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Office of Civilian Radioactive Waste Management

National Transportation Plan

U.S. Department of Energy

Office of Civilian Radioactive Waste Management

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Office of Civilian Radioactive Waste Management
National Transportation Plan

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I. Introduction

This plan outlines the strategy and process for developing and implementing the transportation system required to transport spent nuclear fuel (SNF) and high-level radioactive waste (HLW) from where the material is generated or stored to the proposed repository at Yucca Mountain. The plan provides information about how the U.S. Department of Energy (DOE) Office of Civilian Radioactive Waste Management (OCRWM) transportation mission will be achieved, and how stakeholder collaboration will contribute to specific elements of the transportation system.

A. Purpose of Document

This plan describes each element of the national transportation system that OCRWM is developing, and how input from stakeholders will be integrated with Departmental policies and requirements in that effort. This brings the OCRWM transportation system capital projects, and operational planning efforts together in a single document. It also provides the timetable for major transportation decisions and development milestones needed to support a 2017 start date for shipments. This National Transportation Plan will be revised to incorporate those decisions and development milestones as they are finalized.

This plan discusses:

- The transportation system as currently envisioned
- The current status of system development
- Activities remaining to bring the system to an operational state and how they will be accomplished
- The organizations involved in each transportation system element and their roles and responsibilities
- How and when stakeholders can engage on specific elements of the development process.

This plan will be a "living document" that will be reviewed annually or more frequently as development of the transportation system dictates. Changes to the document will be in accordance with OCRWM procedures and will be updated as programmatic decisions, legislative direction, regulatory changes, and system design solutions are finalized. Specific system components, such as the Nevada Rail Line, will be defined in more detailed separate documents. These detailed documents may include the *Transportation System Requirements Document*, operational plans, procurement plans, and final design reports.

B. Background

SNF and other radioactive materials have been transported safely, world-wide, for almost 40 years. In the United States, shipments by the nuclear industry and the DOE, such as the Naval Nuclear Propulsion Program (NNPP) shipments, Foreign Research Reactor

(FRR) Fuel shipments, and those to the Waste Isolation Pilot Plant (WIPP), have an exemplary safety record. There has never been a SNF transportation accident that has resulted in the release of radioactive material that has been harmful to the public or the environment.

The Nuclear Waste Policy Act (NWPA) of 1982 established OCRWM within the U.S. Department of Energy (DOE) to develop and manage a Federal system for disposing of commercial and DOE SNF and HLW. As part of its responsibilities under the Act, OCRWM has the mission of transporting the SNF and HLW from commercial and DOE sites to the repository.

OCRWM's Office of Logistics Management (OLM) mission is to develop and execute a safe, secure and efficient transportation system that supports the OCRWM mission. This transportation system development will be guided by three principles:

- Conduct a thorough, open and collaborative planning process with interested parties
- Develop a safe and secure transportation system and related infrastructure that is based on that planning
- Complete transportation system validation prior to starting operations.

In February 2002, DOE completed the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (Final Repository EIS). That document analyzed the environmental impacts of the proposed action of constructing, operating, monitoring, and closing a geologic repository as well as transporting SNF and HLW from commercial and DOE sites to the Yucca Mountain site. DOE is in the process of developing a Supplement to the Final Repository EIS (Repository SEIS). In addition, DOE is developing the *Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS* which will review and update, as appropriate, the rail corridor analyses of the Final Repository EIS for the Nevada Rail Line and will also include a detailed analysis of alternative alignments within certain corridors.

This plan describes the transportation system that OCRWM will need when the repository is operating at full capacity. The transportation system for shipments to the Yucca Mountain repository will be developed in stages that are consistent with waste acceptance schedules and the phased start-up of the repository. The transportation infrastructure will continue to expand until the full operating capability is achieved. This phased development and operations will build on the successful SNF transportation experience in the United States and abroad.

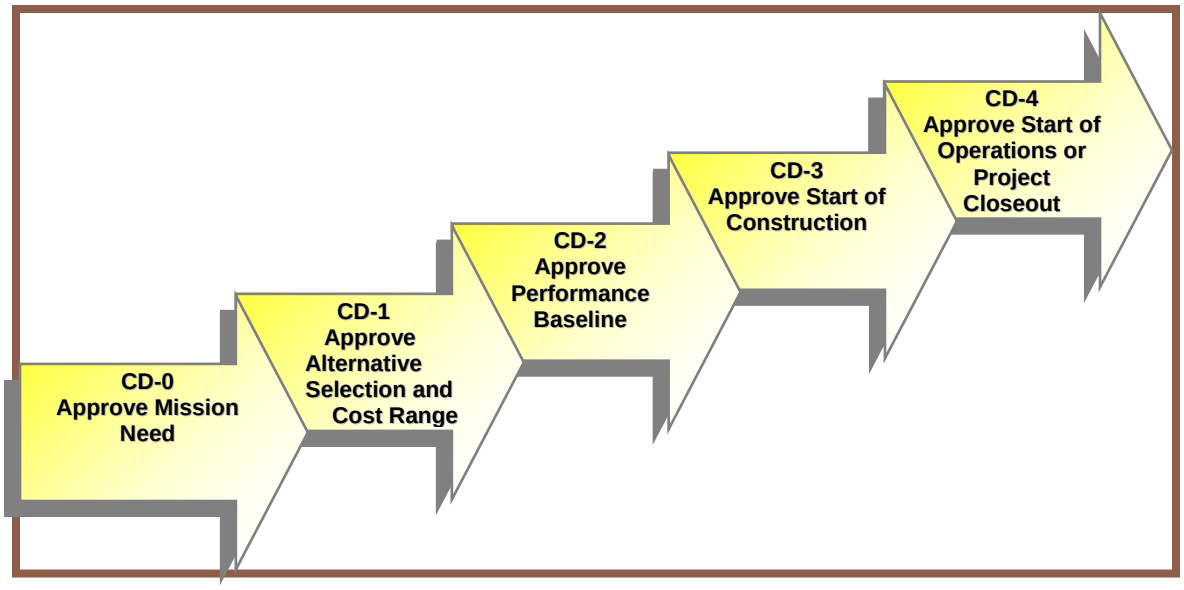
1. Approach to Development of the Transportation System

The development of the OCRWM transportation system has been divided into two projects to acquire capital assets: the National Transportation Project and the Nevada Rail Infrastructure Project. The capital projects are governed by DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets.* In accordance

with this order, any large capital asset project is required to be approved through a series of Critical Decisions (CD's) by the Energy Systems Asset Advisory Board. These approvals come in five stages which include: Approve Mission Need (CD-0); Approve Cost and Schedule range and authorize development of a performance baseline (CD-1); Approve the Performance Baseline, and the start of final design (CD-2); Approve Start of Construction (CD-3); and Approve Start of Operations or Project Closeout (CD-4). The NWPA established the mission need (CD-0) for the transportation projects. These projects received CD-1 approval for their cost and schedule ranges in June of 2004. Figure A illustrates the Critical Decision process. The other aspects of the program are to develop relationships with key stakeholders having responsibilities for transportation and to establish operational capabilities. The capital projects and the parallel institutional and operational planning efforts are building on best transportation practices gleaned from other complex shipping campaigns of hazardous materials, as well as using input from our stakeholder communities.

The National Transportation Project includes the acquisition of shipping casks for truck and rail and special rail cars. The National Transportation Project will also include maintenance and operating facilities for the national transportation system. The Nevada Rail Infrastructure Project is responsible for developing the Nevada Rail Line which will connect the repository at Yucca Mountain to existing main line track within Nevada. The Nevada Rail Infrastructure Project is also responsible for developing the sidings, rail yards, and maintenance-of-way equipment and associated facilities.

Figure A. Critical Decision Process



2. Planning to Date

Planning for the development of the transportation system has been ongoing since the inception of OCRWM. This planning has been done in conjunction with stakeholders, through a collaborative planning process with DOE. DOE has been interacting with key

stakeholders including State Regional Groups (SRGs), Tribes, and industry through the sponsorship of the Transportation External Coordination Working Group (TEC) meetings, vendor meetings, the issuance of notices, and requests for further information. Examples of areas in which stakeholders have provided input include the dedicated train decision, the planned use of Association of American Railroads (AAR) S-2043 rail cars, and the revised proposed Section 180(c) policy.

A summary of these planning efforts is shown in Table 1. Ongoing planning efforts are discussed in Section V. As the system matures, more detailed planning documents, such as an operations plan, Nevada Rail Infrastructure Project Plan, and the Section 180(c) implementation plan will become part of this National Transportation Plan.

Table 1. Overview of Planning Efforts Completed to Date

Planning Documents	
1.	Transportation Business Plan [January 1986] for acquisition of hardware and procedures to support shipping under provisions of the NWPA
2.	Transportation Institutional Plan [August 1986] for integrated development of a network of program participants
3.	Transportation Functions of the Civilian Radioactive Waste Management System (CRWMS) (1992) that the transportation system is responsible for, and some detail on the interfaces between the transportation system and other operating parts of the CRWMS
4.	Operational planning studies including assessments of the capabilities of commercial nuclear plants and of the plants' transportation infrastructure to support shipments of SNF from the sites; (Near Site Transportation Infrastructure (NSTI) concluded in 1996 and Facility Interface Capability Assessment (FICA) concluded in 1992)
5.	Final Environmental Impact Statement (EIS) on the Repository (2002) presenting conceptual overviews of the waste transportation system and its operations.
6.	Strategic Plan for the Safe Transportation of SNF and HLW to Yucca Mountain: A Guide to Stakeholder Interactions (2003) defining and developing the transportation system required for safe, secure shipments and focusing on stakeholder involvement in OCRWM transportation planning
7.	Performance Based Specification for Transportation, Aging, and Disposal (TAD) (November 2006)
Technical Baseline Documents	
1.	Civilian Radioactive Waste Management Requirements Document (CRD) identifying the transportation system and assigning it key CRWMS functions
2.	Waste Acceptance System Requirements Document (WASRD) establishing requirements for acceptance of DOE SNF and HLW waste forms that the transportation system will need to ship
3.	Transportation System Requirements Document (TSRD) specifying the fundamental requirements for the transportation system
4.	Integrated Interface Control Documents, Volume 1 (IICD-1) and Volume 2 (IICD-2) establishing agreements among organizations responsible (OCRWM and the Naval Nuclear Propulsion Program and OCRWM and Environmental Management) for interfaces with the transportation system[1].

[1] The Naval Nuclear Propulsion Program is responsible for shipments of naval spent nuclear fuel to the repository.

3. Timeline for Transportation System Development

The transportation system is being developed on a schedule predicated on shipments to the repository commencing in 2017, with related activities planned to take place a certain number of years in advance of shipments. If the operating dates change, the dates when certain activities are planned to take place will be adjusted accordingly. A list of key milestones is shown in Table 2.

Table 2. Key Transportation System Development Milestones[2]

Milestone Description	Years in Advance of Shipments	Planned Dates
DOE issues *Draft Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS*	10	2007
DOE awards contracts for design/certification of TAD Canister System	10	2007
DOE issues *Final Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS*	9	2008
DOE publishes Record of Decision on Rail Corridor and Rail Alignment	9	2008
DOE awards cask and buffer car final design/prototype/build contract	9	2008
DOE awards escort car final design/prototype/build contract	9	2008
DOE identifies preliminary National suite of routes	9	2008
DOE awards Nevada rail design/build contract	8	2009
DOE starts Nevada rail construction	8	2009
DOE awards design/certify contract for DOE HLW transportation casks	8	2009
Nuclear Regulatory Commission (NRC) issues first certificate of compliance (CoC) for TAD system for storage under Part 72	7	2010
NRC issues first CoC for TAD system for transportation under Part 71	6	2010
DOE awards NWPA 180(c) planning grants	5	2013
DOE completes Nevada rail construction	3	2014
DOE initiates Nevada rail access service to repository	3	2014
DOE begins national transportation system operations	0	2017

4. Policies and Requirements That Govern the Transportation System

Development and, ultimately operation, of the transportation system is governed by various laws and regulations. The NWPA places certain requirements on DOE in fulfilling this transportation mission. These include the following: 1) DOE must use private industry to the fullest extent possible in each aspect of transportation; 2) DOE must ship SNF and HLW in transportation casks certified by the NRC; 3) DOE must

[2] Predicated on full funding as defined in the OCRWM Budget Projection FY 2009- FY 2023 Report presented to Congress in March 2007.

comply with NRC notification requirements prior to conducting shipments (DOE has chosen by policy to provide the same notification to tribal governments); and 4) DOE must provide states and tribes technical assistance and funds for training in safe routine transportation and emergency response procedures.

In addition, more detailed requirements are found in the Transportation System Requirements Document (TSRD), and additional requirements will be contained in the operations plan and the project management plan.

The transportation requirements that will be satisfied in the development, design and operation of the CRWMS come from a variety of sources including statutes, regulations, DOE Orders, industry standards, and State and local codes. DOE has internal Orders and guidance that apply to shipments of radioactive materials, and DOE meets or exceeds the regulatory standards of the Department of Transportation (DOT) and NRC that would apply to comparable commercial shipments. DOE's policy for meeting or exceeding the regulatory standards for shipments of SNF and HLW is further detailed in DOE M 460.2-1, *U. S. Department of Energy Radioactive Material Transportation Practices Manual* and Appendix M of the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*.

