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Office of Civilian Radioactive Waste Management

OFFICE OF LOGISTICS MANAGEMENT

Radioactive Waste Logistics Benchmarking: Project Status Report, Interim Findings

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EXECUTIVE SUMMARY

The Office of Logistics Management (OLM) benchmarking project began in 2005, and is intended to identify, document, and better understand best practices for logistics enterprises. The results will help the Office of Civilian Radioactive Waste Management (OCRWM) design and implement a system to move spent nuclear fuel (SNF) and high-level radioactive waste (HLW) to the proposed repository at Yucca Mountain for disposal. This report summarizes the project team's research and analysis efforts to date, presents preliminary findings, and suggests areas and topics for additional study. The report may also support future OCRWM studies and findings on best practices.

The project team looked at three Federal radioactive material logistics operations that are widely viewed to be successful: (1) the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico; (2) the Naval Nuclear Propulsion Program (NNPP), whose transportation office is located at the Pittsburgh Naval Reactors (PNR) Office; and (3) domestic and foreign research reactor (FRR) SNF acceptance programs, located at the Savannah River Site (SRS) in South Carolina and the Idaho National Laboratory (INL).

The benchmarking project adapted a standard best practices study format based on guidance from the General Accounting (now "Accountability") Office and the Department of Defense. Other project methods included a review of independent lessons learned studies and various shipping campaign documents. The preliminary benchmarking findings are listed in **Table 1**. Additional detail can be found at Section 5 of this report.

Table 1: Preliminary Logistics Benchmarking Findings*

Business Process	*Findings*
5.1 Business Model	5.1.2.1 Extend logistics team to include waste origin/destination sites
	5.1.2.2 Build multidisciplinary matrix teams
	5.1.2.3 Keep logistics management hands-on and delegation chains short
	5.1.2.4 Extensively pilot test and refine plans, equipment and operations
	5.1.2.5 Develop and manage to comprehensive transportation plans
	5.1.2.6 Integrate new developments in tracking, emergency technology
	5.1.2.7 Consider QA impacts of cask certification on OCRWM
5.2 Contract Management/ Outsourcing	5.2.2.1 Consider Federal experience in tailoring outsourcing strategies
	5.2.2.2 Maintain strong control of mission-critical assets and functions
5.3 Stakeholder Relations	5.3.2.1 Focus on safety as the basis for relationships
	5.3.2.2 Make cooperative shipment planning the rule, not the exception
	5.3.2.3 Build relationships using training, demonstrations and exercises
	5.3.2.4 Work through well-established stakeholder networks
	5.3.2.5 Integrate stakeholder relations and technical operations
	5.3.2.6 Manage commitments to planning partners
5.4 Continuity Planning	5.4.2.1 Integrate backup plans and communications

* The category numbering system corresponds to sections within the report.

For future activities, the project team proposes the following:

1. Compare a detailed checklist of benchmarked findings with current OCRWM program plans.
2. Compare Federal project benchmarks with commercial logistics trends and practices.
3. Identify additional candidate benchmarking partners with logistics enterprises relevant to SNF transportation. Subjects could include elements of the Surface Deployment and Distribution Command (SDDC), other hazardous materials shippers, SNF logistics enterprises in foreign countries, or commercial logistics companies within the United States.
4. Work with WIPP, FRR, and NNPP to consider more detailed analysis of additional logistics components/factors, such as:
    a. Load and shipment planning and dynamic routing and consolidation to optimize loading efficiency, asset utilization, and carrier availability;
    b. Asset tracking, communications, and security network technology;
    c. Onsite loading and unloading process improvement; and
    d. Carrier, equipment management, and equipment maintenance contracting.
5. Examine and recommend developing tailored outsourcing solutions where specialized markets or market limitations exist.
6. Develop specific recommendations for OCRWM planning timelines based on Federal experience in acquisition and operations.

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ACRONYMS

ANSI	American National Standards Institute
CBFO	Carlsbad Field Office
DOE	Department of Energy
DOT	Department of Transportation
DOE/EM	Department of Energy/Office of Environmental Management
DOE/NE	Department of Energy/Office of Nuclear Energy
ECF	Expended Core Facility
FRR	foreign research reactor
FY	fiscal year
GPS	Global Positioning System
HLW	high-level radioactive waste
INL	Idaho National Laboratory
LWA	Land Withdrawal Act
M&O	Management & Operating (contractor)
MTR	material testing reactor
MERRTT	Modular Emergency Response Radiological Transportation Training
NAS	National Academy of Sciences
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
NNPP	Naval Nuclear Propulsion Program
NWSC	Naval Weapons Station – Charleston, South Carolina
NRC	Nuclear Regulatory Commission
OCRWM	Office of Civilian Radioactive Waste Management
OGTR	Office of Global Threat Reduction
OLM	Office of Logistics Management
OST	Office of Secure Transportation
PNR	Pittsburgh Naval Reactors Office
RCRA	Resource Conservation and Recovery Act
QA	quality assurance
SRS	Savannah River Site
SNF	spent nuclear fuel
STEP	State and Tribal Education Program
SDDC	Surface Deployment and Distribution Command
TRU	Transuranic (waste)
TRIGA	Training, Research, Isotopes, General Atomics
TEPP	Transportation Emergency Preparedness Program
TEC	Transportation External Coordination Working Group
UPS	United Parcel Service
WIPP	Waste Isolation Pilot Plant

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1.0 BACKGROUND

1.1 Office of Logistics Management: Mission and Challenges

The OCRWM mission is to manage and dispose of HLW and SNF in a manner that protects health, safety, and the environment; enhances national and energy security; and merits public confidence. Preparing for the safe transport of this material from power plants and other facilities to the proposed Yucca Mountain repository is a critical component of this mission. Applying proven, successful logistics practices to the OCRWM transportation system will help ensure system efficiency and safety, and will build public confidence in the waste management program.

Logistics for the Yucca Mountain project will ultimately involve a nation-wide network of radioactive and non-radioactive equipment, materials, and ultimately waste. Extended logistics will support construction and operation of a mined and engineered facility more than 600 feet below ground, encompassing hundreds of acres of surface and subsurface structures and a new railroad line. Equipment and structural materials will be required for construction of the repository facilities and railroad. Extended logistics central to facility operations will be required for handling at least 70,000 metric tons of heavy metal in the form of SNF and HLW. These logistics operations at DOE sites, nuclear electric utilities, and the pre-closure repository site will extend over a period of up to 100 years.

OCRWM is working collaboratively with States, Tribes, and other stakeholders to develop and implement a transportation system that is safe, secure, efficient, and in which the public has high confidence.

The initial phase of this study focused on transportation program analogues to identify practices which would be the most clearly applicable to OCRWM. The Federal Government is a primary U.S. shipper of SNF and higher-radioactivity material and wastes, and the project team examined three of the most prominent programs: (1) the Waste Isolation Pilot Plant (WIPP), (2) the Naval Nuclear Propulsion Program (NNPP), and (3) the domestic and Foreign Research Reactor (FRR) SNF acceptance programs. Detailed information about these programs is found at Section 4.2, *Elements of Partner Logistics Organizations*. Each of the three Federal programs interviewed has a well-established record of safety, strives for excellence in operations, and implements effective stakeholder involvement. The OCRWM transportation system must have these features as well.

