Presentation to the

Nuclear Waste Technical Review Board
Panel on the Engineered Barrier System

Waste Acceptance Requirements/
DOE Interface

Steven E. Gomberg, Systems Engineering Division
Office of Civilian Radioactive Waste Management
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Purpose

- To provide a brief overview of the Civilian Radioactive Waste Management System
- To identify key regulatory requirements affecting waste forms
- To describe OCRWM Waste Acceptance System Requirements
- To provide an overview of the interface between the Office of Civilian Radioactive Waste Management (RW) and Environmental Management (EM)

OCRWM Program Overview

Yucca Mountain Site Characterization

- Technical Site Suitability determination in 1998
- Initial License Application submittal in 2001
- Begin repository operations in 2010

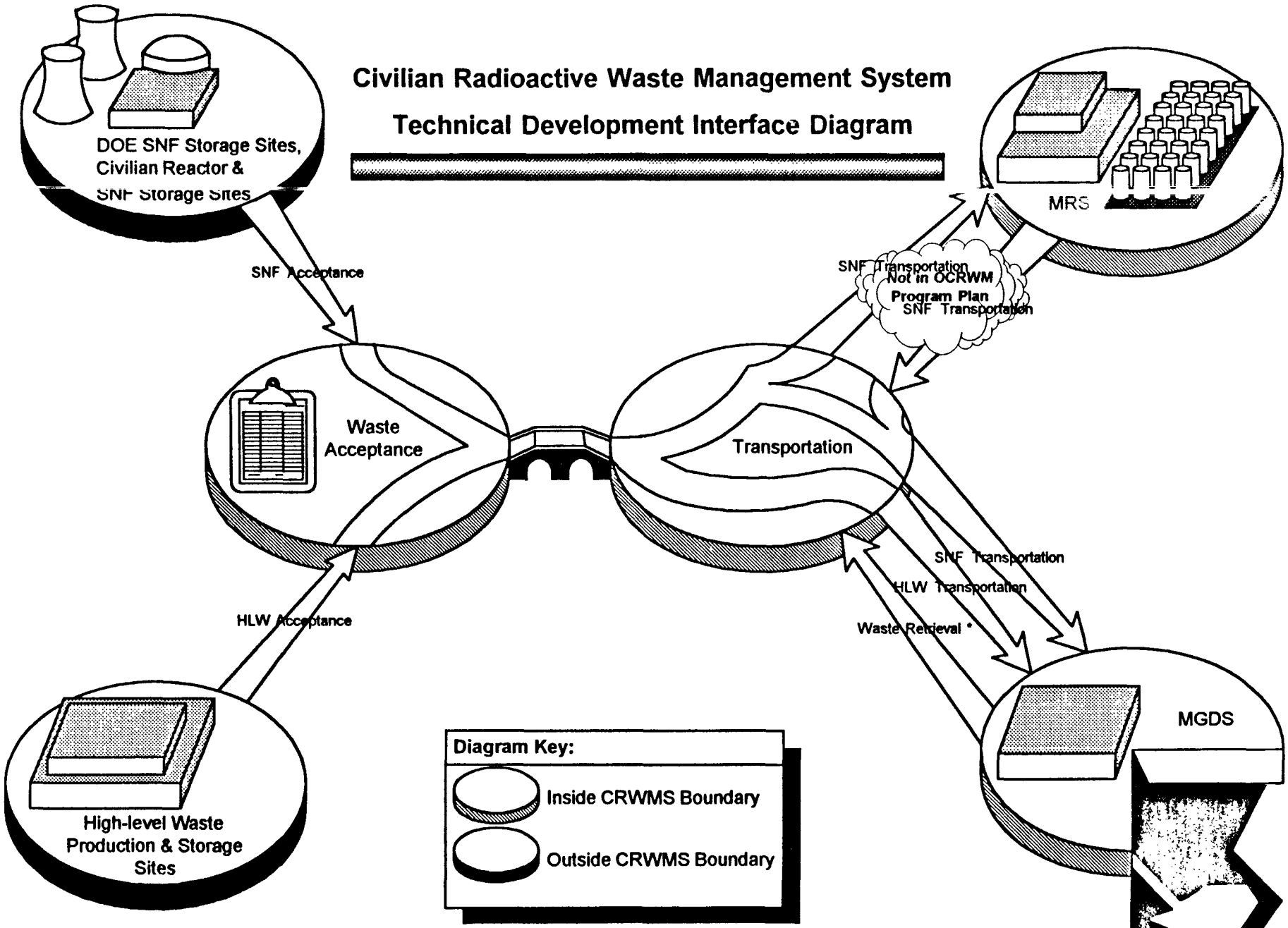
Waste Acceptance Storage and Transportation