5. Resolved Issues

OCRWM has identified issues requiring program or policy decisions and Table 3 identifies those that have been resolved to date. Some of the issues were resolved based on legislation direction or regulatory changes. Others were identified and resolved with the input of stakeholders in the establishment of DOE policies and practices. As the issues are resolved, they become requirements, policies, or programmatic activities. Outstanding issues and the issue resolution process are discussed in Section VI.

Table 3. Resolved Transportation Issues

Issue	Discussion of Issue	Resolution Method
Modal Mix – Rail, truck, barge	Where rail is not practical due to utility limitations in accommodating rail cars, other modes may be used. Will DOE rely on a combination of rail, truck, and possibly barge to transport SNF and HLW to the repository?	On April 8, 2004, DOE issued a record of decision selecting mostly rail as the preferred mode of transportation, both on a national basis and in the State of Nevada.
Liability – Applicability of the Price-Anderson Act	How does Public Law 95-256, better known as the Price-Anderson Act, originally passed by Congress in 1957, apply to OCRWM?	Amended in 1988, the Act requires the nuclear industry (including the DOE) to provide financial protection for the public and includes coverage for transportation accidents. Since then, the Act has been extended until December 31, 2025.
Dedicated Train Service	What is OCRWM's policy on using dedicated trains?	The term "dedicated train" refers to train service dedicated to one commodity, in this case SNF and HLW. In July 2005, OCRWM announced a policy that it would use dedicated train service for its usual rail transport of SNF and HLW to the Yucca Mountain Repository.
Pre - notification	What pre-notification requirements will OCRWM follow prior to conducting shipments?	DOE will follow the policy in DOE M 460.2-1 and articulated in the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*, Appendix M, page 6, which follows NRC regulations on shipment pre-notifications.

Issue	Discussion of Issue	Resolution Method
Overweight Truck	Can OCRWM provide clarification of the legality of overweight trucks due to questions of divisibility of the load and highway damage was unclear in the early years of the OCRWM program?	The use of overweight trucks was determined to be acceptable for the OCRWM Program because the payload is not divisible and the packaging alone makes shipments overweight. Specific length and axle-loadings were also recommended for routinely permitting this kind of truck as determined in a study conducted with American Association of State Highway and Transportation Officials and documented in a report by Battelle in 1990. States readily permit when the vehicle weight ranges from 80,000 to 109,000 pounds. Overweight trucks, in this case, do not include heavy-haul trucks.
Application of Regulations to the NWPA	What regulations apply to NWPA shipments?	DOE meets or exceeds DOT and NRC transportation standards that would apply to comparable commercial shipments. See the Final Repository EIS, Appendix M.
NRC-Certified Casks/ Cask Testing	Will DOE conduct full-scale tests as suggested by some stakeholders?	In 1983 DOE published a *Federal Register* Notice announcing a decision to transport SNF from NRC licensed facilities using NRC certified casks, and a 1986 Memorandum of Understanding with DOE Defense Programs established this requirement for defense waste. Subsequently, the NWPA, as amended, required that all shipments to Yucca Mountain be made in NRC-certified casks. DOE will use packagings certified by the NRC. The NRC will determine the level and extent of testing needed to certify casks for shipping SNF. DOE will not conduct additional structural tests on spent fuel casks.

Issue	Discussion of Issue	Resolution Method
Defense Waste	Will defense waste be placed into the repository?	The 1982 NWPA left it up to the President to determine whether civilian and defense-related wastes should be emplaced in the same repository. On April 30, 1985, the President issued a decision that they should be, with each party paying its proportional share of the full costs. To implement that decision, public rulemaking was used to develop a methodology for allocating defense and civilian costs appropriately. The result was published in the *Federal Register* in August 1987.
Inspections	What vehicle inspection protocols will apply to NWPA shipments?	For highway shipments, OCRWM will use the Level VI Enhanced North American Inspection Standards developed by the Commercial Vehicle Safety Alliance (CVSA) and the DOE, and codified by the DOT (49 CFR 385.415(b)(1)). This decision is documented in DOE M. 460.2-1, *U. S. Department of Energy Radioactive Material Transportation Practices Manual.*
TAD Canisters	What kind of containment approach does OCRWM intend to use to transport SNF shipments?	OCRWM has decided to use a canister-based system for transporting, aging, and disposing of commercial SNF. This decision is documented in the Yucca Mountain Project Critical-Decision 1, Approve Preliminary Baseline Range.
Adoption of AAR Standard, S-2043	Will OCRWM comply with industry rail specification standards for trains carrying radioactive material?	OCRWM has adopted the Association of American Railroads' performance specification for trains used to carry highly radioactive material. This decision is documented in the National Transportation Project Critical Decision-1, Approve Cost and Schedule range.

II. Situation Assessment

The long history of safely transporting SNF in the United States provides a sound basis for the development of the OCRWM transportation system. Shipments have occurred using both the national rail and highway systems and intercoastal waterways under existing laws, regulations, and operating practices. The need for a rail line in Nevada to the repository is being addressed, and the *Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS* will be completed in 2008. The transportation industry has provided the equipment and services needed to make shipments of SNF globally. OCRWM is working with the transportation industry to design and build the equipment needed by the OCRWM system.

The best achievable date for receiving waste at the repository is 2017. Many systems, capabilities, and resources are already in place to support this starting date. Others have yet to be developed, or depend on resolution of issues or uncertainties. This situation assessment discusses:

- Status of SNF and HLW transportation
- Assumptions
- Materials to be transported
- Transportation modes
- Package Selection
- Standard contract
- Institutional activities
- Benchmarking
- Operations planning
- Constraints
- Risks

A. Status of SNF and HLW Transportation

- SNF continues to be shipped safely worldwide. Over the last 30 years, more than 70,000 metric tons of SNF have been transported. Transportation of SNF and HLW in the U.S. has a proven safety record of more than 3,000 shipments over nearly 40 years. There has never been a transportation accident that resulted in the release of any amount of radioactive material that has been harmful to the public or the environment.
- The National Academies' Committee on Transportation of Radioactive Waste concluded in its report, *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*, that:
    - There are no fundamental technical barriers to the safe transport of SNF and HLW in the U.S.

  - U.S. regulations are adequate to ensure package containment effectiveness over a wide range of transport conditions
  - The Department's choice of a mostly rail transportation mode and the use of dedicated trains is advantageous
- DOT's Federal Railroad Administration (FRA) and Federal Motor Carrier Safety Administration establish requirements and practices to help provide rail and highway operational safety.
- Established operating practices and standards such as AAR circular OT-55, *Recommended Railroad Operating Practices for Transportation of Hazardous Materials,* AAR Standard 2043, *Performance Specification for Trains Used to Carry High-Level Radioactive Material* reflect industry approaches to ensure rail operational safety
- DOE routinely ships radioactive materials by highway and rail in accordance with DOE Directives and Orders. On average, 30 shipments of SNF by the NNPP and by university reactor and FRR programs take place each year safely and successfully
- Utilities, trucking companies and railroads have extensive experience with, and the basic infrastructure to, transport truck and rail casks
- OCRWM is developing a *Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS* to analyze the impacts of a potential rail line in Nevada; the draft will be issued for public comment in 2007
- A robust stakeholder relationship and outreach program is in place
- Programmatic technical and project management performance baselines defining the total cost, schedule, and work necessary to develop the capital assets for transportation have been developed and are continuing to be refined
- Detailed interface agreements with DOE's EM Office and the Naval Nuclear Propulsion Program are defined by *Civilian Radioactive Waste Management System, Integrated Interface Control Document, Volume 1*.

B. Assumptions

Based on the 2007 OLM Business Plan, key assumptions for the transportation system have been developed. These include:

- Funds required by the analysis in the *OCRWM Budget Projection FY 2009- FY 2023*, March 2007, will be available to the program
- OCRWM priorities will support completion of the Nevada Rail Line in 2014 for full operational capability to support repository construction
- The earliest the first shipment of SNF or HLW can be made is in 2017, the best achievable date for receiving waste at the repository
- The first shipment will be from one of 72 commercial nuclear plant sites or from one of 5 DOE sites to the repository
- The first shipments will be by rail, using dedicated trains

- The repository will empty and release casks within one week of receipt for maintenance and reuse.
- Cask maintenance will be performed at a facility where handling and disposal activities are conducted
- Decisions on the shipping queue will be made in time to identify corridors for 180(c) funding
- A preliminary suite of routes for SNF and HLW shipments will be proposed in fiscal year 2008
- Assessment and planning grants to support 180(c) training will be issued approximately four years in advance of the first shipment (2013)
- A pilot program for the 180(c) grant process pilot projects will begin earlier than the full planning and training grant program.

C. Materials to Be Transported

The types and amount of materials to be transported to the repository include:

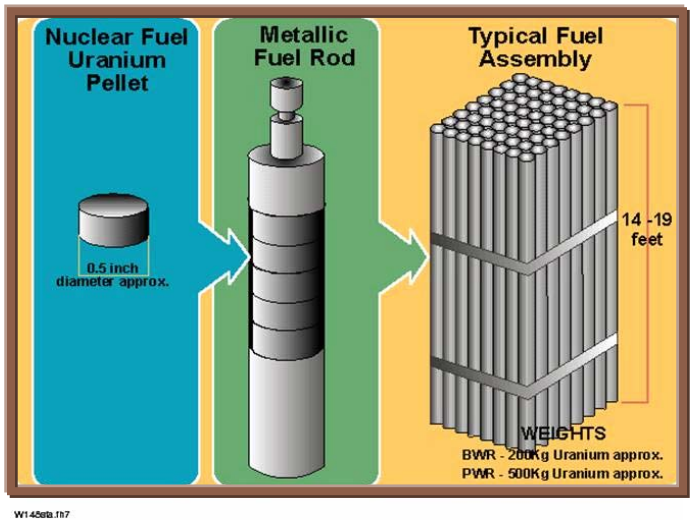
- Commercial SNF – 63,000 Metric Ton of Heavy Metal (MTHM)
- DOE SNF – 2,333 MTHM (DOE SNF amounts include naval SNF)
- DOE HLW – 4,667 MTHM

1. Commercial SNF

SNF is fuel that has been withdrawn from a nuclear reactor following irradiation. The sources of commercial SNF are the commercial nuclear power plants throughout the United States.

Figure B. Typical Fuel Assembly

Under their NRC licenses, commercial nuclear power plants store their SNF in spent fuel pools, and they can combine that option with above-ground dry storage in an independent spent fuel storage installation (ISFSI). Figure B illustrates a typical fuel assembly.



2. DOE SNF

During the last four decades, DOE and its predecessor agencies have generated approximately 250 varieties of SNF from weapons production reactors and research missions.

3. High-Level Radioactive Waste

HLW is the highly radioactive material resulting from the reprocessing of SNF. DOE stores HLW at the Hanford Site, the Idaho National Laboratory, West Valley, and the Savannah River Site. HLW will be processed into a stable glass form, solidified in a stainless steel canister, and shipped in a transportation cask. No liquids will be transported.

4. Naval Nuclear Propulsion Program SNF

DOE plans to emplace approximately 400 canisters of naval spent nuclear fuel in the Yucca Mountain Repository. This relatively small amount of naval SNF is accounted for as part of the MTHM allocation for Category 2 above. The Naval Nuclear Propulsion Program is responsible for transporting these canisters from Idaho National Laboratory to the repository. Naval shipments will use NRC certified casks and the railcars will meet AAR S-2043.

D. Transport Modes

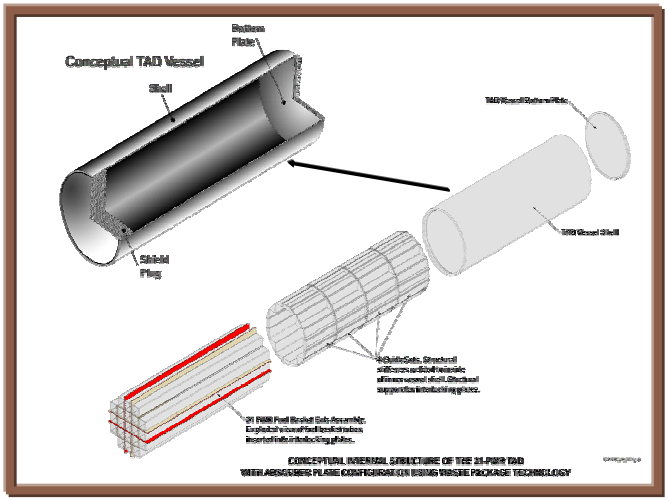
In April 2004, DOE selected the mostly rail scenario analyzed in the Final Repository EIS as the transportation mode both on a national basis and in the State of Nevada. Under the mostly rail scenario, DOE will rely on a combination of rail, truck and possibly barge to transport to the repository, with most of the SNF and HLW being transported by rail. This will ultimately require construction of a rail line in Nevada to the repository.

In July 2005, DOE issued a policy statement indicating that Dedicated Train Service will be the usual manner of rail shipment of commercial and DOE SNF and HLW to the Yucca Mountain Repository when it becomes operational. The term “dedicated train” refers to train service dedicated to one commodity (in this case, waste destined for Yucca Mountain). The use of dedicated train services results in decreased cost as a direct benefit of a reduced fleet size and its attendant operations and maintenance. Safety and security also benefit from the decreased time in transit and shorter “dwell times.” Use of dedicated train service also provides greater operational flexibility and efficiency due to reduced time in transit, and greater predictability in scheduling.