1.2 The Logistics Enterprise Defined

Logistics involves management of a supply chain to achieve efficient movement of goods and services from sources to destinations. Logistics synchronizes activities and manages costs across related, often highly complex, functions. On a global scale,

specialized logistics enterprises move petroleum products from producing to consuming countries, using consortia-owned shipping and storage terminals, trucking and shipping companies, and tracking and pricing software. Other massive logistics enterprises include the Department of Defense's Surface Deployment and Distribution Command (SDDC), which provides global surface deployment command and control and distribution operations in support of the U.S. military.

On a corporate level, logistics divisions monitor other internal divisions or external suppliers in charge of production, purchases, inventory, sales, and delivery, and negotiate to ensure that contract terms are synchronized to ensure lowest costs and efficient delivery. A logistics enterprise may be a standalone supply chain like the United Parcel Service (UPS) or a support service like defense logistics. It is almost always a multidisciplinary "horizontal" function that creates efficiency across a series of "vertical" components that make up the supply chain. The management challenge is to recognize all the components of a supply chain, then to determine how to make the pieces work together best without interfering with the productivity of the components. In "best practice" logistics, the entire extended supply chain is examined to optimize mission-critical assets across the supply chain and continuously identify process improvement opportunities.

1.3 Lessons Learned, Benchmarking, and Best Practices Described

In 2006, the National Academy of Sciences (NAS) completed a detailed study performed by a multidisciplinary committee of experts on the transportation of SNF and HLW. The NAS study is a comprehensive assessment of SNF transportation and the logistics challenges OCRWM faces. The committee's final report, *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States*, included a number of conclusions and recommendations, one of which stated: "[t]he committee strongly encourages the [OCRWM] program to seek expert advice (e.g., using consultants and expert advisory groups) to learn about and incorporate best industry practices for designing and operating this transportation system using an integrated systems approach." [1] This OCRWM benchmarking report is a step toward implementation of the NAS recommendation. The project team incorporated input from consultants and experts involved in Federal radioactive material logistics operations and looked at lessons learned to help identify potential best practices for the OCRWM transportation system in the future.

Lessons learned and *benchmarking* are two tools often used to determine *best practices* for a particular business enterprise. The three terms are at times used interchangeably. For example, "lessons learned" may be used as "benchmarks:" metrics for continuous improvement or corrective action programs. However, the following distinctions may be useful:

- *Lessons learned* are conclusions taken from one situation – perhaps one SNF shipping campaign, or a series of shipments by one organization, or the

impacts of a series of shipments - from one point of view. The lessons can be positive or negative (e.g., “do’s and don’ts”), as well as identify areas in the logistics chain where improvements can be achieved. Lessons learned can be helpful analogies, but their applicability to other situations may be limited by circumstances (for instance, specific statutory requirements or material characteristics).

- *Benchmarking* is a more proactive analysis of a process to describe and document it, determine the critical elements for its success, and determine how success in those areas is measured or achieved. A systematic comparison with similar processes in other organizations may identify performance gaps, identify operational trends, and show where different situations create large process variations. If sufficient data are available, benchmarking can show which operations get the best results.
- *Best practices* are identified when positive results from studying other operations can be translated into positive results for OCRWM. Best practices can be identified through benchmarking or lessons learned exercises, or they may come from completely unrelated sources.

OCRWM does not have an operating logistics enterprise to formally benchmark with other organizations, because the repository has not yet been licensed and built. For this reason, it is not possible at this time to identify OCRWM performance gaps. However, OCRWM is working extensively with internal and external stakeholders to develop its performance goals and requirements, and ultimately its shipping plans. By comparing other organizations’ processes and lessons learned with its own planned systems, OCRWM can identify critical process elements, plan approaches for achieving objectives, and identify similarities or differences that may affect implementation of logistics practices for OCRWM..

The goal for OCRWM is to adopt best practices and create a “Best-in-Class” organization that adheres to internal and external goals, both through continuous process improvement and through an organizational culture committed to excellence.

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2.0 STUDY PROCESS AND ANALYSIS

2.1 Report Methodology

The benchmarking team followed an adapted best practices study format described by the General Accounting (now "Accountability") Office, entitled *Best Practices Methodology, A New Approach for Improving Government Operations*[2] and the Department of Defense report *How To Prepare For and Conduct a Benchmarking Project*.[3] The team developed a process description and plan for implementing findings and obtained preliminary management support for the analytical approach. The team then examined existing studies and analyses, and undertook the following actions:

- Reviewed OCRWM's *Strategic Plan, 2003-2013*[4] and *Transportation System Concept of Operations*[5] to identify those business processes to be benchmarked.
- Reviewed OCRWM's 2004 *Transportation Strategic Plan*[6] and 2003 *Strategic Plan…A Guide To Stakeholder Interactions*[7] to describe the institutional and planning environment in which operations planning is to be conducted.
- Reviewed OCRWM's *Transportation System Requirements Document*[8] to identify the requirements that the national transportation system must meet.
- Reviewed an extensive 2002 report by the U.S. Department of Energy (DOE) Office of Environmental Management (EM)[9] on transportation lessons learned to identify specific planning, business, institutional and operating practices that have been identified by EM, its transportation contractors, and its stakeholders as recurring issues.
- Analyzed the results of these reviews to identify key business processes that can provide a basis for organizing information.
- Analyzed lessons learned studies and other documents[10] completed by potential benchmarking partner organizations or organizations with spent fuel shipping experience to begin baselining best practices.

Subject matter experts were identified to assist in research, analysis, and report development. The benchmarking team included individuals with first-hand experience in Federal spent fuel shipping campaigns and experts in logistics, stakeholder relations, and the OCRWM waste management system.

Benchmarking partners were identified based on the following criteria:

- Federal organizations with operating, organizational, and financial structures similar to OCRWM;
- Experience transporting SNF or radioactive waste;
- A recognized record of safe transportation;

- Successful stakeholder relations, and
- Ongoing transportation activity.

The team developed a questionnaire for interviewing best practice partner organizations. The questions were intended to examine only specific logistics practices; the questions and responses did not address specific DOE policies or decisions.

The team identified contacts within the partner organizations and made arrangements for site visits and conference calls. Site visit preparations included gathering basic information on the benchmarking partners and preparing background information for team members. Follow-up included filling in information gaps and debriefing the team and partners to ensure accuracy.

The benchmarking team's research and examination focused primarily on the practices and recommendations of WIPP because of similar program demands as described in Section 2.3.1, but preliminary benchmarking conclusions have been identified based on consistency across the other organizations. The team visited the WIPP facility, met with senior managers, and participated in roundtable discussions for several days. Based on the WIPP research, benchmarking issues were narrowed so that NNPP and FRR research could be achieved through telephone interviews.

2.2 Areas of Investigation

Although transportation and logistics functions encompass many different steps, this benchmarking project has placed detailed focus on four business processes that are critical to OCRWM's mission success, and can be incorporated into OCRWM planning and preparation in the near-term (1 year). The four processes are:

- *Transportation Business Model*: the core processes that drive success in moving nuclear waste from sites of origin to an interim storage or disposal site (for example, technology used or management organization);
- *Contract Management/Outsourcing*: the parts of the core business processes that have been successfully executed by contractors, and how excellent performance is ensured;
- *Stakeholder Relations*: how programs work effectively with external parties to prepare for and execute shipments; and
- *Continuity Planning*: how business practices are protected, and how they recover following system disruptions, whether natural or man-made.