- Deployment of MultiPurpose Canisters to utilities in 1998
- No Monitored Retrievable Storage facility in planning basis

Second Repository Investigations

- No activities being conducted on second repository
- DOE required to report to Congress on need after 2007

Civilian Radioactive Waste Management System
Technical Development Interface Diagram



Statutory and Regulatory Authority

- Nuclear Waste Policy Act, as amended
  - Statute defines for development of geologic repositories
    - May include other wastes as determined by the Nuclear Regulatory Commission that require permanent isolation
  - Allows DOE to characterize only Yucca Mountain for suitability
    - Limits waste to be placed in first repository to 70,000 MTHM
    - Requires evaluation on need for second repository by 2007
- Disposal of HLW in Geologic Repositories (10 CFR 60)
  - Defines licensing requirements, site criteria, QA requirements
  - Prescribes waste package performance and design criteria
  - Establishes Engineered Barrier System performance objective
  - Provides repository design requirements
- Environmental Radiation Protection Standard* (40 CFR 191)
  - Establishes allowable releases to accessible environment

* Standard remanded in 1987

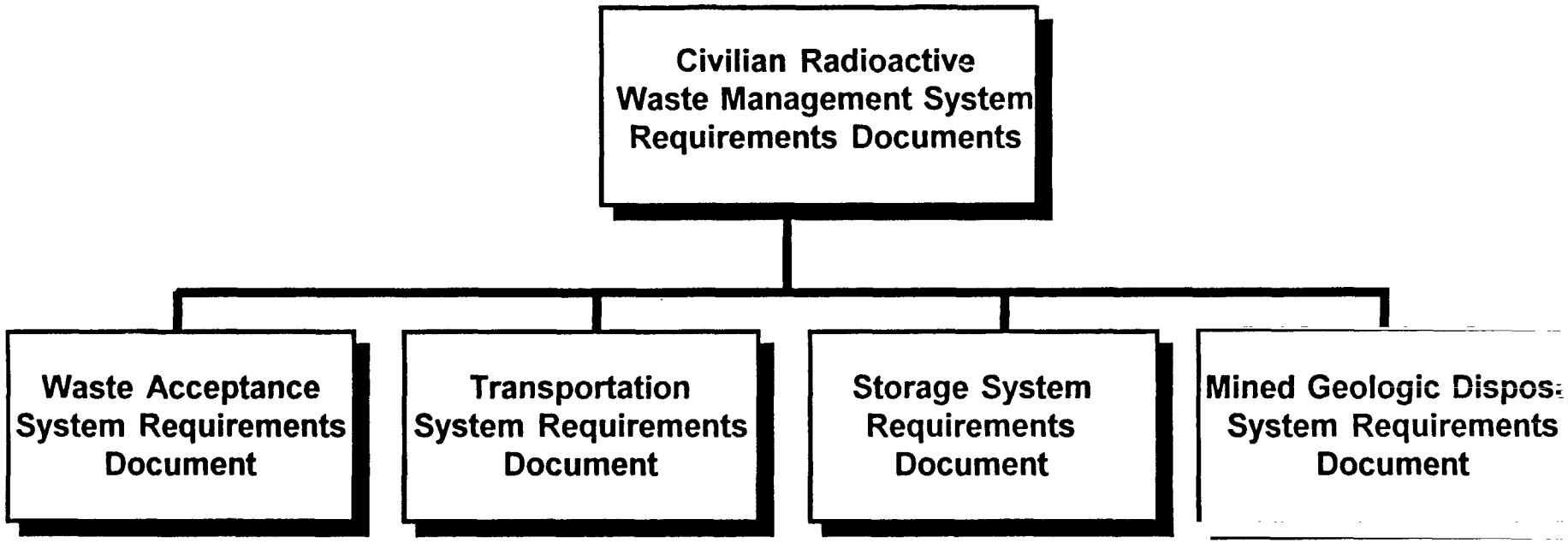
Key Waste Form Considerations

- **Waste Form Requirements**
  - Waste form must meet criteria defined in 10 CFR 60.135
    - Solidification/Consolidation/Noncombustible
  - Waste form must remain subcritical for long timeframes
  - Plan to exclude RCRA mixed wastes from first repository
- **Waste Package Design**
  - Specific package design criteria must be met
    - No explosive/pyrophoric/chemically reactive materials
    - No free liquids
    - Handling
    - Unique Identification
  - Waste interactions must be evaluated
    - Solubility/redox/hydriding/radiolysis/corrosion/...