A decision regarding which mode will be used to transport the waste from each site has not been made. Final decisions on mode for these sites will be made based on specific site conditions and interactions with appropriate stakeholders. Options for transport could include:

- Rail – Consistent with the mostly rail preference, DOE would transport the majority of shipments by rail to Yucca Mountain
- Legal weight truck – Currently six commercial SNF sites do not have the capacity to handle rail casks[3]
- Heavy-haul truck - 24 commercial sites have the capability to handle and load rail casks, but do not have direct railroad service. DOE could ship the casks to nearby railheads by heavy-haul truck. The viability of this approach is illustrated by the approximately 200 heavy-haul shipments of SNF that are conducted in France per year
- Barge - Barge shipments of rail casks containing SNF could be considered from 17 (a subset of the 24 commercial sites without direct rail access) commercial sites that are on or near navigable waterways.

Figure C. TAD Conceptual Schematic TAD



E. Package Selection

1. TADs

The TAD canister-based system will be loaded with commercial SNF and sealed at utility reactor sites. DOE will endeavor to maximize the SNF inventory that will be transported in TAD canisters. At the repository, the TAD canister will be removed from the transportation over-pack and handled using a shielded transfer cask for placement into either a storage overpack for aging or into a waste package for emplacement. Following issuance of a preliminary TAD performance design specification in November 2006, vendors prepared "proof of concept" designs for DOE review. DOE issued a final performance specification in June 2007, a Request for Proposals (RFP) in July 2007, and plans to issue a statement of work for final design in FY 07. Figure C represents a schematic of the TAD.

[3] The *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* references for six sites include Pilgrim, St. Lucie 1, Indian Point 1, 2, & 3, Crystal River 3, Ginna, and Monticello .

Features of the TAD canister-based system include:

- Simplify and improve operations throughout the Civilian Radioactive Waste Management System
- Reduce the number of times bare spent fuel is handled from the reactor pool to dry storage, to transportation, and disposal
- Use of overpacks for storage, for transportation and for disposal. As such, components of a TAD cask system will comply with the regulatory requirements of 10 CFR 71 (transportation), 10 CFR 72 (storage), and 10 CFR 63 (disposal), as applicable
- May be used for on-site storage for a period of time at reactor sites; for this purpose the TAD, its overpack, and its contents must be certified by the NRC.

2. Bare Fuel Casks

DOE's approach to transporting bare fuel includes:

- A portion of the SNF inventory may not be transported in TAD systems, either due to fuel parameters or utility site limitations
- As necessary, these SNF assemblies will be directly loaded into bare fuel transportation casks for shipment to the repository
- Casks will be used to transport these assemblies via legal or overweight trucks or rail.

3. DOE SNF and HLW Casks

Currently, most of the HLW and DOE SNF are stored at the Hanford Site, the Idaho National Laboratory, and the Savannah River Site.

- The storage facilities at these sites are managed by DOE's Office of Environmental Management (EM)
- By agreement with EM, OCRWM will be responsible for design, certification by NRC and fabrication of transportation cask system(s) for DOE SNF and HLW
- The EM Program Office is responsible for development of the canisters this waste will be placed in prior to being loaded into the transportation cask.

Figure D. ISFSI at Surry Power Station

4. Dry Storage

Currently, an estimated 10,000 MTHM of SNF are stored in dry storage systems at utility reactor sites across the United States. Figure D, represents a typical ISFSI.

- These figures will continue to grow until the repository opens
- DOE's goal is for utilities to transition to TAD systems for on-site storage when they become available
- A certain number of other dry storage systems will be in use when repository operations begin (for example, at decommissioned sites)
- The majority of these dry storage systems are dual-purpose (i.e., approved by NRC for storage and transportation)
- Current dry storage systems are not covered under the standard contracts as an acceptable fuel form. This provision could be revisited through contract negotiations in the future.

5. Naval Nuclear Propulsion Program SNF Casks

- By agreement, the Naval Nuclear Propulsion Program is responsible for the design, fabrication, and certification by NRC for transportation cask systems for naval SNF
- The Naval Nuclear Propulsion Program is also responsible for managing transportation logistics activities for delivery of naval SNF shipments to the repository.

F. Standard Contract

The Standard Contract with utilities establishes the basis under which the DOE will accept SNF. The standard contract:

- Defines the standard waste forms, i.e., the specific SNF configuration and nuclear characteristics, of the waste
- Establishes the procedure for the utilities and DOE to determine acceptance schedules and to identify which materials are shipped from specific utility sites to the DOE facilities
- Specifies development of a Delivery Commitment Schedule with utilities.

G. Institutional Activities

- OCRWM has a well established national transportation institutional program in place to communicate, exchange information, resolve issues, and develop plans with a wide range of stakeholders
- These include national organizations and groups, including special interest groups, Congress, other federal agencies, and industry associations. States, tribes, and local governments are important stakeholders
- Many of the interested parties already work with DOE through the Transportation External Coordination Working Group (TEC)
- Jointly sponsored by OCRWM and EM, TEC has a national focus and its membership includes state, tribal, and local government organizations; federal agencies; utility and transportation industries; police, fire, and emergency management professional organizations; and labor unions
- OCRWM will continue to engage stakeholders as specific policies and procedures are developed and key transportation decisions are made.

This collaborative effort is outlined in the *Strategic Plan for the Safe Transportation of Spent Nuclear Fuel and High-Level Radioactive Waste to Yucca Mountain: A Guide to Stakeholder Interactions*, November 2003. The Plan presented the Department's strategy and described the process OCRWM will use to work cooperatively with states, federally recognized tribes, local governments, utilities, the transportation industry, and other interested parties to refine the transportation system as it is developed.

H. Operational Planning

Because of the early stage of system development, operational planning has been limited. OCRWM will determine logistics capabilities of reactors and acquire additional information about the transportation infrastructure near the sites. Details will be further developed during campaign planning. A preliminary operational construct is described in the *Transportation System Concept of Operations (CONOPS)* issued in 2006. The *CONOPS* is a high-level description of transportation system design, and it defines the fundamental operational elements of the transportation system. The *CONOPS* identifies the transportation system:

- Vision, mission, and scope
- Stakeholders
- High-level capabilities
- Geographical and physical features
- Functions and activities
- Operational processes and interfaces.

I. Benchmarking

The OLM benchmarking project is intended to identify and incorporate "best practices" for transportation logistics enterprises. Detailed findings can be found in the *Office of Logistics Management Radioactive Waste Logistics Benchmarking: Project Status Report, Interim Findings*, May 2007. This report only covers federal transportation planning and operational activities. An update to capture the benchmarking work performed with the private sector in the U.S. will be published later. A subsequent update will include benchmarking results from international interactions. The current federal benchmarking findings include:

- Business Model
  - Extend logistics team to include waste origin/destination sites
  - Build multidisciplinary teams
  - Keep logistics management hands-on and delegation chains short
  - Extensively use pilot testing to refine plans, equipment and operations
  - Develop and manage to comprehensive transportation plans
  - Integrate new developments in tracking, emergency technology
  - Consider QA impacts of cask certification on OCRWM
- Contract Management/Outsourcing
  - Consider Federal experience in tailoring outsourcing strategies
  - Maintain strong control of mission-critical assets and functions
- Stakeholder Relations
  - Focus on safety as the basis for relationships
  - Make cooperative shipment planning the rule, not the exception
  - Build relationships using training, demonstrations and exercises
  - Work through well-established stakeholder networks
  - Integrate stakeholder relations and technical operations
  - Meet commitments to planning partners

J. Constraints

Several constraints affect scope and timing of OCRWM activities to develop, acquire, and deploy a transportation system. Constraints are considered to be outside the control of DOE and include Congressional direction, court decisions, and market conditions. These constraints include:

- Material shortages and competition from other industries may impact delivery schedules for casks, rail cars, and construction of the Nevada Rail Line
- The availability and timing of funding that is sufficient to:
  - Develop, acquire, staff, provision, demonstrate, and deploy the logistics system
  - Determine the eventual capabilities of the system, its operational flexibility, and the extent to which OCRWM can involve stakeholder participation in the system's development

- Requirements established by the Standard Contract.

K. Risks

Risk management is required under DOE Order 413.3. A risk is an uncertain event or condition that, if it occurs, affects a project or program's objectives, including cost, schedule, or overall scope of work. The two components of risk include the likelihood (probability) of the risk to occur, and the consequences (impacts) if the event does occur.

OCRWM is focused on risks that can be influenced and mitigated. The types of risks analyzed include technical, cost, schedule, and programmatic risks. Although the probability of a threat event cannot be determined, the consequences of threats are being considered and appropriate mitigations will be designed into the transportation system.

OCRWM is using a risk management processes that help assure projects are completed within the approved schedule and cost range. This process consists of risk:

- Identification – determining which risks have the potential for adversely impacting the program or project from a performance, cost and/or schedule perspective
- Analysis – assessing each risk to determine its relative impact on the program or project by evaluating the probability of occurrence vis-à-vis the magnitude/severity of the consequence, with the goal of prioritizing risks for further handling (i.e., qualitative risk analysis)
- Handling/Response – defining options for addressing the risk through avoidance, mitigation, management, or transfer to minimize the threats to achieving the program or project mission
- Monitoring/Control – tracking and reporting on the status of known risks and continuously evaluating the program or project at assigned intervals to identify, analyze, and handle new risks throughout the life cycle.

III. Development of the Transportation System

As discussed earlier, the transportation system will be comprised of capital assets, the capabilities and personnel to operate the system, and an institutional program which engages stakeholders in a collaborative effort with OCRWM to address issues during the development and operation of the system. OCRWM's approach for developing the transportation system is to incrementally develop various portions of the system. While all elements of the system need to be identified and understood, not all elements will be developed at the same time. Some involve long lead time procurement and fabrication projects; however every component will be available when repository operations begin. This section identifies major transportation system elements and current plans for having them in place when needed.

A. Acquisition of Capital Assets

1. Nevada Rail Infrastructure Project

OCRWM is developing a rail line which will provide access between the repository at Yucca Mountain and existing main rail lines within Nevada. Development of the Nevada Rail Infrastructure Project includes a major federal action under the National Environmental Policy Act (NEPA) which requires DOE to prepare an EIS. In December 2003, DOE announced its preference for the Caliente corridor among the alternative rail corridors within which to study possible alignments for construction of a rail line to Yucca Mountain. This required DOE to prepare an EIS for potential rail alignments within Nevada. On October 13, 2006, DOE announced that it would expand the scope of the ongoing Rail Alignment EIS to incorporate analysis of another corridor alternative. This additional analysis will supplement the corridor analyses in the Repository Final EIS. This expanded EIS will be entitled the *Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS* and will be issued in draft form in 2007 for public comment and in final form in 2008. Figure E represents the Nevada rail corridors examined in the Rail Alignment EIS.

Figure E. Nevada Rail Corridors

A conceptual design for the rail line was developed in order to perform the EIS analysis. Once the specific rail alignment is chosen final designs will be prepared.

a. Acquisition Strategy and Schedule

In June 2004, DOE's Acquisition Executive approved the Alternative Selection and Cost Range (CD-1) and acquisition strategy for the Nevada Rail Infrastructure Project.

A range of acquisition alternatives are under consideration for the Nevada Rail Line. A key element of the acquisition analysis is to seek input from potential vendors regarding their views on viable design, construction and operating procurements for development of rail service to the repository. OCRWM issued a Request for Information (RFI) to potential vendors in June 2007.

The purpose of the RFI is to ensure that OCRWM is aware of the full range of industry views on contracting approaches when preparing the Request for Proposal (RFP) for the final design,

construction and operation contract(s) for of the Nevada Rail Line. Table 4 represents the activities needed to complete the Nevada Rail Infrastructure Project:

Table 4. Key Nevada Rail Infrastructure Project Milestones

Milestones	Date
Issue Draft *Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS*	2007
Issue Final *Supplemental Yucca Mountain Rail Corridor and Rail Alignment EIS* and Rail Alignment ROD	2008
Department of Interior Bureau of Land Management grants right-of-way and free-use permits necessary to start Nevada rail construction	2008
DOE awards Nevada rail design/build contract (CD-2)	2009
DOE starts Nevada Rail Line Construction (CD-3)	2009
DOE initiates Nevada rail access to the repository (CD-4)	2014

The objective of the first phase of Nevada Rail Line development is to support completion of the Rail Alignment EIS. The second phase of Nevada Rail Line development is to establish a preliminary design that will inform the scope of the procurements for final design and construction. This preliminary design phase will be based on the alignment that is selected through the NEPA process. The basis of the Nevada Rail Line design will be Industry Freight Railway Standards for a Class 1 Freight Line for safety of operations and ease of maintenance.

b. Nevada Rail Line

Elements of the Nevada Rail Line include:

- The sidings that connect the Nevada Rail Line to existing main line track for removing rail cars with repository construction materials from regular freight consists;
- Fuel services;
- Train control center;
- Maintenance-of-way facility;
- The rail equipment yard for staging and providing minor maintenance support for rail car assets.

c. Construction

The EIS provides analysis of the construction process and technical activities as required by NEPA. Construction planning elements include:

- Alignment description (earthwork quantities, major bridge construction, operations support facilities)
- Significant material considerations
- Construction support elements (construction camps, water requirements, access roads, communications systems)
- Construction Contract Protocols
- Environmental Impacts
- Schedule

The Nevada Rail Line will be a large construction project with multiple contractors, different types of construction (rail beds and bridges) and acquisition of large amounts of material (ballast, ties and rails). Construction could include at least two bridges, about 300 miles of track and sidings, and active and passive grade crossings and access roads. OCRWM plans to install appropriate signaling, communications and tracking systems to enhance safety.

d. Testing and Commissioning

In order to receive certification from the Federal Railroad Administration to commission and put the Nevada Rail Line into service, the line will be extensively tested. Testing ensures that systems meet performance expectations both individually and together in an integrated fashion. The performance expectations the testing will be measured against will be included as contractual requirements. Testing begins as the various construction contractors complete construction systems and segments. As well as assuring that the Nevada Rail Line is built in accordance with the construction contracts, testing also provides the added benefits of: 1) assuring public safety; and 2) providing training opportunities for maintenance and operations personnel.

e. Rail Equipment and Maintenance Yard (REMY)

The REMY will be the physical location where railcars in trains are uncoupled and switched for delivery to the repository. It will be located somewhere along the Nevada Rail Line. It is also where the rail cars are maintained between trips and where minor maintenance is performed on rail cars. The location of the REMY will be one of the decisions made pursuant to completion of the Rail Alignment EIS.

