Office of National Transportation
Rail Rolling Stock Development

Presented to:
Transportation External Coordination
Working Group Meeting

Presented by:
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Office of National Transportation

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Introduction

Office of National Transportation (ONT) Rolling Stock Planning

- Rolling stock design
- Rolling stock acquisition
- Interface with railroads and utilities
- Cask procurement
Rolling Stock Development Strategies

- Invest in customized rolling stock for unique spent nuclear fuel (SNF) and high level radioactive waste (HLW) transportation needs for safety, security and performance
- Reflect policy decisions: mostly rail, dedicated trains, and flexible, multi-modal system
- Invest in front-end planning and design
  - Advance infrastructure development without major capital requirements at this time; focus on procurement of conceptual designs rather than fabrication of hardware
- Match program to utility and railroad system interfaces
Transportation by rail requires development of unique train consists and specialized equipment

- **Safety**
  - Custom safety standards and design

- **Security**
  - Unique escort and communications

- **Performance**
  - Strong, reliable, flexible

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**Estimated Weight and Length of Rolling Stock**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Weight</th>
<th>No. in Consist</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000 HP Locomotive</td>
<td>136 tons</td>
<td>2 per consist</td>
<td>61 ft length</td>
</tr>
<tr>
<td>Cask Car</td>
<td>72 tons</td>
<td>3-5 per consist</td>
<td>80 - 90 ft length</td>
</tr>
<tr>
<td>Cask &amp; Cradle</td>
<td>150 tons</td>
<td>3-5 per consist</td>
<td>25 ft length</td>
</tr>
<tr>
<td>Buffer Car</td>
<td>32 tons</td>
<td>2 per consist</td>
<td>60 ft length</td>
</tr>
<tr>
<td>Escort Car</td>
<td>80 tons</td>
<td>1 per consist</td>
<td>85 ft length</td>
</tr>
</tbody>
</table>
Rolling Stock Strategy

- ONT is developing rolling stock designs that integrate best available railcar technology for spent fuel transportation
  - Integrate objectives of the Association of American Railroads’ (AAR) Performance Specification, S-2043
  - Seek evaluation and confirmation of S-2043
    - Implementation of the standard involves first-of-a-kind prototype development and testing
- ONT is allowing lead time for design, testing, and full-scale production of railcars providing best available technology
AAR’s Standard S-2043


- Principal technical requirements of the standard are:
  - 1,000,000 lb. buff strength for car designs
  - Performance monitoring for the dynamic status of the cars
  - Electronically Controlled Pneumatic (ECP) braking equipment on all cars
  - Truck and suspension redesign and optimization to improve steering, reduce truck warp and provide good wheel load equalization
  - Prototype cars (1 ea.) will go through single car testing and consist testing for a period of 16 – 18 months
Performance Requirements Evaluation

- ONT has engaged Transportation Technology Center, Inc. (TTCI) to provide preliminary evaluation of several standard and premium railcar truck designs.

- Railcar simulations performed by TTCI show that:
  - Depressed center cars (~90 ft long) with premium trucks could meet S-2043.
  - Flat cars (~60 ft long) with premium trucks could also meet S-2043.

- ONT is evaluating which type of cask car (short vs. long) would offer the greatest operational advantage to the system.

- ONT has provided comments on a draft AAR Standard for Operations (Circular #C-10101).
Custom Cask Car Development

• **System Requirements**
  – Carry a range of spent fuel casks from different commercial and DOE reactors
  – Develop one cask car design to keep production costs down
  – Design skids to fit unique dimensions and loads of spent fuel casks
  – Design equipment compatible with existing rail infrastructure

• **Specifications**
  – May be a depressed center or flat type rail car
  – Carry cask packages ranging in weight from 25 tons to 160 tons
  – Maximum load size about 17 feet long, 12 feet wide, not to exceed 15 feet from top of rail

• **Acquisition Plan**
  – Procurement of first conceptual design in 2006
Custom Buffer Car Development