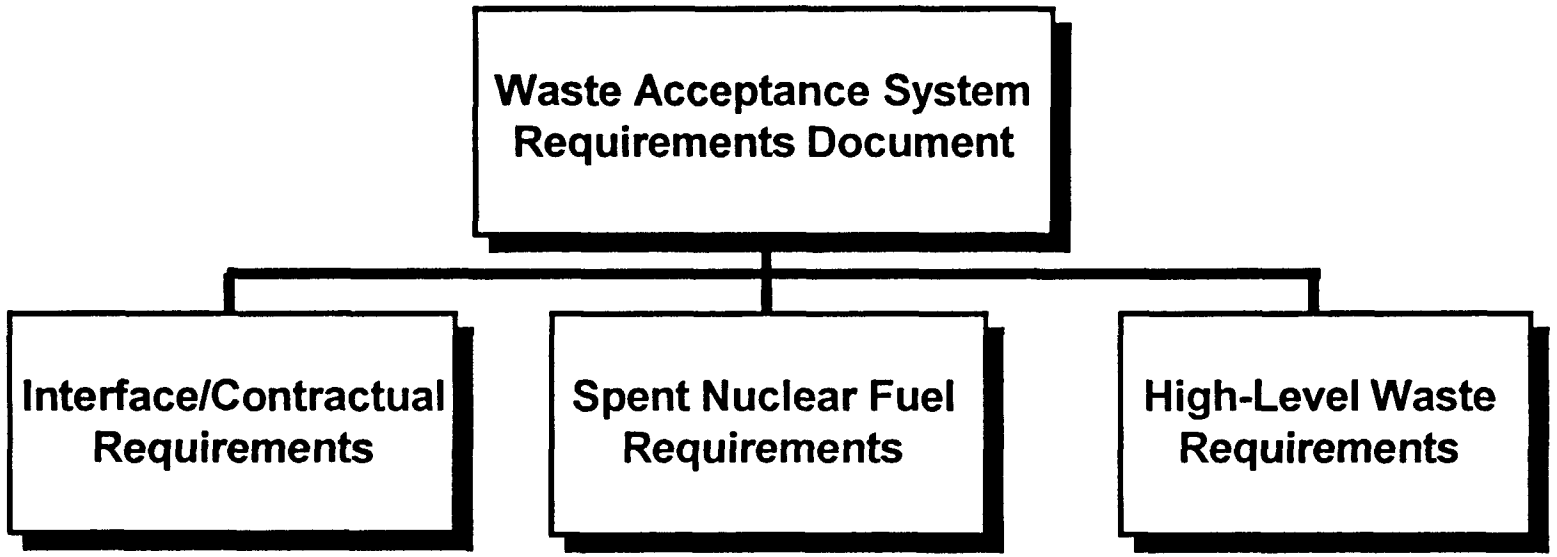
Waste Form Performance Allocation

- **Waste Form is key physical interface**
  - Characteristics help define design of waste, transportation, and repository surface/subsurface facilities and equipment
- **Waste Form Performance Allocation as part of EBS and Total System Performance Objectives**
  - Substantially complete containment of Waste Packages
    - Not less than 300 years nor more than 1,000 years
  - Release rate after the containment period
    - Can not exceed one part in 100,000 per year of the radionuclide inventory present at 1,000 years after closure
  - Remanded standard sets allowable radionuclide releases to accessible environment for each radionuclide for 10,000 years
- **Long-term criticality control must be maintained**

Office of Civilian Radioactive Waste Management Requirements Hierarchy