2. National Transportation Project

The National Transportation Project includes the acquisition of shipping casks for truck and rail; special rail cars, and any maintenance facilities necessary to maintain the casks, inter-modal transfer equipment, and monitoring and maintenance equipment. Barges and/or heavy-haul trucks may be used for short-distance transport of SNF from those sites lacking access to nearby railroads. The current plan is to procure services for barge, legal and overweight truck and heavy haul truck shipments rather than procuring hardware.

In June 2004, OCRWM obtained CD-1 approval for the National Transportation Project. Subsequently, OCRWM solicited advice from industry which helped frame the acquisition strategy. A detailed acquisition strategy is being developed in accordance with the requirements of DOE Order 413.3. The procurement approach for each element of the transportation system will be discussed with vendors prior to initiating final contracting activities.

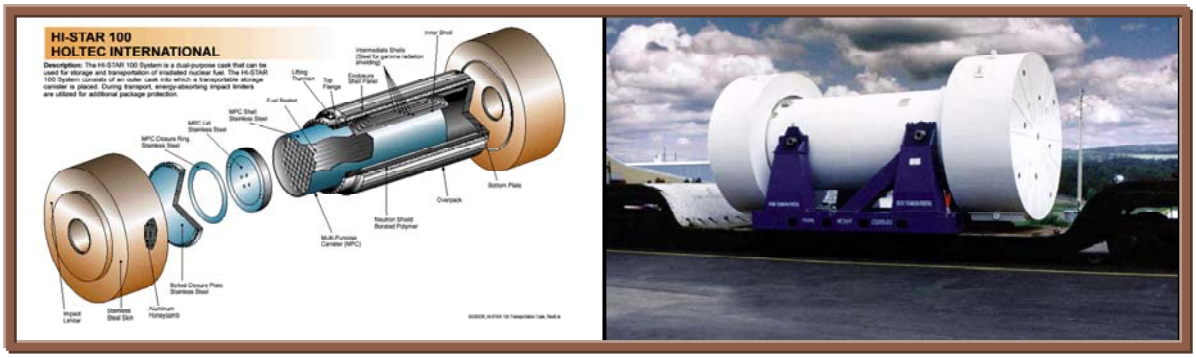
a. Cask Systems

TAD transportation overpacks will comprise the bulk of the transportation cask fleet. Additional transportation cask acquisitions will ensure all of the acceptable waste forms can be transported successfully, even waste that cannot be placed in a TAD canister. The transportation cask system acquisition process will begin in FY 2012. The goal of cask acquisition is to procure and receive initial casks by FY 2016 to support FY 2017 initial waste acceptance.

OCRWM intends to contract with qualified vendors for the design of the TAD system. This design effort is managed by the OCRWM Waste Management Office (WMO). OCRWM intends to procure the casks needed for start-up shipment throughput levels. After the repository opens and shipments begin, the balance of the needed fleet acquisition will be transitioned to the private sector as part of the operational contracting activities.

OCRWM has used a range of estimates and assumptions for determining the likely size of the cask fleet.

Figure F. Holtec International, HI-STAR 100 cask rail, TN-BRP cask sitting on a depressed car



Current estimates for the cask fleet size use conservative transportation turnaround times and cask capacities, resulting in a range of approximately 100 to 120 casks necessary to transport the required 3,000 MT per year based on the *Total System Model*. OCRWM is continuing to model potential operational practices and will refine its estimates of the appropriate cask fleet size and composition when TAD designs are certified. OCRWM does not believe it is necessary, or even preferable, to develop a "final" fleet inventory before these design activities are complete. Flexibility in the acquisition approach will enable the Program to adapt to changed circumstances. Figure F represents a NRC certified cask design and a cask in transit.

b. Ancillary Equipment

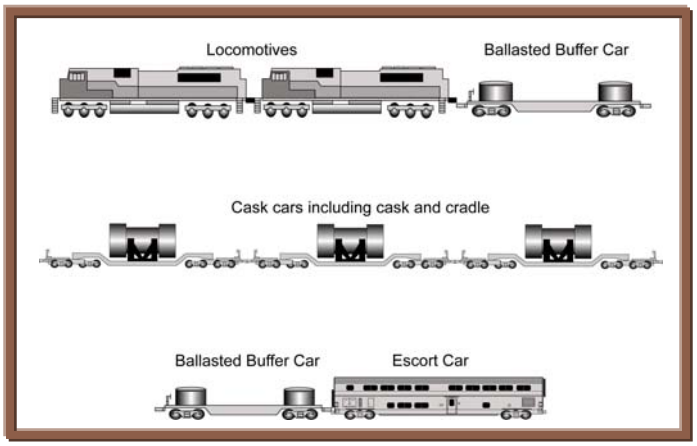
Ancillary equipment encompasses all components used in cask handling operations to move the cask, operate the working mechanisms of the cask and complete the cask loading and unloading process. These components include lifting yokes, lifting slings, vacuum drying systems, hoses and tubing, torque wrenches and other hand tools, and various other implements or pieces of equipment as required by the cask vendor to operate a specific cask system. These components will be designed in conjunction with any new cask system designs. Ancillary equipment is not included in the NRC Certificate of Compliance, although maintenance and testing requirements are detailed in the cask system Safety Analysis Report (SAR) produced by the vendor. The SAR generally stipulates load testing and inspection requirements for the lifting yokes and other rigging components as well as requirements for other components requiring calibration or testing.

c. Rolling Stock

The components of the Rolling Stock include the following specifically designed railcars: cask cars, buffer cars, escort cars, and locomotives. The cask car will carry the cask and cask cradle and may be positioned in the middle of the train consist. The buffer car will act as a spacer between the cask car(s) and the escort car, as well as between the cask

car(s) and the locomotive. The escort car will house the Government shipment escort personnel.

Figure G. Rolling Stock, Escort and Buffer Car Schematic



Rolling stock will be designed to, and tested to meet AAR S-2043 standards. Current plans call for delivery of 400 MTHM in 2017, building to a steady-state acceptance rate of 3,000 MTHM per year by 2021. Preliminary fleet estimates to move 3,000 MTHM annually indicate a potential need for : 120 cask cars, 60 buffer cars, and 15 escort cars. DOE has not decided whether to procure or lease locomotives. Figure G represents a schematic of the train consist including the cask cars, buffer cars and escort car.

The AAR standard requires testing and acceptance of new cars. Prototype cars will be delivered in time to meet acceptance testing schedules. Once acceptance testing has been completed, and the car is accepted by the AAR, production cars will be fabricated. While fewer cars will be needed at the start of shipments in 2017, it may not be possible or economical to procure cars in small lots (railcar manufacturers may select bigger, more profitable product lines like bulk tank cars or commuter railcars). OCRWM may need to contract for larger deliveries in batches to obtain fabrication priority.

Rolling stock acquisition began in FY 2007 with work to design the escort car in collaboration with the Naval Nuclear Propulsion Program. Escort car design work is continuing. Initial development of the cask and buffer cars will begin in FY 2009. Prior to procuring cask and buffer cars, OCRWM will reengage with potential vendors on contracting approached to consider prior to issuing any requests for proposals. The rolling stock procurement is expected to deliver initial railcars by FY 2015 to support operational testing and exercises for initial waste acceptance in FY 2017.

d. Tractors and Trailers

Based on current estimates, only a limited number of tractors and trailers will be required to transport the cask fleet. Tractors for pulling legal weight, over-weight and heavy-haul trailers will be provided by a vendor. OCRWM is currently evaluating a range of options for providing trailers needed for these transport activities. Options include leasing the equipment, purchasing these items prior to cask delivery, or requiring them as part of logistics services contracts. As the procurement of these items is dependent on the type of cask system procured, these decisions will be made during subsequent phases of the cask system acquisition process.

The acquisition approach for trailers will be the subject of interactions with vendors before contracts for procurement of either hardware or services are proposed.

Although this decision has yet to be made, heavy-haul trucks may be used for short-distance transport of SNF from those sites lacking direct rail access. OCRWM may procure heavy haul services. The private sector has significant capacity and experience with providing these services.

e. Maintenance Facilities

The current scope for the cask maintenance facility (CMF) will be to service and maintain the canister-based transportation cask fleet that will be used by OCRWM. Since the repository system is designed to maximize the use of TAD canisters, maintenance of the few casks that have shipped bare fuel will be initially contracted as a service. If this scenario changes this approach will be revisited. In both cases, DOE will utilize a competitive bidding process to develop the facility and to procure maintenance services. The facility would support the operations of the repository and have the ability to maintain and store the cask fleet, ancillary equipment, spare parts and consumables in a controlled environment. The facility would accommodate delivery of transportation casks or other equipment on both rail cars and tractor-trailers. The CMF would be designed to implement radioactive contamination control and personnel and public dose protection in accordance with applicable federal, state and local regulations.

f. Transportation Operations Center

All transportation operations will be managed from an operations center. The following functional capabilities could be provided through the operations center:

- Coordination with the shipping sites, the repository, WMO, and the CMF
- Scheduling the use and maintenance of, casks, ancillary equipment, and rolling stock
- Coordination with carriers
- Pre-shipment notification of states and tribes
- Monitoring and tracking of shipments
- En route communications
- Initiation of emergency management activities including a 24-hour call-in number
- Security communications.

Possible integration of the transportation operations center with the repository operations center and with the emergency management center is being considered. Ongoing benchmarking activities will inform decisions regarding future functions and capabilities.

B. Operations Development

A major part of the OCRWM transportation system development is the design of the operations capability. The first step is to define requirements and how they will flow down into the development of operational planning.

Activation of the transportation system includes shipment planning, dispatch of unloaded casks and associated equipment to an origin site, transport of loaded casks to the repository, secured communications, shipment tracking and maintenance of unloaded casks and ancillary equipment. The *DOE Radioactive Material Transportation Practices Manual* supplementing Order 460.2-1 provides guidance for the procedures to be used for transportation operations.

OCRWM plans to contract for logistics services, and for completing procurement of the fleet assets needed for full scale operations. System readiness will be verified through the use of exercises, practice runs with empty casks, and operational readiness reviews, including the conduct of field exercises and proof of operations testing.

1. Operations Activities

An operations plan will be developed and used as a basis for hardware and operational training; resource deployment; preparatory activities; and full scale operations. Transportation planning activities include identification of applicable regulatory and programmatic requirements, selection of modes and routes to be used, development of a communications and tracking system and planning for public information. States, tribes, carriers, and utilities will be involved in development of the operations plan.

Table 5, represents the operational activities needed to begin transportation operations.

Table 5. Operations Milestones

Milestones	Date
Finalize National Transportation Operations Delivery Commitment Schedule	2012
Complete National Transportation Site-Specific Service Agreements	2015
Begin National Transportation Operations	2017

2. Assessment of Existing Infrastructure

While OCRWM will not fund the upgrades to infrastructure at shipping sites or the national transportation infrastructure that might be deemed appropriate, it is critical to understand the capabilities of the infrastructure in these areas. The following describes how OCRWM will assess those capabilities.

a. On-site assessment: Prior studies have evaluated utility on-site capabilities to ship spent fuel, including crane load capacity, pool depth, rail infrastructure and other operational interface issues. The FICA study was conducted in 1992 and was followed up by a planning study entitled Facility Interface Data Sheets (FIDS) in 2004 that also supported the acquisition strategy. Results of the FIDS are not publicly available. Both of these studies will be updated by field surveys to inform a revision of the Transportation Operations Plan and used in concert with the final delivery commitment schedule. This data will allow OCRWM to identify the shipment mode, the kind of casks and the ancillary equipment required for each facility. Utilities and DOE sites are responsible for any infrastructure upgrades within the gates of their facilities needed for transportation activities. This information will feed into the site specific campaign plans.

b. Near-site infrastructure: A prior study of Near-site Transportation Infrastructure (NSTI) assessed the capabilities of highways, bridges, railroads and barge access to each utility site. OCRWM intends to revisit the study to update the data as needed. Due to the long lead time for infrastructure upgrades by states, counties, and railroads, the initial step is to team with the FRA to review short-line railroad track capability near reactors. In addition, state transportation departments will be consulted through the SRGs to identify the long range transportation plans for highway and bridge upgrades in the vicinity of the shipping sites. OCRWM will rely on DOT planning and funding and private sector investments for any needed upgrades. DOE sites will also be surveyed to understand their infrastructure condition.

c. National Infrastructure: The existing interstate highways and rail lines serve a large volume of traffic and DOE will operate over that system as would any other shipper. OCRWM will work with states and industry on routing options, as needed, to address shipment size, weight and dimensional considerations.