• System Requirements
  – Provide distance between the cask and escort cars to protect personnel
  – Provide distance from heavier axle loads in the consist when bridge loads are an issue in routing
  – Carry spare parts and cask support equipment for the consist
  – May require additional weight or ballast

• Specifications
  – Flat car
  – Option to carry a standard 20-foot container

• Acquisition Plan
  – Procurement of conceptual design when funds become available

Flat Cars Buffer Car with Containers
Custom Escort Car Development

- **System Requirements**
  - Carry security and technical personnel escorting shipment
  - Provide base for security or emergency communications

- **Specifications**
  - Expected to be a bi-level car that provides –
    - Operations and communications workspace; living and storage space; bunk rooms; bathrooms and a shower room; kitchen and dining area; common lounge area
  - Systems include –
    - Air conditioning; potable water system and waste water storage system; diesel generator units; electrical and lighting

- **Acquisition Plan**
  - Procurement of conceptual design when funds become available
Standard Locomotive

- **System Requirements**
  - Standard model of the latest industry design to provide flexibility and cost savings

- **Specifications**
  - Expected to be 4000 horsepower units
  - Each SNF train will have two locomotive units
  - Will have electronically controlled pneumatic brake systems

- **Acquisition Plan**
  - Buy / lease analysis planned
ONT’s Rolling Stock Acquisition Plan

• ONT continues to develop a two-part procurement
  – Conceptual design (multiple vendors)
  – Final design, prototype, and fabrication (single vendor-lead team)

• Plan is to procure 120 cask cars, 60 buffer cars and 30 escort cars
  – Production rate will be linked to repository requirements
  – Ultimate plan is to support annual 3000 metric tons heavy metal throughput at repository

• Locomotives may be procured later
## ONT’s Rolling Stock Acquisition Plan

### Phase I: Conceptual Design

<table>
<thead>
<tr>
<th>Currently Complete: Draft Car Specifications, RFP Documents</th>
<th>Issue Draft RFP</th>
<th>Final RFP</th>
<th>Award Preliminary Concept Design Contract</th>
</tr>
</thead>
</table>

- **Receive Comments From Rail Industry And Stakeholders**

### Phase II: Final Design, Prototype, Production

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue Notice Of Interest, And Award Final Design Contract</td>
<td>Initiate Prototype Fabrication</td>
<td>(Complete Prototype Testing)</td>
<td></td>
<td>Begin Full-scale Production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Initiate Prototype Testing</td>
<td></td>
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</table>
Cask and Rolling Stock Interface

- Cask-to-cradle-to-car designs must be integrated
- Efforts are underway to standardize the interface between the transfer skid and the cask cars
  - For example, ONT is working with TTCI to determine if ISO connectors can be used to secure the cask load
Interface with Utilities

- ONT is planning to ensure rolling stock and casks match utility needs and capabilities
  - Data provided by the utilities in the Facility Interface Data Sheets has been compiled and analyzed
  - Cask Capability Reports have been completed by the vendors
  - For the baseline, casks have been matched with the capabilities at different utilities
    - Modeling will continue in this area
    - No decisions will be made solely on this data

- We anticipate discussions with the utilities on their preferences for shipping cask options
Transportation Cask Acquisition

- Two separate cask procurements will be undertaken to accommodate
  - Commercial SNF
  - DOE SNF and HLW
- ONT will contract with multiple vendors to minimize risk of late or non-delivery
- Initial conceptual design work on DOE SNF transportation casks will begin in FY 2006
Dual-Purpose Casks

- SNF delivered to the repository may require additional cooling time or “aging” prior to final disposal.
- ONT continues to evaluate the feasibility of using the same cask design to meet both NRC requirements for transportation (10 CFR Part 71) and the NRC requirements that would apply to any aging facility within the repository site (10 CFR Part 63).
- ONT has solicited a feasibility analysis of using existing 10 CFR Part 72-certified storage casks in an aging system that is part of a Part 63-licensed repository.
Summary

- ONT rail transportation rolling stock will use best available technology
- Infrastructure acquisition plans are moving forward in phases, emphasizing flexibility