OCRWM Requirements in Waste Acceptance System Requirements Document



- Interface Requirements
- Contractual Requirements
- Documentation Requirements
- Training Requirements
- QA Requirements

- Waste form Criteria
  - –Commercial SNF
  - –DOE SNF Specifications (Future Development)

- Waste form Criteria
  - –Canistered BSi HLW Glass
  - –Other Waste Forms (Future Development)

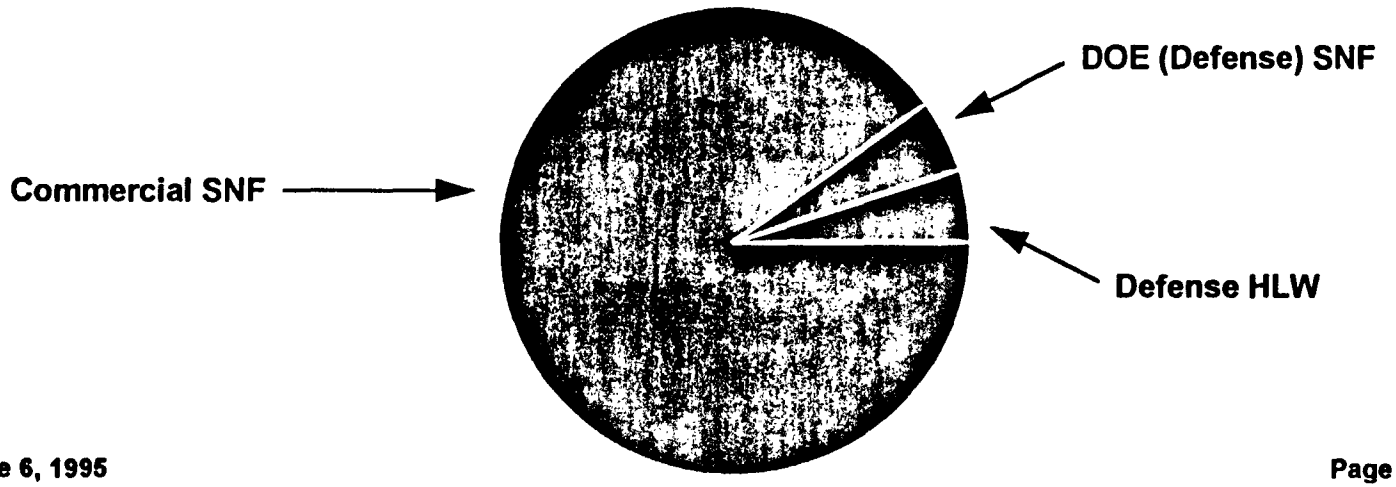
CRWMS Waste Forms

- Waste management system currently planning to dispose of commercial SNF and canistered HLW glass in the first repository
  - Significant data exists for these waste forms
- Evaluating applicability of other waste forms for potential disposal in a geologic repository
  - DOE spent fuel (production reactor SNF, research reactor SNF, naval reactor SNF, etc)
  - surplus weapons materials
  - plutonium residues
  - greater-than-class-C waste