3. Logistics Management

In accordance with the NWPA, OCRWM will use private industry to the maximum extent possible. OCRWM's role will be to oversee the contractor(s) providing logistics support.

a. Campaign Planning

OCRWM anticipates managing shipments as a series of campaigns with a campaign defined as those shipments from a single origin site to the repository. A site campaign plan contains step-by-step, real-time instructions for completing a shipment from an origin site. A site campaign

plan will be developed annually for each origin site scheduled to ship material to the repository. In accordance with the standard contract, campaigns are scheduled according to the delivery commitment schedule. Sixty-three months prior to the start of any shipping campaign, OCRWM would contact origin site and appropriate agencies to begin finalizing specific details of the campaign and assembling them into a campaign plan. Details of the campaign plan would include, but would not be limited to:

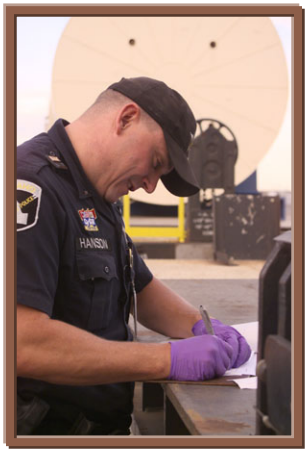
- Identification of the type and number of casks required
- Identification of Transportation Service Provider serving the origin site
- Identification of appropriate shipping windows that meet approved final delivery commitment schedules
- Final details on any restrictions on use of the selected shipping routes
- Details on how inter-modal transfers would be provided if required
- Specific locations for the delivery of empty casks and equipment to the origin site
- Details for the acceptance of loaded casks by DOE
- Which routes from the suites of routes would be used for the shipments
- Location of the classification yard in the event cask cars from multiple shipping sites are incorporated into a single dedicated train for the cross-country shipments
- Roles and responsibilities with states, tribes, local officials, carriers, utilities, and DOE and other federal agencies.

Agreements about specific roles and responsibilities and details of site campaign plans will be coordinated with the shipping site, states, and tribes and commercial carriers at least two years prior to a shipment so that all parties can plan well in advance and organize the appropriate training and resources. The site campaign plan will formalize those agreements.

b. Notification

As required by the NWPA, Section 180(b), all shipments to the repository would comply with NRC regulations on advance notification to state governments. Although current regulations do not require notification of tribal authorities, DOE policy is to inform tribal governments of SNF and HLW shipments that would pass through their jurisdictions.

Figure H. Inspection in Progress



c. Inspections

Prior to shipment of transportation equipment to origin site will be inspected by OCRWM and any defect will be corrected prior to its deployment. Further, loaded shipments will be inspected prior to departure from the origin site by state and federal inspectors for compliance with appropriate requirements.

OCRWM will follow the CVSA Level VI inspection standards and

participate in that program for truck shipments. The pre-shipment inspections ensure that OCRWM and contractor-supplied equipment meets the highest transportation safety standards. Shipments in-transit may be inspected by state, federal and industry inspectors, as required, but with a goal of minimal in-transit inspections due to reciprocity agreements between jurisdictions. OCRWM intends to integrate and schedule any such inspections with other planned stops for fuel or crew changeovers. OCRWM's goal is to demonstrate safety performance that would justify decreasing the number of such in-transit inspections over time. Figure H illustrates an inspection in progress.

For rail shipments, inspections will be conducted in accordance with the FRA's *Safety Compliance Oversight Plan* shipment inspection program and the state's rail safety programs. Barge shipments will also be inspected which may involve the U.S. Coast Guard and Port Captains.

d. Shipment Tracking

OCRWM will track shipments in-transit. OCRWM tracking will integrate geographic location capabilities, onboard monitoring and two-way communications to provide for real-time assessment and response capabilities. Tracking may also be used to direct OCRWM resources and equipment including when to use expediting services to ensure that logistics schedules can be met. OCRWM will assess other DOE tracking systems and evaluate if any additional technology will be required closer to the start of shipping. Appropriate state and tribal officials will have access to shipment tracking information for shipments that will cross their jurisdictions.

e. Communications

Transportation system communications will be coordinated through the transportation operations center. Activities will include routine communications with carriers; coordination between shipping sites, carriers, and the repository with states, tribes, and other federal agencies; notification of shipments or changes to schedules to statutory recipients and those having a demonstrated need-to-know; coordination with parties dealing with operational contingencies; and support of emergency response situations.

f. Operational Contingencies

Contingency planning will be built into transportation campaign plans and site specific service plans, and will be coordinated with stakeholders. Operational contingencies include:

- Weather and other natural phenomenon: These events tend to be local and somewhat transitory in nature. OCRWM will direct commercial highway carriers to heed advice and guidance issued by local law enforcement agencies and other authorities regarding route conditions and travel restrictions. Rail shipments will proceed under railroad guidance and operating procedures.

- Mechanical: Carriers will be required to have repair plans, contractor support identified for spares or replacement vehicles, or equipment and riggers and cranes in the event of an emergency en-route.

- Scheduling: Unexpected changes to the schedule would require the operations center to notify the applicable state and tribal officials, utilities, the repository and other parts of the system of any changes to schedules so that they can take the appropriate action.

4. Security Planning

Security planning will be done in accordance with NRC regulations in 10 CFR 73, or equivalent DOE requirements. Assessing nationwide and specific threats and developing appropriate responses would be done in coordination with state, tribal and local, and federal officials. OCRWM plans to provide armed escorts with all shipments.

5. Demonstration Tests

Demonstration tests could be applied to actual shipments of material that would be moved by OCRWM and associated with other activities, such as research projects. Planning will incorporate tabletop exercises as well as demonstration projects to test the entire transportation system in collaboration with key stakeholders.

6. Operational Readiness Reviews

Readiness reviews include validation of procedures and planned responses to confirm that plans actually work and communication channels are open and accessible. Readiness reviews may involve origin sites, the repository, state, tribal, local and other federal agency officials. The outcome will be a demonstrated capability rather than a proposed capability benefiting all involved entities. Operational readiness reviews encompass planning tabletops, practice runs and operational exercises.

7. Pilot Projects

OCRWM plans to conduct pilot projects to test the new system before larger scale investments are made and the full-scale rollout is started. OCRWM plans to test the transportation system operations to validate that the shipments can be conducted safely and securely ahead of initial shipments. Pilot projects would include conducting training in cask handling for the logistics operator, for repository personnel and for shipping sites using non-radioactive and non-contaminated cask systems. Other pilot projects may involve shipment of empty casks using contracted carriers and selected routes. Involving carriers, state, tribal and local officials in OCRWM shipment operations before loaded casks are shipped is part of the gradual and collaborative development of the transportation system that will add to the safety of the actual shipments when they begin. In addition, a Section 180(c) pilot program will be used to test the approach to Section 180(c) implementation and will involve state and tribal governments.

C. Institutional Program

An important facet of the transportation system development/execution process, which will continue on for the life of the OCRWM program, is building relationships. OCRWM is working with interested parties through a collaborative planning process seeking input for developing specific policies and procedures and key program decisions. Open and timely communication with stakeholders will help build public confidence in OCRWM's ability to ship SNF and HLW safely and securely.

OCRWM is developing an internal institutional plan that guides its outreach efforts and outlines the issues being addressed and the resolution mechanisms. Current planning envisions expanded stakeholder relations activities as the program matures and technical and operational program approaches are refined.

1. State Regional Groups

SRGs anchor the collaborative process with the states. DOE has had a working relationship with states for over 25 years and maintains cooperative agreements with these groups which represent the interests of their member states. The regional groups are:

- Council of State Governments' (CSG) Northeast HLW Transportation Task Force
- CSG's Midwestern Radioactive Materials Transportation Committee
- Southern States Energy Board's Radioactive Materials Transportation Committee
- Western Interstate Energy Board's High-Level Waste Committee

2. National Interactions

OCRWM maintains an institutional program through which it will communicate and exchange information, and develop plans with national organizations and groups, including Congress, other federal agencies, national special interest groups, and national labor organizations. The phases of the interactions will be timed to support the OCRWM operational and technical decisions. Participants in each phase and the type and amount of information OCRWM shares will depend on the participant's roles and responsibilities for ensuring safe, secure, and efficient transportation. For security reasons, the more detailed the planning becomes, the fewer the number of participants that can share in the increased level of detail.

OCRWM continues to work with interested parties through TEC, which has a national focus. TEC members represent organizations, not individuals. TEC meets in an informal atmosphere of open communication to learn about and discuss DOE shipping activities, to identify transportation and emergency preparedness-related issues of concern to their constituents, and to discuss potential ways of addressing those concerns. TEC meetings are held semi-annually, and are open to the public.

To facilitate national planning efforts, OCRWM has awarded cooperative agreements to two organizations, the National Conference of State Legislatures (NCSL), and the Commercial Vehicle Safety Alliance (CVSA), to exchange information and improve understanding by state officials about transportation safety. NCSL is a bipartisan organization that provides research and technical assistance to state legislators and their staffs. CVSA promotes commercial motor vehicle safety and security. Its members enforce motor carrier safety laws. All 50 states belong to these organizations.

OCRWM interacts with the NRC, DOT, and DHS (including the Federal Emergency Management Agency) through the TEC and in one-on-one meetings, as appropriate. These interactions will promote coordination on programmatic activities such as emergency preparedness and ensure all applicable regulatory requirements are met. Barge shipments will also require interfaces with the U.S. Coast Guard. A memorandum of agreement may be developed that addresses understanding between the two Federal Agencies regarding the conduct of barge operations that involve OCRWM shipments.

With regard to local governments, OCRWM recognizes that local officials are uniquely qualified to provide information on transportation conditions and impacts within their areas of jurisdiction and, accordingly, are important participants in developing procedures for the transportation system. In planning for safe, secure, and efficient shipping operations and emergency response capability, OCRWM will provide grants and technical assistance to state and tribal officials for training at the local level as specified under the NWPA Section 180(c) provisions. In addition, OCRWM will coordinate with other training providers, such as the DOE Transportation Emergency Preparedness Program, DHS (including the Federal Emergency Management Agency), and the DOT.

Interactions with local governments will be through designated state liaison representatives and directly, as particular transportation issues or situations dictate. For instance, in Nevada, the Affected Units of Local Governments has specific roles spelled out in the NWPA. As part of transportation planning, mitigation of impacts to communities will be addressed as part of the development of the railroad and for transportation operations. OCRWM will continue to have detailed interactions with local governments in Nevada and will provide local officials and their communities with current and accurate transportation information.

Business arrangements between OCRWM and railroads handling the shipments will address operations, services, and costs.

For barge shipments, operating agreements with affected port authorities and the U.S. Coast Guard will be needed. These agreements will include terms that address dwell time and location of shipments during inter-modal transfers and during times when port operations would normally not be conducted; standards of practice; service standards; and operational interfaces (including equipment).

3. Tribal Interactions

Tribal governments are sovereign nations, and OCRWM will interact with federally recognized tribes on a government-to-government basis as described in the *U.S. Department of Energy American and Alaska Native Tribal Government Policy*. OCRWM is establishing relations with tribes along potential shipping routes through one-on-one visits, workshops, tours, and expanding tribal involvement in TEC.

OCRWM is following up with tribes and any others identified along potential Yucca Mountain shipping routes, to keep them informed and to obtain their input on crucial transportation decisions. Regional and national meetings with tribes may become part of this follow-up activity. Other mechanisms to interact with tribes might include holding meetings in conjunction with existing EPA regional meetings. This approach might require an MOU with EPA.

OCRWM will continue to participate in other DOE tribal outreach efforts, including State and Tribal Government Working Group, and coordination with the DOE Director for Indian and Inter-governmental Affairs and regional DOE tribal points-of-contact.

4. Nevada-Specific Interactions

Because the State of Nevada is the host state for the Yucca Mountain repository, Nevada-specific transportation planning activities will support and enhance existing interactions conducted by the OCRWM Office of External Affairs. This includes working with the affected units of local government, coordination with the State of Nevada and its agencies, and through public information and education programs already in place.

During the preparation of the EIS to support the construction of a rail line linking the repository to the national rail system, OCRWM has engaged the state, tribal, and local governments in Nevada through scoping meetings and coordination around rail alignment activities. These include topics such as impact mitigation, access to water and grazing areas, location of construction camps, and rail maintenance facilities. These interactions will be increased once the Draft Rail Alignment EIS is published to address the analyses and conclusions in that document. Nevada representatives also participate in TEC and the Western Interstate Energy Board's HLW Committee.