2.3 Partner Overview

To perform this benchmarking study, the team conducted interviews with other successful partner organizations that transport nuclear waste, including WIPP, NNPP, and the FRR program. The mission and function of each program are briefly described below.

2.3.1 Waste Isolation Pilot Plant

The WIPP program transports transuranic (TRU) waste from various DOE sites across the nation to a repository in Carlsbad, New Mexico. The project is managed by the DOE Carlsbad Field Office (CBFO) and began operation in March 1999. All shipments are transported by truck, and as of November 2006, the program had conducted over 5,000 shipments, covering more than 5 million road miles. WIPP operations are overseen by CBFO and its Management and Operating (M&O) contractor, Washington TRU Solutions (WTS). The CBFO Office of the National TRU Program is responsible for transportation program implementation, management, and assessment. The M&O contractor coordinates shipments with the generator/origin sites and controls the waste handling facilities at the repository.

WIPP was selected for special focus as an OCRWM benchmarking partner because of similar program demands:

- The host state was recognized in authorizing legislation as having a significant participatory role in planning and oversight of the facility.
- Stakeholders in the cross-country shipments for WIPP were involved from the beginning phases of transportation planning.
- Material to be disposed of at WIPP consists of TRU waste, which requires special packaging, transportation casks, and (depending on the material) remote handling or special security arrangements, much like SNF.
- State regional groups and other stakeholders that interact with DOE on transportation issues have repeatedly identified WIPP as a model for stakeholder relations.

2.3.2 Naval Nuclear Propulsion Program

The NNPP, which has operated since the 1950s, provides cradle-to-grave nuclear fuel management for the U.S. Navy's nuclear-powered fleet. As part of this mission, NNPP is responsible for shipping SNF from nuclear-powered submarines and aircraft carriers refueled and defueled at naval and commercial shipyards to NNPP's Expended Core Facility (ECF). ECF is part of the NNPP's Naval Reactors Facility currently operated by Bechtel Bettis, Inc., at Idaho National Laboratory near Idaho Falls, Idaho. On average the program ships about 10 spent nuclear fuel casks a year by rail on 3 to 4 trains. This rate can double when an aircraft carrier is being refueled or defueled (about every 3-4 years currently). NNPP has a comparatively "flat" organization structure where the primary managers report directly to the Program Director (currently, Admiral Kirkland H. Donald). Some observations regarding NNPP's shipping program versus OCRWM's plans for shipments include the following:

- While OCRWM will be shipping most of the material to be disposed of at Yucca Mountain, NNPP is responsible for shipping Navy spent fuel from shipyards to ECF; and eventually from ECF to Yucca Mountain.

- The number of shipments (casks) that NNPP executes (typically 10 or fewer annually) is significantly smaller than the expected number for OCRWM (possibly several hundred annually).
- All shipments for NNPP are done by rail, which will be the mode for most OCRWM shipments.
- NNPP shipments are classified national security shipments, limiting stakeholder communications, while most OCRWM shipments will have less restrictive security requirements.
- From the inception of the program until the mid-1990s, there was not a proactive spent fuel shipment outreach effort, but external stakeholder relations since that time have grown and are continuously advancing, as necessary.

2.3.3 Foreign Research Reactor SNF Acceptance Programs

The National Nuclear Security Administration (NNSA) is responsible for the FRR SNF Acceptance Program. The current program was initiated in 1996 and as of November 2006 had completed 34 shipments, which includes 7,150 SNF assemblies. The FRR program oversees the logistics of accepting spent fuel in foreign countries, and shipping fuel to the SRS in South Carolina. Depending on the country of origin, DOE may be the shipper of record, or may assist the reactor's logistics agent in conducting the shipment as a Nuclear Regulatory Commission (NRC) licensee. Overseas shipments enter the United States primarily through the Naval Weapons Station—Charleston, South Carolina (NWSC). Most of the fuel is stored at SRS, but one fuel type - Training, Research, Isotope, General Atomics (TRIGA) fuel - is transshipped from SRS to INL for storage. Shipments from SRS to INL are managed by a separate organization – DOE/EM – using DOE/Office of Nuclear Energy (DOE/NE) staff resources at INL. Like the NNPP, the FRR program is a relatively "flat" organization from a management standpoint. The SRS and INL sites also accept SNF from domestic research reactors operated by universities and other Government programs.

The FRR SNF Acceptance Program business model has useful similarities to OCRWM logistics planning, such as:

- Overland, FRR shipments are primarily by rail to SRS, but also include truck shipments to INL (one shipment to INL via rail has taken place from Concord, California to INL).
- Intense State and local interest (and litigation) shaped the program's planning and regulatory framework.
- Acceptance of SNF involves complex international agreements, contract agreements, and cooperation with reactor sites operated by a broad variety of commercial or national entities.
- Loading and shipping activities are usually conducted by commercial logistics companies.
- Shipments are regulated by NRC and also under internal DOE regulations.

- Most FRR shipments are non-Category I shipments (e.g., not "national security" shipments).

3.0 LOGISTICS PROCESS OVERVIEW

Transportation functions at partner organizations – narrowly considered to include shipping of material on highways and railways – are not systematically separated from primary supporting equipment management, or from activities at the originating sites, the destination sites, transfer points, or operations management centers. These activities are all viewed as part of a comprehensive transportation logistics enterprise. **Figure 1** compares the planned OCRWM logistics function to a more traditional supply chain operation.

