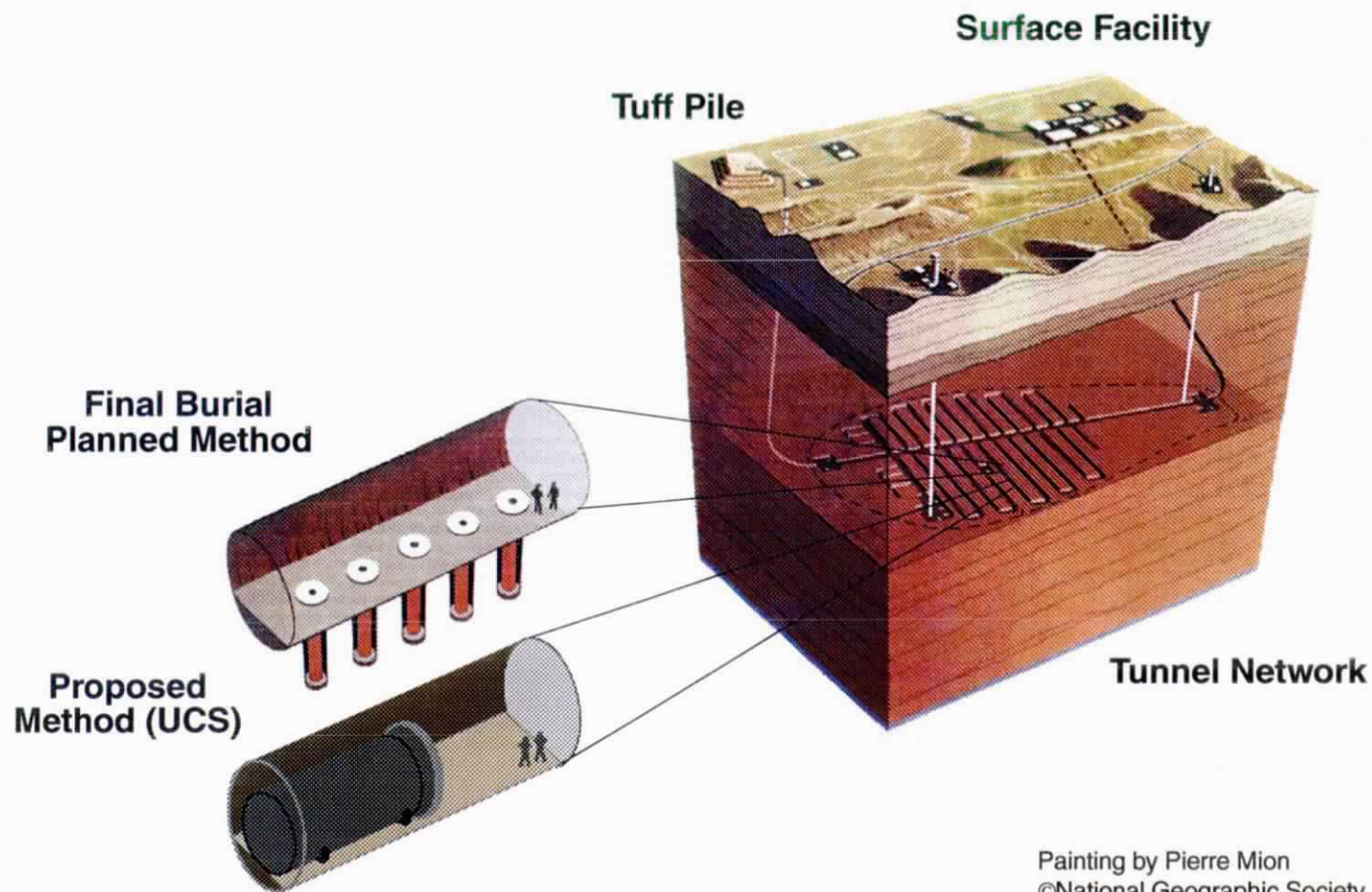
- **Simplified System Reduces Spent Fuel Handling And Transportation Impacts**
- **Uses Same Containers At Utility, MRS, And Repository Sites**
- **Provides Robust, Long Lived Waste Package**
- **Can Solve Utility Site Storage Problems - Eliminates Problem Of Paying Twice For Utility Site Storage And For The DOE Waste Disposal Program**