Commercial & DOE SNF Fuel Allocation Comparison

Commercial SNF (Projected-2030) 85,700 MTHM	DOE (Defense) SNF (Projected-2030) 2,750 MTHM

First Repository Planning
(Total Allocation: 70,000 MTU)
(Commercial SNF: 63,000 MTU)
(Defense SNF/HLW: 7,000 MTU)



Disposition of DOE Spent Nuclear

- Proposed ultimate disposition strategy
  - Provide safe, interim storage and management of SNF at specified locations until ultimate disposition
  - All DOE-owned SNF will be stabilized, characterized, and prepared for repository disposal
- Reassessment of defense waste allocation
  - Some or all DOE-owned SNF in first repository
  - Quantity of SNF/HLW will not exceed 10% of capacity
- Considerations for Acceptance
  - Payment of Fees
  - Compliance with repository waste acceptance criteria
  - Appropriate NEPA review
  - Minimize impact on CRWMS schedule

Qualification of Waste Forms

- Characterization
  - Physical, Chemical, Radiological Properties
  - Characterization Testing
- Performance Assessment
  - Waste Form Performance under Repository Conditions
  - EBS and Total System Performance
  - Criticality Calculations
  - Validation Testing
- Design
  - Engineered Barrier System Design
  - Surface and Subsurface Facility Design
- NEPA/Environmental Assessment
- Licensing/Safety Analysis Report
- Quality Assurance

Evaluating DOE SNF Disposition

- Evaluate DOE SNF for repository disposal
  - Identify key issues affecting the ability to accept, transport, and dispose of DOE SNF
    - Technical, Regulatory, and Programmatic
  - Recommend data needs and activities to allow integration of DOE SNF into CRWMS
- Provide early guidance to EM on acceptability of waste forms for disposal
  - Direct disposal
  - Conditioning or treatment
  - Processing

DOE-Owned Spent Nuclear Fuel Steering Group

- Coordination among Programs facilitated by DOE SNF Steering Group
  - Established July 29, 1994
  - Jointly authorized by Director, Office Of Civilian Radioactive Waste Management (RW) and Assistant Secretary For Environmental Management (EM)
- Responsible for:
  - Identifying issues regarding waste acceptance through emplacement of DOE SNF in a geological repository
  - Recommending tasks and activities for resolution of DOE SNF disposal issues

DOE-Owned Spent Nuclear Fuel Steering Group (continued)

- DOE SNF Steering Group Organization
  - RW
  - EM
  - Chairs and Members
  - Task Teams
- Task Team Organization
  - Program Team
  - Waste Acceptance and Transportation Team
  - Repository Team

Key Issues by Task Team

- **Program Task Team**
  - Physical Characteristcs and Quantity
  - Physical Integrity
  - RCRA Determination
  - NEPA Coordination
  - CRWMS Schedule Impact and Consequences
  - Quality Assurance
  - Future Materials for Repository Disposal

Key Issues by Task Team

- **Waste Acceptance and Transportation Team**
  - Interagency Agreement / Fees
  - Safeguards and Accounting
  - Management of Classified Information
  - MTHM Equivalence
  - Transportation Design and Operations
  - Canisterization and Standardization

Key Issues by Task Team

- **Repository Team**
  - Waste Form Constraints
  - Waste Characteristics for Performance Assessment
  - Waste Package and Equipment Design Considerations
  - Corrosion Product Control
  - Radiation Shielding
  - Decay Heat Removal
  - Material Incompatibilities
  - Long-term Criticality Control

Summary

EM-RW have established a close working relationship to develop, control, and resolve waste acceptance requirements and issues.