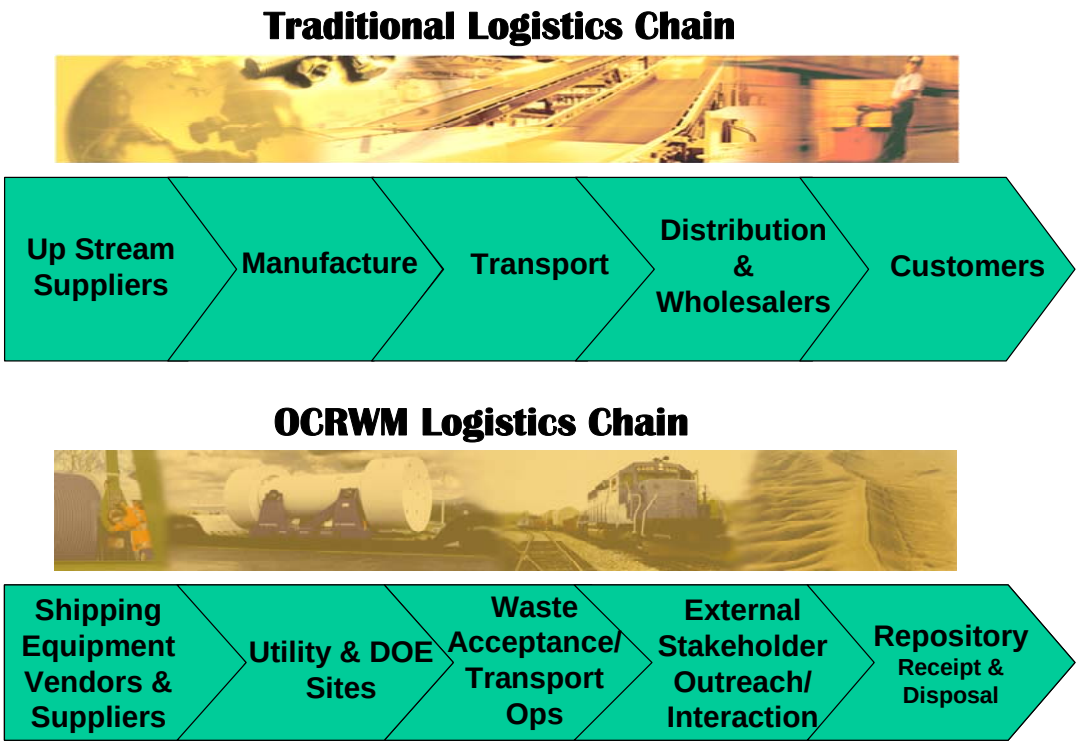

Figure 1: OCRWM and Traditional Business Logistics Chains Compared

Common Elements of a Radioactive Waste Logistics Enterprise

The elements of the logistics enterprise at radioactive waste management partner organizations and at OCRWM are identified by common terminology, as described below. Detailed findings and recommendations based on partner organizations' experience are set forth in Section 5.0, *Benchmarking Results*.

Operations Planning

Operations planning includes development of a comprehensive system plan and protocols covering activities at origin and destination sites, routes, characterizing material to be shipped, regulatory requirements, equipment, vehicles, maintenance, and long-term scheduling. These comprehensive plans are updated regularly, from annually to every 3 years.

Each organization also develops plans for specific shipping campaigns. These plans focus on the regulatory certifications, procedural authorizations, stakeholder interactions, route confirmation, equipment and carrier availability, and site readiness required for safe completion of shipments. Plans may include very specific operational activities.

Planning includes detailed agreements with origin and destination sites concerning certifications of material characteristics, responsibilities for providing key equipment or services, formal acceptance of material, scheduling, and regulatory compliance.

Waste Acceptance

Part of the logistics chain includes responsibility for contractual and regulatory compliance and quality assurance aspects of taking possession of SNF. Acceptance includes procedures to establish the characteristics of the radioactive material being received and its status in its container. Characterization is essential to compliance with technical packaging requirements, and to successful receipt of the material at the destination site.

Stakeholder Relations

Management of relationships with “stakeholders” is a component of operations safety and reliability. Stakeholders include the State and local governments and Tribes along potential shipping routes that provide essential police, emergency response, and road condition monitoring services. Planning, routing, notification, training and other operations involve stakeholders, carriers, and interest groups. Stakeholders also include public and nongovernmental organizations.

Equipment Management

Certain equipment - such as casks, cask cars and escort vehicles - in the transportation logistics processes play a key role in the efficient operation of the system. These units are expensive and customized for the very heavy weight, radiological protection, security, and multiple-use aspects of the system. Limited availability of some of this equipment has created bottlenecks in logistics at some point in the evolution of each organization studied. Procurement and maintenance of these items is a driver of management processes and scheduling.

Critical components include shipping casks, cars or trailers for rail or highway shipping, and cranes and other large-scale equipment at loading and unloading sites. Ancillary equipment to manage cask operations (tools, tie downs, impact limiters) is part of the overall set of components.

Equipment scheduling includes testing and inspections, maintenance and turnaround time. If equipment is not dedicated to the organization's own transportation needs, or if equipment maintenance facilities are not dedicated to the transporting organization's needs, availability involves working around the demands of other organizations. These issues affect the cost-benefit analyses for ownership or contracting for key system equipment.

Maintenance of critical system equipment includes decontamination, repair, safety certification, and tracking.

Carriers

The organizations studied ship their material by highway, railway, and oceangoing vessels. In all cases, commercial carriers are used. Carriers provide the trucks, ships, locomotives, and drivers or crews. Carrier management involves establishing a shipper/carrier business relationship with trucking companies, railroads, and ocean or barge carriers. These carriers may provide some of the critical equipment and may carry out safety procedures. Carriers inevitably form part of the system interface with regulators and stakeholders. Carriers may also form extended companies offering integrated logistics management, inventory warehousing, equipment, and equipment maintenance.

Site Management

Origin and destination sites have primary missions for which transportation of spent fuel or radioactive waste is a support function or an ancillary responsibility; however, preparation for and completion of SNF or HLW loading and unloading is a safety-related and resource-intensive activity. Regulatory compliance, contingency planning, scheduling, and transportation system interface require trained personnel who are part of the system logistics team. Either origin or destination sites may be command-and-control centers for the transportation logistics system.

Origin Sites

An originating site may be the location where spent fuel or waste is generated, a place where it has been in storage, or a place where it has been unloaded for intermodal transfer (for example, a FRR continental U.S. receiving site that receives spent fuel from overseas and sends it by rail or truck to a DOE storage site).

Destination Sites

A destination site is the terminating site for a specific shipping campaign.

Tracking

A distinct component of transportation logistics is shipment tracking, including a feedback loop of information supporting site readiness and equipment management. For hazardous materials, this often includes real-time communications with carriers and sites.

4.0 LESSONS LEARNED AND LOGISTICS ORGANIZATIONS

4.1 Lessons Learned from Past SNF Shipping Campaigns

The project team extensively reviewed preexisting studies and various shipping campaign documents. These reports focused on SNF shipping campaigns and documented the significant "lessons learned". As part of this project, in August 2006, INL released *Spent Nuclear Fuel Transportation: An Examination of Potential Lessons Learned from Prior Shipping Campaigns*.[11] This review organized findings from DOE's multi-year and high-visibility single-shipment campaigns in terms of the four topics which were explored in detail throughout this benchmarking study: business model, outsourcing, stakeholder relations, and contingency planning. The INL study reviewed the following documents:

- *Best Practices and Findings for DOE Programs Transporting Spent Nuclear Fuel* (January 2003),
- *West Valley Spent Nuclear Fuel Shipment Project Lessons Learned* (April 2004 and November 2001),
- *Lessons Learned Cross Country Transportation Working Group* (June 2001),
- *Transportation External Coordination Working Group (TEC) Meeting Summaries* (July 2000),
- *Foreign Research Reactor West Coast Shipment Spent Nuclear Fuel Transportation External Lessons Learned* (October 1998),
- *WIPP Transportation Safety Program Implementation Guide* (December 2003).

Business Model Lessons Learned

When exploring the business model/structure, the INL report found it was critically important to share information with stakeholders and agencies or organizations that are involved in planning for DOE radioactive waste shipments. Keeping points-of-contact lists current for both States and Tribes may seem a minor administrative task, yet was critically important to ensure the effective and timely flow of information. To avoid confusion, information and messages shared with all involved parties must be consistent and timely. DOE programs received positive results from holding operational readiness reviews with impacted agencies and organizations and the transportation corridor of States and Tribes.

Various shipping campaigns examined also suggest that shipments should have transportation plans that describe operational strategies. The transportation plans should include a common set of elements as identified in DOE M 460.2-1, *U.S. Department of*

Energy Radioactive Material Transportation Practices Manual. Some campaigns recommended that, to the extent appropriate, plans should include stakeholder requests that may be "extra-regulatory" in nature but that are prudent from a business management standpoint.