5. Communications/Public Information

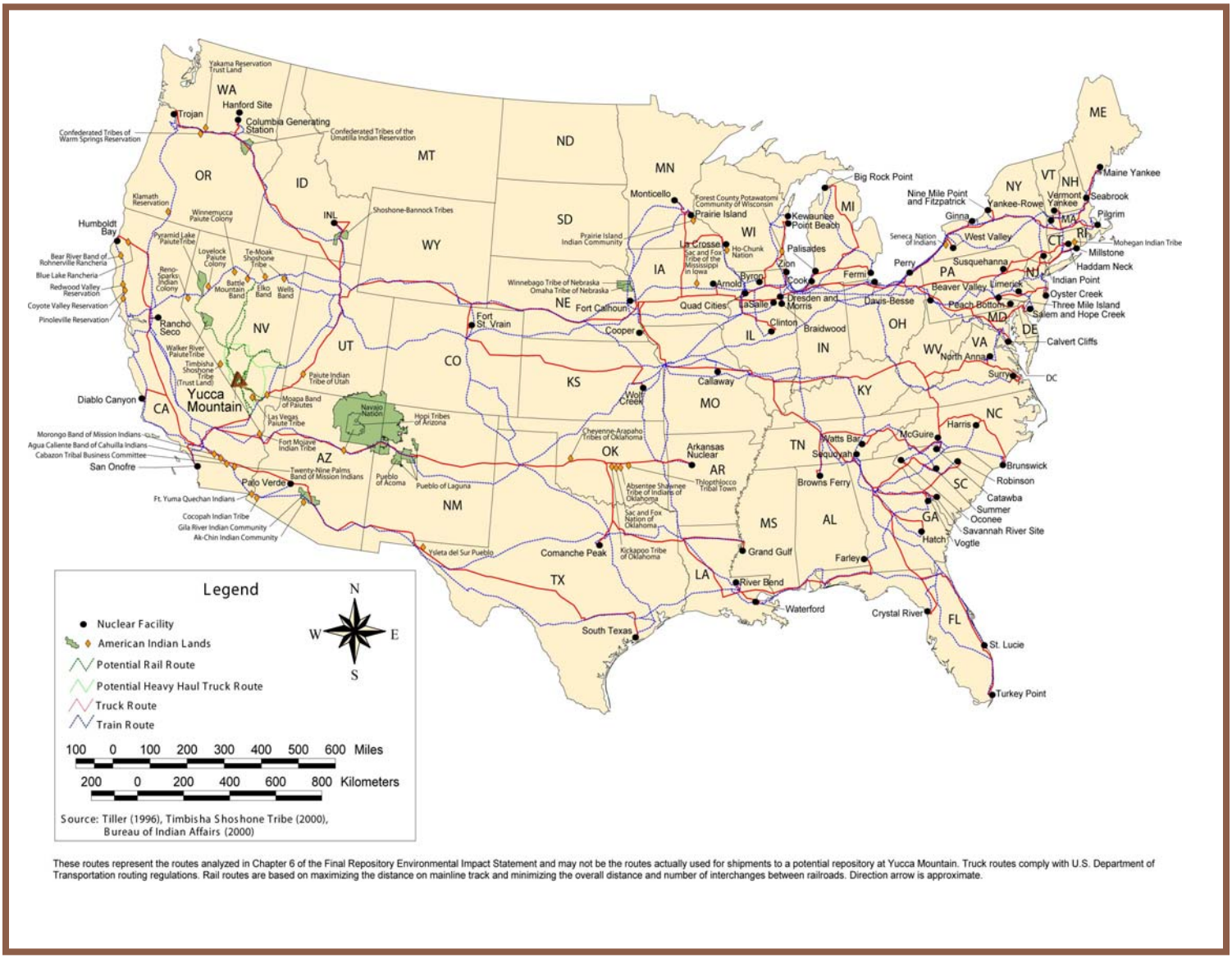
OCRWM provides transportation program information to interested parties, including states, tribes, the public, industry, and the media. Types of materials include reports, brochures, news releases, audio/visual materials, and fact sheets and exhibits. Information programs will be integrated with educational/training programs in presentations, display materials, exhibits, and other interactions with various parties to increase their knowledge of the program. Information

materials are developed jointly with our stakeholder groups so that they are appropriate for their constituents use.

D. Key Logistics Development Initiatives

Two key initiatives in which OCRWM has and will continue to engage stakeholders are route selection and emergency preparedness. Figure I, represents the representative routes analyzed in the Final Repository EIS.

Figure I. Representative Routes Analyzed in the Repository Final EIS



These routes represent the routes analyzed in Chapter 6 of the Final Repository Environmental Impact Statement and may not be the routes actually used for shipments to a potential repository at Yucca Mountain. Truck routes comply with U.S. Department of Transportation routing regulations. Rail routes are based on maximizing the distance on mainline track and minimizing the overall distance and number of interchanges between railroads. Direction arrow is approximate.

1. Route Identification

OCRWM has started a process to identify routing criteria, initially focusing on rail routing that involves working with railroads, carriers, states, tribes and local officials. The work is being conducted through the TEC Routing Topic Group. Later on, broader public input will be sought to provide comments on routing criteria and the process for developing a set of routes. Industry standard practices, DOT requirements and analyses of regional routes by state organizations will be included in the process for DOE's identification of a preliminary set of routes. Should proposed DOT and DHS regulations become adopted further defining the rail industry's responsibility to determine safe and secure routes for SNF shipments based on their operational knowledge and analyses of safety and security risks along alternative rail routes, DOE will ensure industry regulatory responsibility is considered in route identification for OCRWM shipments.

Identifying routes for shipment campaigns is a prerequisite for state, tribal and local government transportation partners' use in developing their grant applications for training emergency responders under the provisions of Section 180(c) of the NWPA. Timely identification of routes provides an advanced planning framework for states and tribes and allows time for security reviews and operational testing well in advance of actual shipments. Even though OCRWM will solicit input from stakeholders, DOE is responsible for the final determination of routes with carrier input.

The OCRWM process for identifying suites of national routes will address program needs to ensure consistency and adequately incorporate stakeholder input including:

- Solicit stakeholders input on criteria
- Seek input from the general public on criteria and process
- Complete criteria for route identification in FY 08
- Select preliminary suite of routes in FY 09
- Determine specific routes for actual shipping campaigns in advance of the shipments.

The National Academies' Committee on Transportation of Radioactive Waste provided recommendations on developing routes in the report, *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States* which include:

- Coordinate route planning, emergency preparedness and training with states as mitigation strategies
- Identify and make public a suite of preferred highway and rail routes for shipments to the repository as soon as practicable to support state, tribal and local planning.

The basis for final route identification will be existing regulations, industry standards and DOE policies. Final reviews of the candidate highway and rail routes with the SRGs,

tribes, and carries will result in a national suite of routes. The purpose of this review will be to afford these stakeholders the opportunity to know in advance what routes have been identified and to offer any additional information that may be useful to further refine the routes. Under current regulation, DOE will have the responsibility for final route selection using the input from the stakeholder community.

2. Emergency Preparedness

As a part of planning for shipments to the repository, DOE understands that train and truck accidents may occur. Although it is highly unlikely that any accident would lead to a release of radioactive materials from a shipping cask due to its robust nature, DOE will develop its own emergency response plan and will provide assistance to emergency response officials in helping them prepare for such an event.

a. DOE Emergency Response Plan

DOE will develop an emergency response plan that provides requirements and guidelines to be followed by DOE management personnel in the event an off normal or emergency situation occurs during an en-route transportation activity. The primary focus of the plan will be to provide specific guidance that directs appropriate response actions in addition to the immediate notifications and actions taken by on-scene shipper or carrier personnel. It will contain a list of points of contact with state and tribal emergency response agencies. The plan would address coordination with on-scene response personnel and that notifications and communications with other federal and state jurisdictions has been established and is being maintained. The plan will also address press and media briefing guidelines.

Carrier emergency response plans will also be developed under their contract with DOE. This information will be a section of the individual campaign plan.

b. Section 180(c) Implementation

As is the case in all emergency situations, state, tribal, and local safety officials have primary responsibility for public health and safety and would be the first responders to any transportation accident involving radioactive materials.

The Department has a statutory responsibility to help prepare the emergency response system described herein. Section 180(c) of the NWPA, as amended, states:

> "The Secretary shall provide technical assistance and funds to states for training for public safety officials of appropriate units of local government and Indian tribes through whose jurisdiction the Secretary plans to transport SNF or HLW. The training shall cover procedures required for safe routine transportation of these materials, as well as procedures for dealing with emergency response situations."

The implementation of the Section 180(c) program has three stages. During the first stage, OCRWM will develop the proposed grant policy and steps to implement the program, conduct a pilot involving a limited number of states and tribes to test the program, and then issue the final Section 180(c) Policy. The second stage will begin in 2012, when OCRWM must set up the grant process in order to make funds available four years prior to the first shipment. During the third phase, the grant program will become fully operational phase with potentially 43 states and 49 Indian tribes eligible for grants. The third phase would last until shipments to the repository are complete.

(1) State and Tribal Grants

Under the Section 180(c) program, DOE will make available two grants to eligible state and tribal governments, an initial assessment and planning grant and a training grant. The assessment and planning grant will be available four years prior to shipments commencing through a jurisdiction. Once the state or tribe completes the assessment and training grant they will be eligible for the training grant every year that shipments travel through their jurisdiction.

(2) Training and Exercises

The key to effective emergency response is training and preparation. Emergency responders receive assistance and training from a variety of federal agencies, including the Federal Emergency Management Agency and the Departments of Energy, Transportation, and Homeland Security. DOE has an extensive history helping states plan and carry out multi-jurisdictional exercises to prepare for radioactive materials shipments.

Within the limits of the grant guidelines the Section 180(c) grants allow recipients to plan exercises and select training best suited to their jurisdiction. The Department will work cooperatively with interested jurisdictions to plan and conduct exercises. In addition, the Department has emergency management planning and training assistance available through the Office of Environmental Management's Transportation Emergency Preparedness Program (TEPP). Recipients of Section 180(c) grants may access this training or the training of their choice provided it is approved in their grant application.

(3) Technical Assistance

Technical assistance to support 180(c) activities will consist of non-monetary assistance offering DOE's specific knowledge, expertise, and existing resources to aid training of public safety officials. Procedures will address safe routine transportation and emergency response situations. Technical assistance could also include provision of information packets with materials about the OCRWM Program and shipments, and provision of other training materials and information.

IV. Outstanding Issues and Resolution Method

Addressing issues through a collaborative planning process is not new to the DOE. The DOE has been using mechanisms such as the TEC and cooperative agreements with stakeholders for a number of years to address transportation issues. Outstanding issues that will be resolved before shipments commence are captured in Table 6.

Table 6. Transportation Issues – Outstanding

Issue	Resolution method
Routing – The process to be used for selecting preferred and alternative routes	Highway routes are selected in accordance with 49 CFR 397.101(b). Selection of highway routes will follow the approach of several current DOE programs, which includes working with state and tribal governments to identify several legal routes under the DOT routing rule. States and tribes will have the opportunity to establish alternative routes, per the DOT, prior to OCRWM shipments. Rail routing is dependent on railroad business and routing practices. The DOE is currently working with SRGs to develop route selection criteria and to obtain recommendations for regional suites of routes (preferred and alternative). In addition, a TEC Topic Group is working on routing criteria and the process for identifying a suite of national routes.
180(c) Technical Assistance and Funding for Training – The level of support to be provided to states and tribes for transportation preparedness and emergency response training	Since 1995, the DOE has been collaborating with stakeholders to develop policies and the implementation process for issuing Section 180(c) grants to affected states and tribes. Section 180(c) requires the Department to provide funding and technical assistance to states and tribes for training public safety officials through whose jurisdictions OCRWM plans to transport SNF and HLW. In 2004, OCRWM established the Section 180(c) Topic Group to continue to develop a policy for Section 180(c) implementation. The policy will be issued in a Federal Register Notice. A policy addressing tribal grants is being discussed with tribes and is under development.
Rail Alignment – The rail alignment to be used in Nevada directly to repository	Selection of the Nevada rail alignment is being addressed through the NEPA process. The Rail Alignment EIS is underway, and the Record of Decision is anticipated in fiscal year (FY) 2008.

Issue	Resolution method
Safeguards and Security – The role of each governmental and commercial entity involved in shipment and the interactions to define that role	OCRWM will work with SRGs and tribes in developing approaches to securing shipments. This effort will address escort and inspection activities, as well as new security requirements for shippers and carriers promulgated since September 2001. Safeguards and security activities will be governed by requirements and needs at the time of shipment. Key elements of the security system will be information security, people, hardware, and operations.
Operational Practices – What operational practices will apply to NWPA shipments	The DOE Radioactive Material Transportation Practices Manual 460.2-1 incorporates many OCRWM shipment practices. Stakeholders were engaged in the effort. OCRWM will work with stakeholders regarding development of operational systems and procedures (i.e., loading/unloading, transport, communications, logistics, routing, etc) and operational plans and exercises. Additionally, the OCRWM will work with states, tribes, other federal agencies, and industry to identify enhancements to its existing unclassified tracking satellite system called TRANSCOM, so that the most current generation of tracking systems appropriate to a particular mode is available for shipments to the repository. Ongoing discussions are required regarding inspection of rail shipments so an inspection process that minimizes operational impact can be implemented (like the CVSA state reciprocity system for highway shipments).
Operational Procedures and Plans/Transportation Services - The OCRWM will define its operational procedures and plans and obtain its transportation services	The OCRWM will develop a transportation operations plan that will outline the waste acceptance schedule, modal mix, cask usage, operational features of the system, and transportation services. The plan will detail the features of the transportation system, planning activities, and coordination with other federal agencies and state and tribal governments for training and emergency preparedness. Campaign plans specific to each shipping site will tier off the operations plan. The OCRWM will also continue to develop and refine an approach for the performance of its acceptance and transportation responsibilities as set forth in the NWPA and in the Standard Contract. As required by Section 137 of the NWPA, as amended, the DOE will utilize private industry to the fullest extent possible in each aspect of transportation.

