NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING

SUBJECT: Decision Hierarchy Activity

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AND ORGANIZATION: System Development

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INTER-RELATIONSHIP OF ANALYSIS AND DECISION PROCESS

Program Evaluations
- Decision Hierarchy
- Other

Top Level Analyses
- System Architecture Study

More Specific Analyses
- Cask/Canister
- Thermal Loading
- Other

Stakeholder Interactions
- System Arch. Panel
- MPC Workshops
- Other

UNDERLYING BASES FOR DECISIONS
Overview of Decision Hierarchy Activity

- **Identify Program Level Decisions**
  - Logical order (Hierarchy)
  - Schedule

- **Identify Programmatic Risks**
  - Possible increases in cost
  - Possible increases in schedule
  - No changes in safety requirements

- Identify decision support data needs

- Identify decision support system analyses
Briefing Objectives

• This briefing addresses the systematic identification of one type of programmatic risk:
  – Associated with anticipating future decisions
  – Schedule sensitive
  – Referred to as “schedule-induced”

• This briefing also addresses identification of system analysis needs
Overview of Analysis

• Analyzed the Reference System modified to include the Multipurpose Canister (MPC)
  – MPC (fabrication starts in 1997)
  – Phase 2 Truck Casks (fabrication starts in 1997)
  – MRS (storage starts in 2000)
  – Repository (emplacement starts in 2010)
  – Exploratory Studies Facility (testing starts in 1997)

• Decisions for all elements of the CRWMS were addressed
  – Program level decision milestones and schedule
  – System technological decision hierarchy
  – Contingency options
Overview of Results

• 128 linkages between milestones
  - When decisions affect future options
  - When assumptions need to be made about future decisions
  - Based on technological hierarchy

• 13 instances of schedule-induced programmatic risks related to thermal load and waste package design decisions
  - Relevant to the MPC and MRS
  - Relevant to the Repository and ESF

• 11 instances of schedule-induced programmatic risks readily mitigated by schedule changes or engineering solutions
Example Results

- Approach

- Example
  - Illustrate technological hierarchy
  - Illustrate schedule-induced programmatic risks
Approach

- Identify Program-Level Decision Milestones and Schedules

- Construct Technological Decision Hierarchy for CRWMS
  (Logical precedence in direction of arrows)

- Integrate Technological Hierarchies and Schedule
  (Milestones linked per technological decision hierarchy)

- Identify Schedule-Induced Programmatic Risks (→)

backward arrow = SPR = logical disconnect on order of decisions
### Technological Decision Hierarchy Format

<table>
<thead>
<tr>
<th>Utilities</th>
<th>MRS</th>
<th>Transportation</th>
<th>MPC (Disposable)</th>
<th>Waste Package</th>
<th>Repository</th>
<th>ESF</th>
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- **Requirement Decisions**
  - Repository Decision 2
  - Precedes
  - Waste Package Decision 3

- **Design Decisions**

- **Fabrication Decisions**

- **Operations Decisions**

**Decision Flow**

*1/10/94*
example Technological Decision Hierarchy - MPC Canister/Cask

*Transportation cask decisions are included in the MPC decision hierarchy
Example Schedule-Induced Risks: MPC Canister/Cask

- Start MPC Design / Certification ~ 5/97
- Start Thermal Test (Abbreviated) ~ 6/97
- Start MPC Fabrication ~ 10/99*
- Select Repository Thermal Load and Waste Package Capacity

Legend:
- Milestone
- Decision (selection of options)
- Schedule-Induced Programmatic Risks

- Gross Loaded Weights
- Criticality control
- Capacity
- Thermal Test Configuration
- Thermal Testing
- Thermal Loading
- Capacity

*Prior to data freeze for LAD
Findings

- Milestone network diagram

- Schedule-induced programmatic risks
Program-Level Decision Milestone Network Diagram

- Chart shows milestones in chronological order (left to right)

- Chart shows technological precedence of decision milestones (arrows)

- Chart shows instances of schedule-induced programmatic risks (backward arrows)
Schedule-Induced Programmatic Risks

- MPC design and fabrication decisions must anticipate waste package thermal, criticality and material design decisions
- Repository and Waste Package license application design decisions must anticipate thermal decisions
  - ESF thermal test configuration decisions must anticipate thermal and waste package design decisions
  - MRS design decisions must anticipate MPC design and contingencies
- MRS design decisions must anticipate repository requirements for ageing and blending
- Repository surface facility design decisions must anticipate non-standard fuel and HLW transportation cask design decisions
Conclusion

• System analyses need to address mitigating programmatic risks for:
  
  – MPC design and fabrication strategies for anticipating waste package thermal, criticality and material decisions
  
  – The thermal testing program
  
  – MRS design anticipation of MPC evolution
  
  – MRS and Repository options for ageing and blending
  
  – Repository anticipation of non-standard fuel and high level waste cask designs

• The tool that has been described is to be used for identifying “schedule-induced” programmatic risks as the program evolves