Security continues to be a major concern, and programs noted that balancing "need-to-know" security limitations with the need for coordination of information can be challenging. DOE should ensure that all involved parties understand the requirements for safeguarding information. Programs using State escorts need to plan carefully when handing off shipments at State borders, and some observers urged the use of Federal escorts to eliminate potential delays.

Contract Management/Outsourcing Lessons Learned

Campaign evaluators stressed the importance of good contract performance, specifically clarity of terms and expectations between the DOE customer and the transportation services provider. Use of checklists to identify responsibilities and the status of activities proved to be of value to the shipping campaigns. Rail environments present unique operating considerations, and DOE programs frequently underestimated how long it would take to complete rail service negotiations.

Stakeholder Relations Lessons Learned

Accurate and clear communications with stakeholders was identified by every program as a critically important aspect of success. The Transportation External Coordination Working Group (TEC) recommended that DOE identify stakeholders to get them involved in a two-way dialogue to promote sharing of accurate information and build credibility for the program.

Some programs found public awareness training to be helpful in turning negative perceptions positive. Public awareness training can be used to increase public understanding of the transport of radioactive materials. Responder training and support for responders, law enforcement, and emergency management agencies has obvious benefits in preparing communities for shipments through their jurisdictions. Training should include realistic exercises which help shippers, carriers, States, and Tribes understand how shipments occur and assess their own support capabilities.

Contingency Planning Lessons Learned

Emergency planning was identified by all the shipping campaigns as playing a vital role in the implementation of a successful shipping campaign. Emergency planning should include a contingency plan to provide mitigation and recovery actions for potential incidents or events. The contingency plan should identify who is involved and who the responsible parties are. The operational contingency plan should include how the States and Tribes will be involved, contingencies for weather and adverse road/truck

conditions, and provisions that will be made in the event of an unplanned detour. Incidents such as unscheduled delays, accidents, vehicle breakdown, and threats against the shipment should also be included. Finally, the operational contingency plan should identify who is responsible for authorizing the use of alternate routes and the corresponding notifications to DOE authorities and other agencies.

Table 2 illustrates commonalities that were most frequently cited as important to improving transportation in six lessons learned reports reviewed for this study. As illustrated in the table, a transportation plan, emergency planning, an operational contingency plan, and tracking and notification technology were among areas of importance agreed upon by most or all of the shipping campaigns examined. Planning, tracking, and notification were clearly the activities of most interest for transportation improvement.

Table 2: Commonly Cited Logistics Issues

Activities Cited for Lessons Learned	*Reports That Identified Activities for Lessons Learned*					
	DOE-SNF (1)	**WV-SNF (2)**	**CCTWG (3)**	**TEC (4)**	**FRR (5)**	**WIPP (6)**
Exceeding Regulatory Requirements		X		X	X	X
Shipping & Receiving Schedule		X			X	X
Tracking and Notification Technology	X	X		X	X	X
Transportation Plans	X	X	X	X		X
Emergency Planning	X	X	X	X	X	X
Security Planning	X	X		X		X
Operational Contingency Plan	X	X	X	X	X	X
Emergency Training Programs		X		X	X	X
Public Awareness Training		X		X	X	X
Performance Indicators						X
Federal Railroad Admin. Inspections		X				
Sharing with States & Tribes	X	X		X		X
2- Way Dialogue with Stakeholders		X		X		X
Resource Guides & Media Packets		X				X

(1) *Best Practices and Findings for DOE Programs Transporting Spent Nuclear Fuel*
(2) *West Valley Spent Nuclear Fuel Shipment Project Lessons Learned*
(3) *Lessons Learned Cross Country Transportation Working Group*
(4) *TEC Meeting Summaries*
(5) *FRR West Coast Shipment SNF Transportation External Lessons Learned*
(6) *WIPP Transportation Safety Program Implementation Guide.*

4.2 Elements of Partner Logistics Organizations

The Federal organizations studied have evolved significantly different structures through decades of practice carrying out similar functions. To a large extent, each logistics organization reflects the structure and culture of its parent organization. Although all three systems work well, they are structured very differently.

4.2.1 WIPP Logistics Organization

The following responsibilities are identified by WIPP as primary functions for the team leader/logistics manager:

- Planning;
- Scheduling shipments;
- Carrier and equipment availability, turnaround;
- Acceptance and authorization to ship from origin site;
- Regulatory interface (State, local, Tribal, Federal);
- Security;
- Enroute tracking; and
- Acceptance, unloading, and inspection at WIPP.

Responsibilities of the Office of the National TRU Program members include:

- WIPP operations;
- Waste characterization, waste certification, and shipping site certification;
- Representative for cask availability: Cask design, fabrication, QA, NRC certification, maintenance, inventory, readiness, replacement;
- Representative of Contracting Officer specifically for oversight of carrier contracts, terms and conditions, route oversight, performance evaluation;
- Scheduling (M&O contractor);
- Incident/Accident Response Team;
- Institutional Program Manager; and
- Intergovernmental Program Manager.

4.2.2 NNPP Logistics Organization

At NNPP, one manager carries out the primary logistics responsibilities with support from other functional areas. All parties are responsible for ensuring smooth operation of their part of the logistics function and its overall coordination. NNPP relies almost exclusively on rail for its shipments.

The NNPP logistics manager (who is the Transportation Officer (TO) at the Pittsburgh Naval Reactors Office) is the “center of gravity” for all transportation matters, and the TO, supported by office staff, is responsible for the following tasks:

- Shipment planning and scheduling, with origin and destination sites;
- Authorization to ship (NNPP internal);
- Carrier (railroad) operational interfaces, e.g. clearances, routes;

- Acquisition and maintenance of “rolling stock” railroad cask cars and escort cars;
- Shipment regulatory compliance (DOT, DOE, NRC equivalency);
- Shipment security and emergency response procedures and operations;
- Shipment traffic management activities, e.g. tenders, bills of lading, payment invoices;
- Shipment tracking and escorting (with specially-trained NNPP personnel);
- Stakeholder relations; and
- Escort training and readiness.

The NNPP program leads at Headquarters have overall programmatic responsibility, and interact with the transportation program in areas such as:

- Setting requirements for and overseeing origin site and destination site logistics operations including receipt, unloading from ship, loading for transport, unloading at storage site, and site preparations;
- Cradle-to-grave management of naval reactor fuel elements and canisters (if used);
- Shipping and storage cask design, certification, acquisition, scheduling and maintenance;
- Security and emergency response policy.

4.2.3 FRR Logistics Organization

The NNSA Headquarters Office of Global Threat Reduction (OGTR) is the formal FRR organization lead. However, program execution is done at the field level either by NNSA employees or officials from other DOE programs acting on NNSA’s behalf. In the 10 years since the current program’s inception, logistics has largely transitioned from one with intensive Headquarters involvement to a semiautonomous field-based approach. This evolution appears to have come about based on the experience gained over time, as well as generally positive relationships established with affected States and Tribes.

At the SRS, the NNSA-OGTR manager is responsible for the following:

- Coordinating with the port facility where foreign spent fuel shipments will arrive in the United States (currently NWSC);
- Interface with foreign reactor operators;
- Origin-reactor-to-U.S. transportation arrangements, for countries eligible for this assistance due to economic need;
- Authorization to ship from origin site; and
- Scheduling, where possible, to consolidate spent fuel on one ship for overseas transport.