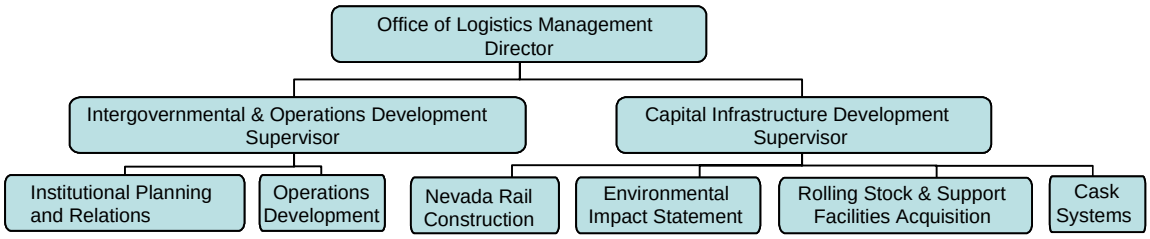
Issue	Resolution method
Application of Regulations to NWPA - which regulations are applicable	The OCRWM will follow all applicable state, tribal, and federal regulations in place when shipments occur. See the FEIS, Appendix M.

V. Organization

A. Organizational Overview and Structure

OLM is responsible for developing and operating the transportation system and is made up of two activities, as shown in Figure J.

Figure J. OLM Organizational Chart



The current OLM organization is structured to provide key management attention in two specific areas. The first is operational development including institutional planning. The second is capital project development. Both areas of system development rely heavily on stakeholder interactions in the planning process. As the transportation system matures, the focus will shift from planning to design and construction. At the end of the capital project development effort, the organization will change to focus on transportation exercises and demonstration projects until the repository is ready to open. As preparedness for actual operations begin, the OLM organization will transition to a structure focused on operations and maintenance.

B. Personnel

The private sector will be used to the maximum extent possible in accordance with the NWPA, as amended. The personnel needed to develop and manage operation of the transportation system will change during different phases of the program. These needs will be dictated in large part on the scope of activities in each phase of development. It is assumed that OCRWM will maintain control of the following transportation related activities, using Federal employees with the following areas of expertise augmented by contractor support, for the life of the program:

- Project Management and oversight
- Grants management and technical assistance
- NEPA compliance
- Quality Assurance (QA)

- Transportation policy development
- State and tribal interactions and negotiations
- Emergency preparedness planning
- Systems engineering
- Contract and contractor management
- Logistics planning and execution
- Safety oversight
- Permitting

Activities conducted by contractors will be addressed according to the program phase include:

- Conceptual and final design
- Construction of facilities and hardware
- Logistics, shipment, and maintenance operations.

1. System Development Phase

OCRWM will continue to rely on contractors to provide the people and services to produce the products necessary to achieve its mission. Currently, OCRWM receives support from a Management and Operating Contractor, a Direct Support Services Contractor, and various National Laboratories for planning for infrastructure development and interacting with stakeholders. OCRWM will require very specialized skills for key activities that only last 3-5 years in the final design and in the construction/acquisition phases of capital project development. For these specialized and short lived activities, the best experience and knowledge can be obtained through contracting.

As OCRWM transitions from system development to system operations, the number of contracts will likely decrease, while the number of contractors will be determined by the level of shipment activity each year.

2. Operational Phase

To implement the operational phase, OCRWM will decide whether to use the services of an integrated logistics contractor for operations or contract directly with separate transportation service providers for services to:

- Develop detailed campaign plans
- Coordinate transportation activities and equipment training with utilities and DOE sites
- Operate the National Transportation Operations Center
- Operate the Nevada Rail Line
- Operate the cask maintenance facility

- Operate the rail equipment maintenance yard and the rail maintenance-of-way facilities.

C. Roles and Responsibilities

1. OCRWM. The OCRWM adheres to the concepts of performance-based contracting where the government establishes requirements, the contractor performs the work necessary to meet those requirements, and the government reviews and accepts the products. Within this structure, the OCRWM sets policy and expectations; monitors key performance indicators; and provides leadership and incentives to ensure critical outcomes, including quality, safety, regulatory acceptance, and fiscal responsibility are successfully achieved. The Office of the Director:

- Is ultimately responsible for development and operation of the repository system including transportation
- Provides overall policy, guidance, and direction
- Facilitates integration of program activities
- Provides resources, both fiscal and personnel
- Ensures effective implementation of the QA program
- Provides interface with Congress, Secretary of DOE, other Federal agencies.

2. OLM

- Establishes the strategy, policy, requirements, analyses, and formulating plans for the transportation system in support of repository planning and operations
- Develops, implements and maintains transportation requirements, protocols, procedures, document control processes, and quality assurance requirements
- Prepares NEPA documents for transportation activities
- Conducts interactions with the Bureau of Land Management, other agencies, and private landowners as necessary to facilitate the acquisition of an administrative land withdrawal, right-of-ways, or easements for the Nevada Rail Line
- Interacts with EM on development of near-site transportation requirements, including facility interface and servicing equipment needs
- Implements policies and procedures related to transportation operations, notification, logistics, safeguards and security, safety and regulatory compliance to operate a nation-wide transportation system
- Develops and implement policies and strategies for conducting communications and interactions with states, tribes, and local government entities, national and regional organizations, the professional and technical community, and public interest groups regarding OCRWM transportation issues
- Implements NWPA Section 180(c) by working with state, tribal, and local governments regarding the disbursement of grant funds for training, emergency preparedness, and emergency response and fully integrates with transportation

operations planning and execution
- Develops acquisition strategies and contracting approaches for transportation goods and services.

3. Other DOE Programs

- DOE sites with material for disposal at the repository will receive, load, and prepare casks for shipment and will provide OCRWM with the information needed to develop transportation campaign plans
- The Naval Nuclear Propulsion Program will provide cask systems and railcars and manage the transportation logistics activities for delivery of naval SNF to the repository for disposal.

4. States and Tribes

- Protect public health and safety and the environment in their jurisdictions
- Regulate and enforce the safe transport of hazardous materials (not pre-empted or assigned by federal legislation and regulation)
- Designate preferred alternatives to DOT routes for shipment of highway route-controlled quantities of radioactive material
- Provide for security and law enforcement resources as each state deems appropriate (OCRWM will provide armed escorts)
- Provide emergency response resources
- Provide training for local officials under Section 180(c)
- Cooperate and assist in the environmental cleanup of hazardous materials resulting from an incident
- Coordinate with local or sub-jurisdictions.

5. Local Governments

- Responsibility to protect health and safety in their jurisdictions
- Provide for security and law enforcement resources, as needed
- Provide emergency response resources
- Coordinate with states, commercial utilities, and DOE facilities as needed.

6. Utilities

- Provide information needed by OCRWM to plan transportation campaigns
- Load transportation casks
- Prepare their portion of the shipping papers
- Certify that waste is ready for shipment to the repository

7. Transportation (and related) Industries

- Supply NRC-certified casks procured by DOE, or through logistics service contracts
- Supply AAR S-2043 rail cars procured by DOE, or through logistics service contracts
- Provide transportation services to move the radioactive materials in compliance with DOT, NRC and other regulatory requirements and DOE tender/contract provisions
- Recover any cask involved in an incident, and cleanup environmental contamination caused by the transport or an incident
- Meet all safety, public health and environmental regulations (federal, state, tribal and local) and standards set by the industry (AAR and CVSA)
- Pay all appropriate fees, taxes, and tolls through their contracting mechanism with OCRWM

8. Other Federal Agencies

- NRC
  - Promulgate and enforce shipment pre-notification requirements and cask certification requirements
  - Regulate the packagings used by OCRWM to transport SNF and HLW to the repository.

- DOT
  - Regulate the handling, packaging, and transport of SNF and HLW
  - Rail: Regulate the operations of railroads, inspect and enforce the safety of the engines, cars, tracks, and associated operating infrastructure of railroads; enforce the safety for the transport of hazardous SNF and HLW
  - Highways: Designate highway route-controlled quantity routes and sets the requirements for the designation of alternate and alternative preferred routes; establishes highway safety standards for SNF and HLW shipments
  - Motor Carriers: Regulate the operations of motor carriers, including vehicles, drivers, and associated personnel (loaders, management of carriers); enforce the safety regulations for transport of SNF and HLW on the roadways in conjunction with states.

- DHS
  - OCRWM will be working with DHS to determine how best to integrate DHS and DOE emergency preparedness and security issues associated with transportation
  - The U.S. Coast Guard regulates barge operations in waterways, including routes, security envelopes, and enforcement of personnel qualifications for barge pilots.

VI. Baselines

At the appropriate time, OCRWM will develop a performance baseline (CD-2) for each capital project. Transportation capital projects include the Nevada Rail Infrastructure Project and the National Transportation Project. The transportation system project baseline consists of the technical scope, schedule and cost of activities needed to complete these projects. For the Nevada Rail Infrastructure Project, the scope includes design and construction of the Nevada Rail Line and rail support facilities (Interchange Facility, End-of-Line Facility, Maintenance of Way Facilities, Train Control Center); field investigations; and the Yucca Mountain Rail Corridor and Rail Alignment EIS. The National Transportation Project scope includes development of specifications and acquisition of rail and truck cask systems; design, acquisition, manufacture, testing and acceptance of rolling stock; and design and construction of cask maintenance and transportation operations facilities.

Long lead times are required between the initial procurement of the transportation capital assets, including casks, TADs, and rolling stock, and the actual delivery of such items. Since these capital assets are very specialized and must meet stringent design and performance specifications, the requisite funding must be in place to advance the final design, analysis, prototype development, and fabrication of these capital assets, leading ultimately to their first order deliveries. Funding shortfalls within the production cycle could lead to increased costs to DOE. For example, the lead times between the procurement of the casks and rolling stock, and their delivery is three to five years.

National institutional activities, including implementation of the Nuclear Waste Policy Act's 180(c) provisions; operations; and physical security systems are operational costs that do not go away when operations begin. These activities and their costs are included in OCRWM financial planning and requirements development, but are not part of the capital project performance baselines. The capital projects are completed and closed before operations begin.

A. Schedule

The key milestones for the transportation system – the Nevada Rail Infrastructure Project and the National Transportation Project — are shown in the Preliminary Milestone Schedule tables below. These tables present the DOE milestones for each project. The milestones are dependent upon schedule requirements rather than specific repository operational dates.

The Nevada Rail Infrastructure Project major milestones are shown in Table 7. The National Transportation Project major milestones are shown in Table 8.

Table 7. Preliminary Milestone Schedule, Nevada Rail Infrastructure Project

Activity Name	Finish
Prelim Preliminary Milestone Schedule for	28-Mar-14
Departmartment of Energy Issues Draft Supplemental Rail Corridor & Rail Alignment Environmental Impact Statement (EIS)	30-Mar-07
Depart of Interior U.S. Fish & Wildlife Service Completes Endangered Species Consultation Biological Opinion NR Constr.	28-Mar-08
DOE Issues Final Supplemental Yucca Mountain Rail Corridor And Rail Alignment EIS	28-Mar-08
DOE Completes Nevada Rail Conceptual Design	28-Mar-08
DOE Publishes Record of Decision of Rail Alignment	28-Mar-08
DOE Starts Nevada Rail Preliminary Design	31-Mar-09
DOE Awards Nevada Rail Design/Build Contract	31-Mar-09
Nevada Department of Environmental Protection Issues Air Quality Permit for Nevada Rail Construction	31-Mar-09
Depart of Defense U.S. Army Corps of Engineers Issues Clean Water Act Section 404 Permit for Nevada Rail Construction	31-Mar-09
Advisory Council on Historical Pres., DOI Bureau of Land Mgmt & DOT STB Approve NV Rail Cultural Res. Prog	31-Mar-09
DOI BLM Grants Right-of-Way and Free-Use Permits for Nevada Rail Construction	31-Mar-09
DOE Starts Nevada Rail Construction	31-Mar-09
DOE Completes Land Acquisition for Nevada Rail Alignment Corridor	31-Mar-10
DOT STB Licenses Nevada Rail Line, If Operated for Common Carriage	28-Mar-14
DOE Completes Nevada Rail Construction	28-Mar-14
DOE Completes Nevada Rail Testing and Commissioning	28-Mar-14
DOE Initiates Repository Rail Access Service	28-Mar-14