Proposed Universal Container System



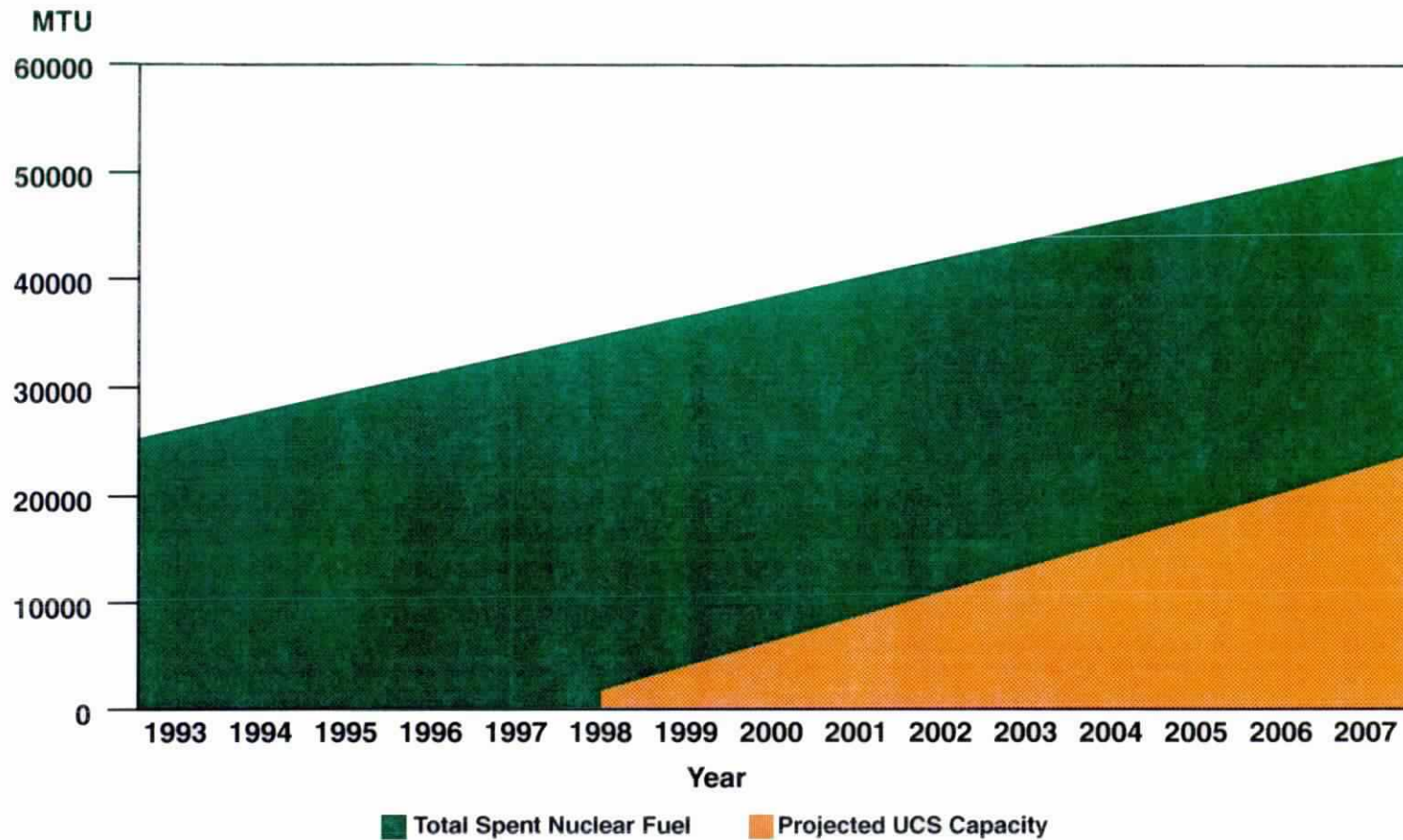
1. Load UCS At Utility Or MRS
2. All Further Handling Steps Are Of Sealed Containers Being Inserted Into Overpacks
3. Minimize Handling And Use Of Elaborate Hot Cell Facilities Required To Handle Individual Fuel Assemblies

Yucca Mountain Repository Showing Current Design and Proposed UCS System



Painting by Pierre Mion
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Comparison Of Total Spent Nuclear Fuel To Projected UCS Capacity



Public Perception And Safety

- **Simple, Safe, Passive System**
- **Limits Handling Of Spent Fuel**
 - **Responds To Concerns Of Communities Considering Hosting A Monitored Retrievable Storage System**
- **Limits Spent Fuel Transport Impacts**
 - **One Train Shipment Of Ten UCS Containers Can Replace 70 Truck Shipments**
- **Provides Superior Waste Disposal Package**
 - **UCS Can Be Designed For 10,000 Year Life To Balance Reliance On Geology And Engineered Barriers As Suggested By The Nuclear Waste Technical Review Board**

UCS Logistics

- **Deliver UC To Utilities On Oldest Fuel First Basis**
- **Allow Early Delivery With Utility Paying Financing Cost From Delivery Date To Allocation Date**
- **Utility Provides Storage Overpack (If Needed) For Utility Site Storage**
- **DOE Provides Transportation Overpack**
- **DOE Provides MRS Storage And Repository Disposal Overpacks**

UCS Benefits

- **Cleaner Operations At MRS And Repository**
- **System-Wide Cost Savings Potential**
- **Minimizes Diversity Among Dry Storage Systems**
- **Transportation Process Is Simplified**
- **Numerous Repository Advantages (EPRI Report)**
- **Reduced Handling Of Spent Fuel - All Facilities**
- **Eventual Post-Shutdown Operating Cost Savings**
- **Near-Term Progress In Waste Program**
- **SOONER AND FASTER FUEL ACCEPTANCE!**

Options For UCS Incompatibilities _____

- **Small-to-Large Cask Transfer**
- **Heavy Haul UCS To Rail Access**
- **Include Smaller Containers In UCS “Family”**
- **Let MRS Be First UCS Contact**
- **Facility Component Upgrades**

Issues To Be Addressed

- **Container Design Requirements**
- **Overpack Design Requirements**
- **Timing Of Implementation**
- **Impact On Program Activities Underway**
- **What Is True Cost Savings**
- **Pool Fuel Deliveries**
- **Reimbursement/Equity**
- **NRC And IAEA Requirements**

UCS Technical Issues

- **Repository**
 - **UCS Impact On Repository Emplacement Requirements**
 - **UCS Impact On Repository Thermal Performance**
- **Transportation**
 - **Container Interface**
 - **Storage System Interface**
- **Storage**
 - **Container Design Criteria**
 - **Storage Overpack Design Criteria**

Recommendations

- **Continue DOE/Utility Dialogue**
- **Form Joint Committee To Consolidate Efforts**
- **Further Quantify Merits Of UCS**
 - **Cost**
 - **Handling**
 - **Progress**
- **Establish Design Criteria**