The spent fuel characteristics determine where it will be stored. Generally, TRIGA fuel is stored in dry condition at INL, and Material Testing Reactor (MTR) fuel is stored in pools at SRS. The FRR manager at the destination site is responsible for most of the logistics for movement of that spent fuel once it reaches the United States. Most shipments are currently destined for and managed by SRS.

Logistics management prior to receipt in the United States is the responsibility of the foreign research reactor, or the central coordinator at SRS or INL, depending on the reactor's country of origin. These responsibilities include:

- Preparation of fuel for shipment and readiness of origin site (When the United States is responsible, the NNSA role is to assess and support preparations and readiness);
- Contracting with vendors for non-U.S. transport segments. Vendors provide:
    - Casks, cask maintenance, and certification;
    - Regulatory compliance for transportation; and
    - Negotiations with trucking companies, overseas shippers, or railroads through unloading at the port-of-entry.

Once spent fuel arrives in the United States, responsibility for acceptance and management falls to personnel at the two destination sites, SRS and INL. Although the program at SRS is overseen by an NNSA official, and the DOE official in Idaho is a DOE/NE employee performing work on behalf of the DOE/EM, the responsibilities of the two site officials are similar. Each onsite manager is responsible for the following:

- Inspection, evaluation, and characterization of the foreign research reactor and the reactor fuel destined for storage at the U.S. site;
- Regulatory certifications of readiness to receive spent fuel at the destination sites;
- Enroute tracking;
- Planning with affected jurisdictions;
- Contracting with vendors for domestic transport. Vendors provide:
    - Casks, cask maintenance, and certification;
    - Carrier;
    - Regulatory compliance for transportation; and
    - Negotiations with trucking company or railroad.

5.0 BENCHMARKING RESULTS

5.1 Business Model and Organization

5.1.1 Objectives

The project team attempted to identify common elements of the partner logistics organizations and, where appropriate, to recognize general management practices that appear relevant for OCRWM planning. The business model analysis suggests areas of common success and concern, both of which can provide insights for OCRWM planning and future study.

5.1.2 Findings

5.1.2.1 Extend Logistics Teams to Include Origin and Destination Sites

OCRWM identified the personnel and organizations that specifically carried out responsibilities for shipment of radioactive materials from an origin site to a destination site. The "logistics team" as described may include personnel from different programs or offices, but in successful logistics projects, the interfaces among different elements are reduced or eliminated - cooperation in logistics planning and operations is seamless.

The key functions of the logistics team, as a whole, are similar across organizations:

- Coordination with origin site preparations and loading;
- Scheduling;
- Acceptance at origin and destination site;
- Authorization to ship from origin site;
- Managing shipping through commercial carriers;
- Maintaining availability of casks and carriers (possibly through third-party vendor);
- Enroute tracking and communications;
- Security and emergency response;
- Coordination with unloading at destination site; and
- Stakeholder relations.

Integration with origin and destination site functions is an essential aspect of the logistics team. Logistics managers' and site managers' responsibilities frequently, and sometimes purposely, overlap. The project team found that some logistics managers set facility design requirements and operating requirements to ensure that turnaround times for shipping containers are reliable. Logistics managers or their designees perform onsite evaluations and inspections to determine site conditions and preparedness, whether sites are Federal sites or commercial facilities in foreign countries. These

functions are integral to success, although they are outside the traditional purview of transportation.

Logistics team interactions with origin and destination sites are critical to the ability to manage transportation logistics reliably. At sites where spent fuel loading or unloading is not the critical driver of the site's primary mission, there may be scheduling delays, or there may be difficulties meeting all the receiving sites' requirements. Unloading and cask turnaround at a destination site for NNPP or FRR is a 4-to-6 week process, due to the ever-present potential for shifting site priorities to affect schedules (waste receipt and storage is only one of several missions at these sites). The impact on logistics is that casks and other transportation equipment may be delayed at the site, affecting scheduling of future shipments. For FRR, this results in direct costs for cask lease and labor. NNPP factors the turnaround time into cask acquisition/inventory requirements, and is constantly evaluating unloading practices at ECF for process improvement.

At WIPP, the destination site has a unified disposal mission, and the rate of disposal is directly linked to reliable and timely delivery of waste through the logistics team. WIPP's Resource Conservation and Recovery Act (RCRA) disposal permit originally placed strict limitations on the numbers of loaded packages that could accumulate at the site at any given time, and sometimes the logistics manager has had to adjust arrival times for en-route shipments. This limitation has been removed with a recently approved permit modification issued by the state of New Mexico. By intensely focusing on unloading and turnaround of equipment, WIPP can reliably meet increased throughput goals and schedules for pick-up at origin sites. However, WIPP does not control schedules at origin sites, and delays may occur there.

Generally speaking, origin site logistics responsibilities for the programs examined include:

- Origin site preparations, including scheduling onsite equipment such as cranes;
- Waste characterization;
- Loading;
- Package characterization; and
- Providing information regarding need and appropriate time for pick-up.

These findings suggest OCRWM should focus on optimizing loading and unloading at sites, and not solely target improved transport times as the key driver for equipment inventory management. Days or weeks might be saved in improved loading/unloading processes; considerably less time might be saved in expedited transport times. Partner organizations recommended that OCRWM have good planning and design interfaces between logistics and the repository, and initiate and test detailed processes for scheduling and executing loading practices at different commercial reactor sites.

5.1.2.2 Build Multidisciplinary Matrix Teams

In all of the studied organizations, logistics are managed through matrix teams. The teams are small, including two to four primary managers who interact with sites, contractors, carriers, and stakeholders. The team members are very close "hands-on" managers of the interfaces—these interactions are not delegated to site M&O contractors. Overall leadership of the team, and the degree to which the team leaders assume overall direction and control, varies among organizations studied.

WIPP has the most centralized and transparent logistics organization. Logistics is one of only two facility operations divisions; the other is the Office of Site Operations. The logistics and transportation function is the responsibility of the Office of the National TRU Program.

NNPP personnel strongly recommended that clear lines of authority and responsibility be established and responsible managers be required to partner and collaborate to optimize the entire spent fuel shipment transportation logistics network. At NNPP, one manager carries out the transportation logistics responsibilities; other officials also have responsibility for site interfaces and overall cradle-to-grave responsibility for managing the fuel. The NNPP logistics operations manager conducts day-to-day activities and detailed planning and scheduling, carrier interactions, stakeholder relations, safety and emergency response. Contract support is provided primarily by one entity (Bettis Atomic Power Laboratory), which exists for the sole purpose of supporting NNPP.

The FRR SNF Acceptance Program centralizes its logistics to some extent by working closely with field oversight of logistics contractors or contractor teams. The Federal team that carries out the program is matrixed from a variety of organizations, including the lead organization, NNSA-OGTR Headquarters; the NNSA-OGTR manager located at SRS; the INL FRR logistics manager who is a DOE/NE employee, and supporting services from DOE/NE.