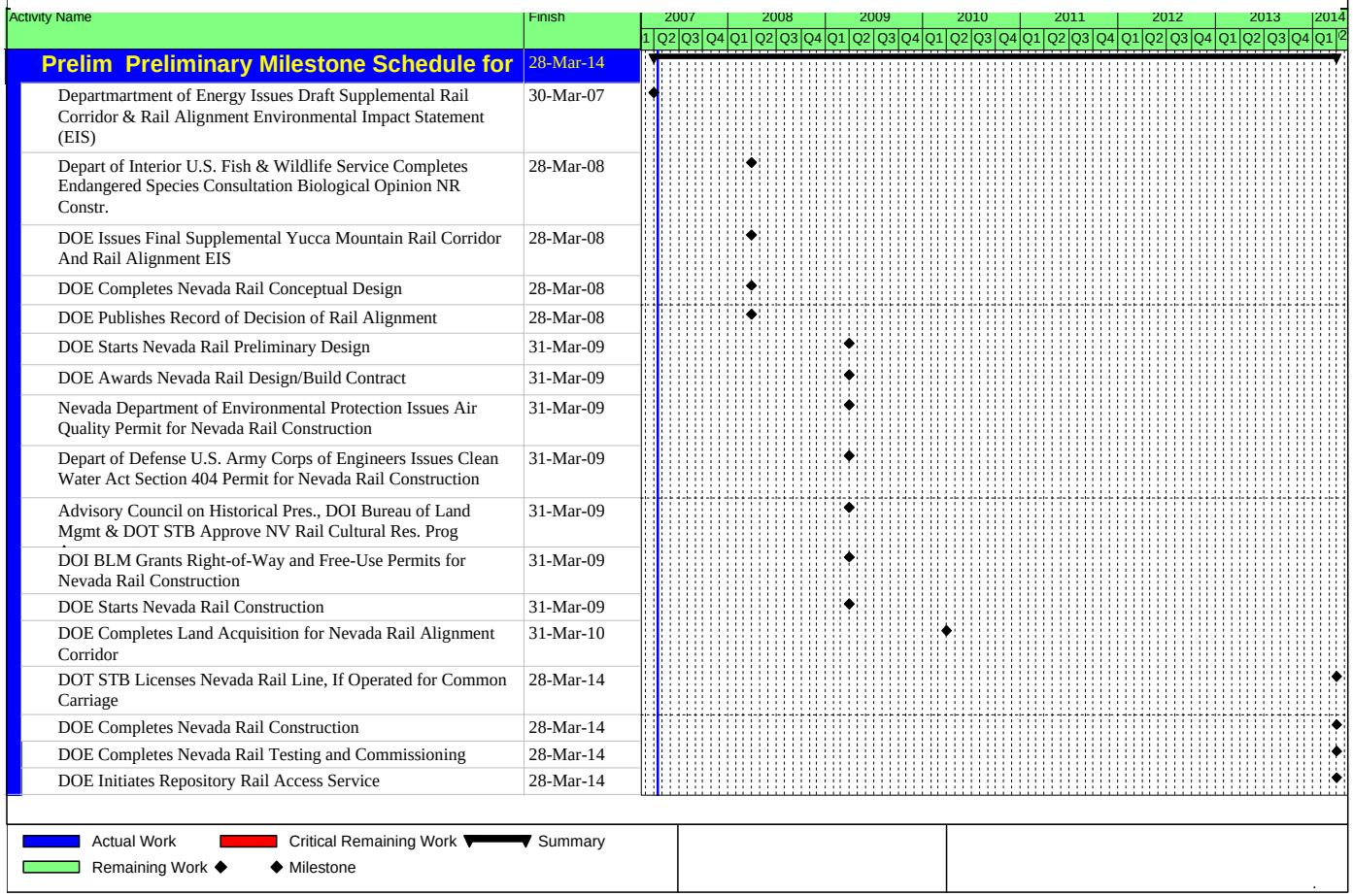
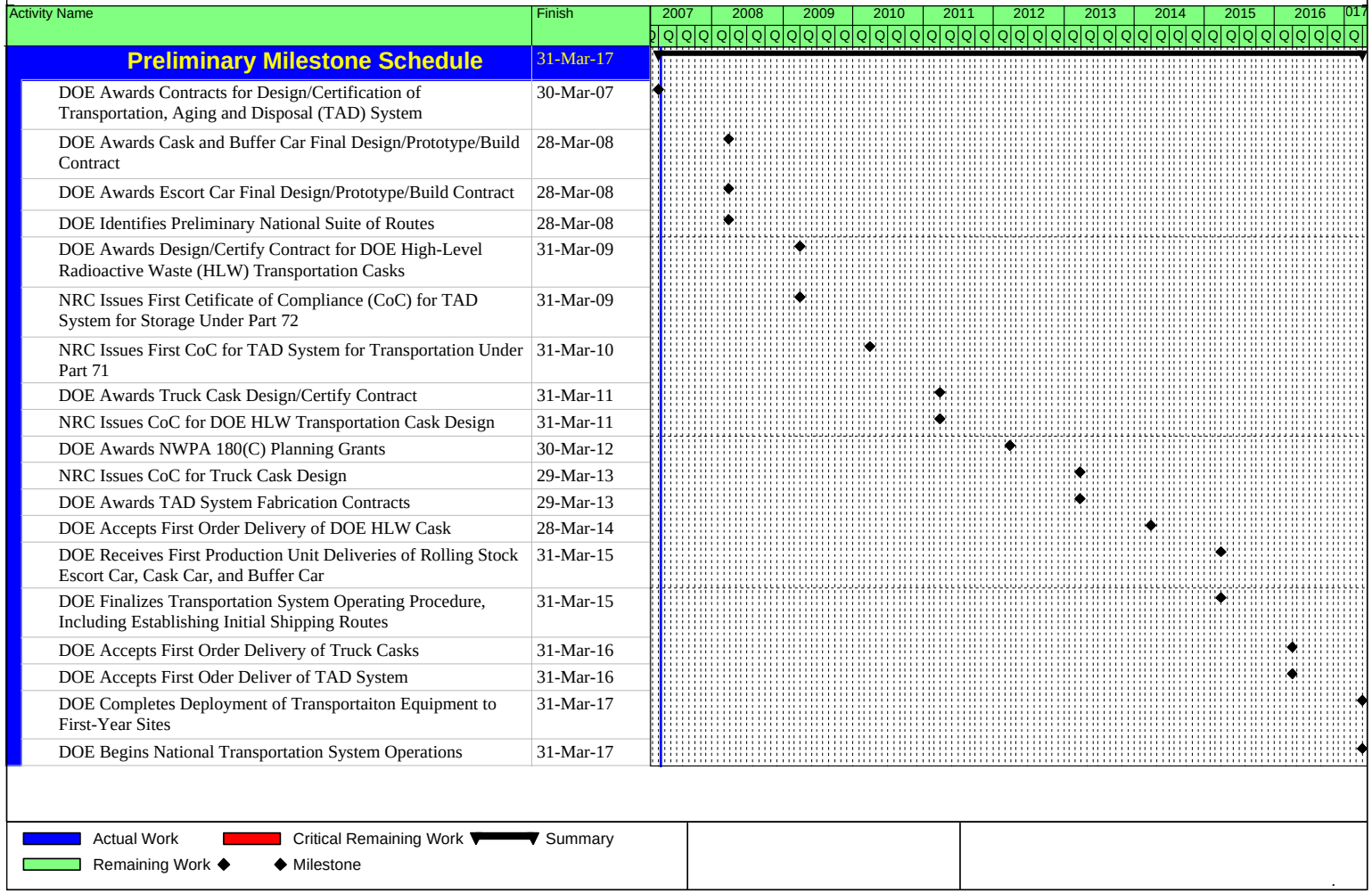


Table 8. Preliminary Milestone Schedule, National Transportation Project

Activity Name	Finish
Preliminary Milestone Schedule	31-Mar-17
DOE Awards Contracts for Design/Certification of Transportation, Aging and Disposal (TAD) System	30-Mar-07
DOE Awards Cask and Buffer Car Final Design/Prototype/Build Contract	28-Mar-08
DOE Awards Escort Car Final Design/Prototype/Build Contract	28-Mar-08
DOE Identifies Preliminary National Suite of Routes	28-Mar-08
DOE Awards Design/Certify Contract for DOE High-Level Radioactive Waste (HLW) Transportation Casks	31-Mar-09
NRC Issues First Cetificate of Compliance (CoC) for TAD System for Storage Under Part 72	31-Mar-09
NRC Issues First CoC for TAD System for Transportation Under Part 71	31-Mar-10
DOE Awards Truck Cask Design/Certify Contract	31-Mar-11
NRC Issues CoC for DOE HLW Transportation Cask Design	31-Mar-11
DOE Awards NWPA 180(C) Planning Grants	30-Mar-12
NRC Issues CoC for Truck Cask Design	29-Mar-13
DOE Awards TAD System Fabrication Contracts	29-Mar-13
DOE Accepts First Order Delivery of DOE HLW Cask	28-Mar-14
DOE Receives First Production Unit Deliveries of Rolling Stock Escort Car, Cask Car, and Buffer Car	31-Mar-15
DOE Finalizes Transportation System Operating Procedure, Including Establishing Initial Shipping Routes	31-Mar-15
DOE Accepts First Order Delivery of Truck Casks	31-Mar-16
DOE Accepts First Oder Deliver of TAD System	31-Mar-16
DOE Completes Deployment of Transportaiton Equipment to First-Year Sites	31-Mar-17
DOE Begins National Transportation System Operations	31-Mar-17



B. Costs

The cost component of the transportation system baseline is a comprehensive account of best available information and current cost data provided by OCRWM, equipment manufacturers, and subject matter experts to date and is based on the acceptance plan of 70,000 MTHM. The cost baseline includes costs for all planned transportation system projects through March 2017, the estimated start of DOE National Transportation Operations. These costs were based on certain key assumptions for the transportation system:

- Costs for Nevada Rail are based on the Caliente Corridor
- Dedicated trains will be used
- Locomotives will be leased, not purchased (for Nevada Rail Line operations)
- The Navy will provide their own rolling stock, so those costs are excluded
- Costs for design and procurement of the escort cars will be shared with the Naval Nuclear Propulsion Program
- Cask and rolling stock maintenance facilities will be constructed at Yucca Mountain

A range of estimated costs have been developed to describe the financial commitments necessary to execute the Nevada Rail Infrastructure Project through March 2017. The estimated range for this Preliminary Cost Range is presented in Table 9.

Table 9. Nevada Rail Infrastructure Project, Preliminary Cost Range

($000's - Constant 2006 Dollars)

WBS	WBS Element Description	Cost Range ($000's)		
		Low Point	Mid Point	High Point
4.2	**Nevada Rail Infrastructure**	**$ 1,698,958**	**$ 2,427,083**	**$ 3,155,208**

A range of estimated costs have been developed to describe the financial commitments necessary to execute the National Transportation Project through March 2017. The estimated range for this Preliminary Cost Range is presented in Table 10.

Table 10. National Transportation Project, Preliminary Cost Range

($000's - Constant 2006 Dollars)

WBS	WBS Element Description	Cost Range ($000's)		
		Low Point	Mid Point	High Point
4.1, 4.3, and 4.4	**National Transportation Project**	**$579,693**	**$828,132**	**$1,076,572**

Refer to Table 11 for the funding profile requirements through FY 2017.

Table 11. Funding Profile

($000's - Constant 2006 Dollars)

FY-09	FY-10	FY-11	FY-12	FY-13	FY-14	FY-15	FY-16	FY-17	Total
251,277	$ 508,415	$ 641,492	$ 694,145	$338,550	$ 313,847	$ 106,913	$ 195,984	$ 65,720	$ 3,255,219
6,075	$ 7,322	$ 23,134	$ 59,797	$ 40,402	$ 35,652	$ 52,763	$ 133,722	$ 48,592	$ 418,950
220,798	$ 470,907	$ 585,181	$ 588,229	$ 246,711	$223,707	$ -	$ -	$ -	$ 2,427,083
24,404	$ 30,185	$ 33,177	$ 46,118	$ 51,436	$ 50,798	$ 46,046	$ 47,908	$ 12,014	$ 377,921
-	$ -	$ -	$ -	$ -	$ 3,690	$ 8,103	$ 14,354	$ 5,115	$ 31,262

Appendices
A number of these documents have yet to be developed.

- Appendix A. Concept of Operations
- Appendix B. Operations Plan
    - Campaign Plans
    - Operations Center Plan
- Appendix E. Fleet Maintenance and Inventory Management Plan
- Appendix F. Nevada Rail Infrastructure Project Plan
- Appendix G Transportation Institutional Plan
- Appendix H. Section 180(c) Implementation Plan
- Appendix I. Emergency Response Plan
- Appendix J. Strategic Plan
- Appendix L. General Transportation Information
- Appendix M. Requirements Documents
    - Practices Manual
    - Transportation System Requirements Document

References

- *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*
- Transportation Strategic Plan
- *Transportation Concept of Operations*
- *Transportation System Requirements Document*
- *Nuclear Waste Policy Act*
- *Transportation Practices Manual 460.2-1*
- *Office of Logistics Management Radioactive Waste Logistics Benchmarking: Project Status Report, Interim Findings*, May 2007
- *Civilian Radioactive Waste Management System, Integrated Interface Control Document, Volume 1, Rev.2*
- FRA's *Safety Compliance Oversight Plan*
- *U.S. Department of Energy American and Alaska Native Tribal Government Policy.*