FRR Acceptance Program interactions of a policy nature are coordinated by NNSA Headquarters with the Department of State. Logistics arrangements, however, are handled at the field level. Under the U.S. fuel acceptance policy, reactors from high-income countries (such as Japan and Germany) are responsible for contracting with logistics agents to ship as NRC licensees on their behalf. For shipments from other countries, DOE uses task order contracts, and the shipment is performed under DOE authorities. Although the regulatory structures are different, all shipments are executed in essentially the same way. Assessment of the waste characteristics and facility requirements of the foreign reactor is handled by the DOE receiving site. Initial stakeholder interactions were contentious, but DOE has established strong relationships with local officials in South Carolina and Idaho. Field logistics managers at each site work directly with the States in which they are located for communications, notifications, routing, and planning for normal and off-normal operations. Over time this has built a solid foundation for stakeholder-DOE interactions.

5.1.2.3 Keep Logistics Management Hands-On and Delegation Chains Short

Within the programs studied, overall management responsibility for logistics is generally delegated to a senior official who has hands-on responsibility for determining related design and interface requirements, overseeing loading and unloading at origin and destination sites, and managing shipping containers. This is because loading, unloading, equipment availability, and equipment turnaround times dominate the logistics system operating requirements. This person typically has some latitude to "speak for the program" on logistics matters. Thus, when problems arise and decisions need to be made, the organization can respond rapidly and effectively.

Day-to-day logistics operations are also a centralized leadership function, focused on shipment scheduling, arranging and monitoring transportation services, stakeholder relations, and shipment tracking. Execution of logistics requirements, set by logistics managers, at origin and destination sites, are local site functions. Other functions, such as regulatory compliance, security, and emergency response, require greater coordination at multiple levels and generally have greater Headquarters involvement.

5.1.2.4 Extensively Pilot-Test and Refine Plans, Equipment and Operations

Every program studied performs testing and inspections of its packaging, vehicles (trailers and rail cars), and response systems. Emphasizing a commitment to hands-on equipment testing and inspection, NNPP officials quoted Admiral Rickover, "you get what you inspect, not what you expect." NNPP noted that its spent fuel casks and railcars are designed, manufactured and evaluated as a transportation system for optimal rail dynamic performance and mechanical worthiness in accordance with Association of American Railroads standards.

WIPP explained that it had significant issues with its trailers when operations commenced. The original trailer designs that were used experienced cracks after relatively low mileage when transporting only two TRUPACTS on a trailer versus the normal three per trailer. More extensive road testing prior to startup might have revealed this problem sooner. Instead, WIPP had a fleet of trailers that required modifications and expensive repairs on the road and during routine maintenance at the WIPP site. The design and procurement of new trailers was time consuming and required additional resources.

WIPP recommends purchase of prototype canisters and vehicles early, then an extensive testing process, accumulating operating experience over all types of road and railroad operating conditions. Additionally, the interfaces with the shippers or generator sites should be tested.

WIPP purchased the first trailers with TRUPACTs in a "package deal" from the cask fabricator. The trailers were fabricated to normal commercial practices and were used in

a slightly different manner than originally designed. The trailers were originally designed for use with three TRUPACTs and then were used extensively to haul only two TRUPACTS due to payload weight limitations. WIPP recommends that trailers and rail cars should be designed by and purchased from fabricators specializing in this equipment and that an auditable QA program be required and appropriate QA standards and checks be applied. New WIPP trailers were procured to stricter standards and design verification standards.

WIPP representatives recommended the complete origin-to-destination logistics network be tested. Testing is needed for procedures for operating new shipping equipment and for regulatory compliance, as well as for the equipment itself.

WIPP representatives said that origin sites can overestimate their ability to ship early in the process. All the requirements of the origin and destination sites' Safety Analysis Report and the Certificate of Compliance must be met or the site will not be able to load. First-hand verification of waste characteristics by the waste acceptance organization is necessary, thereby avoiding casks arriving at the origin site to pick up a load of waste that turned out to be in an unacceptable waste form.

Before opening the facility for operations, WIPP developed a demonstration program including prototype casks which was focused on stakeholder interactions, emergency response preparedness, and public education. In retrospect, WIPP determined the demonstration program could have been even more effective with the following improvements:

- Adequately testing the equipment under routine and continuous operating conditions;
- Providing sufficient repetitions of waste verification and TRUPACT loading processes at the sites;
- Notification procedures for an in-transit emergency, and the joint information center response; and
- Addressing the possible need to reverse shipments due to unexpected rejection of waste at WIPP.

Finally, WIPP recommended that OCRWM consider planning extensive operational readiness reviews with utility sites.

5.1.2.5 Develop and Manage to Comprehensive Transportation Plans

All successful programs developed detailed transportation plans and followed them. The plans themselves had intrinsic value in helping to focus discussions and negotiations between programs and stakeholders. WIPP in particular uses a transportation plan framework for documenting stakeholder agreements and planning operations, and carries out a fairly transparent update and periodic review process for the plan. Transportation planning frameworks established by DOE/EM and documented

in the *DOE Radioactive Material Transportation Practices Manual*, DOE M 460.2-1, and by benchmarking partners should be examined in more detail for applicability to OCRWM.

5.1.2.6 Integrate New Developments in Tracking and Emergency Technology

The WIPP, FRR, and NNPP programs agree that technology developments have played a vital role in transportation management, as well as in continuity planning for waste shipments. These programs all monitor their respective shipments based on individual needs of the program, and provide planning information such as weather developments and forecasts.

TRANSCOM and telephonic communications systems are the primary tools by which WIPP communicates with its carriers. TRANSCOM is a tracking and communications system used to monitor the progress of various unclassified "high visibility" shipments such as spent nuclear fuel and high level waste. Shipment information is made available through devices on vehicles and satellite relays. Authorized TRANSCOM users access the system by computer and connect to the TRANSCOM website through the Internet. The TRANSCOM system is operated by a service contractor at the CBFO in Carlsbad, New Mexico, and is supported through the satellite and communications systems of QUALCOMM©,[12] which is located in San Diego, California. QUALCOMM© maintains backup systems in other parts of the country in case of emergency situations. In the event that TRANSCOM equipment fails, backup procedures exist. Backup servers for TRANSCOM are also being established in a separate geographical location.

Because the FRR program sometimes manages the logistics of accepting spent fuel from foreign countries as well as U.S. shipments, the program utilizes two notification technology systems: TRANSCOM and Purplefinder©.[13] The TRANSCOM system is used primarily for land shipments, while the commercially-available Purplefinder© system is used for overseas shipments. Purplefinder© is a powerful Web-based service that provides a highly effective way of automatically tracking vessel movements in real time.

NNPP's spent nuclear fuel national security shipments require the security features of the classified SECOM tracking system, which is used for DOE special nuclear material and classified shipments and is managed by NNSA's Office of Secure Transportation in Albuquerque, New Mexico.

All three programs also use voice communications over common carrier systems for primary real-time contacts with stakeholders and carriers, including emergency notifications. Information regarding weather and road or rail conditions, needs for assistance, and potential or actual emergency events is primarily provided by shipment drivers or escorts and local or railroad police.

5.1.2.7 Consider Quality Assurance Impacts of Cask Certification Inside the OCRWM Logistics System

Although the WIPP repository is regulated by the U.S. Environmental Protection Agency (EPA) and not by the NRC, WIPP found that its responsibilities as a user of NRC-certified casks bears significant compliance impacts. Ensuring that DOE origin sites and cask manufacturers meet NRC QA requirements is a WIPP responsibility that may also impact OCRWM.

Throughout WIPP operations, various programs for QA were in place through DOE requirements, vendor or contractor practices, contract requirements, and NRC or EPA requirements. The overall lesson learned at WIPP was not to assume that the appropriate standard for QA is being applied, or that the QA being applied will adequately meet or interface with other QA requirements in a complex hierarchy.

Despite WIPP's general exemption from NRC licensing in 1992 it became clear to the WIPP program that a portion of the WIPP transportation system was going to be heavily affected by NRC requirements for packaging. The WIPP Land Withdrawal Act, Section 16 (LWA) (Public Law 102-579, as amended) required that TRU waste be transported to WIPP in packages: "(1) the design of which has been certified by the Nuclear Regulatory Commission; and that have been determined by the Nuclear Regulatory Commission to satisfy its quality assurance requirements." As a result of the LWA, the transportation packaging used by WIPP must be designed, fabricated, assembled, and tested under a QA program approved by the NRC. Although WIPP cask vendors must obtain NRC certification for the casks, the CBFO is registered with the NRC as the user of the NRC-certified packaging. The CBFO is responsible to NRC for ensuring the packaging is used in accordance with the certificates of compliance issued by the NRC under QA programs that meet NRC requirements. To ensure that all NRC packaging requirements are met, WIPP conducts periodic audits of DOE users, including DOE origin sites and shippers. In addition, oversight is provided by the CBFO to confirm that cask fabrication and the completed packages meet the requirements of the NRC.

Currently, the WIPP program uses four NRC Type B approved packages, the HalfPACT, TRUPACT-II, CNS 10-160B, the RH72B, and an additional packaging is in development. WIPP personnel monitored the fabrication of the TRUPACT-II and HalfPACT casks, and conducted QA inspections and audits of the fabricators to ensure that all work was performed in accordance with their NRC-approved QA programs. WIPP provided onsite oversight 7 days a week, 24-hours-per-day, as required. Specific hold and witness points were incorporated into fabricator work plans that required DOE-CBFO representatives to be present to observe critical testing and design compliance measurements. WIPP personnel also reviewed all fabricator non-compliance reports.

The NRC certificates of compliance for the WIPP packaging also include payload requirements that require shippers to know characteristics of the material or waste being shipped and how the packaging is used and maintained. All these operations must be conducted under QA programs that are equivalent to NRC-approved programs. Over the life of the packaging, WIPP must be able to show that the packaging meets the NRC certificates of compliance. This can only be accomplished through the implementation of appropriate controls and verified with appropriate oversight.

WIPP experience has been that DOE origin sites have underestimated the time and resources required to establish programs that meet the rigor required to comply with the regulatory permits issued and the transportation requirements. Shipments were not ready as scheduled. This meant that the initial throughputs at DOE origin sites were much lower than anticipated, and transportation resources were under-utilized. Shipments should be scheduled only after a site has exhaustively demonstrated that they can meet all requirements. Scheduling is simplified if a backlog of compliant and properly packaged material or waste is available for shipment.

The WIPP program discovered there were some advantages to implementation of NRC requirements for TRU waste packaging to WIPP. The WIPP stakeholders had greater confidence in the objectivity and independence of the NRC and there was greater acceptance by stakeholders of NRC requirements as applied to packaging.

Additionally, WIPP must comply with Department of Transportation (DOT) requirements for shipping and manifesting hazardous waste. This includes items such as manifesting, placarding, tractor requirements, and driver requirements. The WIPP TRU waste transportation contracts have established higher standards than DOT in some areas, primarily driver qualifications. Also, WIPP has worked out specific programmatic protocols with the State, local, or Tribal governments that cover such things as communications, notifications, emergency response, and weather delays. These steps may sometimes be “extra-regulatory,” but they can offer real benefits, and operations managers should consider them.

5.2 Contract Management and Outsourcing

5.2.1 Objectives

The Nuclear Waste Policy Act of 1982 requires OCRWM “to utilize by contract private industry to the fullest extent possible in each aspect of…transportation.” (Sec. 137(a)). Some activities remain primarily Federal, and determining essential Federal activities is an important benchmarking objective. However, outsourcing of certain functions does not absolve Federal programs from the responsibility to ensure those functions are executed appropriately. Effective Federal logistics programs use performance requirements and evaluation tools for its contractors, which can also serve as benchmarking objectives.

The term “contractors” is used here to include different private sector sources of products or services, which may in other contexts be referred to as “vendors,” “suppliers,” “carriers,” “shipping agents,” or other terms.

5.2.2 Findings

5.2.2.1 Consider Federal Experience In Tailoring Outsourcing Strategies

In nuclear waste transportation by Federal agencies, as in other hazardous or heavy materials transportation industries, certain functions are commonly outsourced:

- Carrier services - carriers generally provide the shipping vehicle and drivers, but shipping programs often own customized equipment such as trailers and shipping containers;
- Manufacturing of shipping containers and ancillary equipment; and
- Shipment tracking information technology and services.

Functions that are not normally outsourced by the programs studied include:

- Responsibility for safety, security, and reliability of logistics system (compliance or execution activities are commonly outsourced, while oversight and performance accountability are Federal);
- Responsibility for design and performance requirements for mission-critical equipment and services;
- Primary interface of logistics with origin and destination sites, and for agreements and contracts;
- Primary Federal emergency response interface;
- Stakeholder relations: primary contact with Government or Tribal representatives (although many programs have extensive contractor support); and
- Authorizing initiation of shipment.

5.2.2.2 Maintain Strong Control of Mission-Critical Assets and Functions

Tendencies to outsource reflect the mission and structure of the Federal agencies involved. NNPP developed under unique circumstances, which continue to influence its program execution today. When the Navy began its nuclear reactors program, it had to have absolute security and confidence in the quality and precision of its system components, procedures, and people, because of the key strategic role of the nuclear fleet in national defense. For this reason, the program outsources comparatively few functions and services. A couple of longstanding, dedicated, cost-reimbursement contractors provide various specialized support services. On the other end of the spectrum, the FRR program is a decentralized organization with infrequent shipments and relies on commercial suppliers for most offsite activities and equipment. For

mission-critical elements, FRR uses either in-house control or close contract management to prevent system disruptions. Mission-critical elements normally include:

- Shipping containers and related customized vehicles such as trailers;
- Equipment design, testing, and inspection;
- Equipment maintenance; and
- Carrier availability.

Organizations with closer control over casks and carriers have fewer difficulties with scheduling pick-ups and overall reliability. Control is increased through ownership, through vendor contracts with detailed performance specifications and evaluation, and through dedicated resources that are obtained through exclusive vendors. Control is reduced when carriers or casks are provided by subcontract through another logistics organization.

For mission-critical elements, the partner programs studied trended toward having closer control over contracts, contract terms and performance; shorter or staggered contract periods; and closer relationships with contracting officers (onsite or part of program line management). Commercial SNF transport is a relatively low-demand, complex endeavor with high costs of entry and comparatively few participants. These services could be considered a partial "market failure," as evidenced by high volatility in costs, high overhead rates, and poor substitutability of services.[14] At WIPP, FRR, and NNPP, DOE (not the site M&O contractor) deals directly with the entity providing the transportation. Federal contracting and traffic management specialists are key members of the logistics team. Dedicating casks, trailers, and vehicles to the logistics organization, and providing controlled maintenance through a consistent organization, contributes positively to equipment reliability, whether or not the equipment is owned or functions are outsourced. However, these desirable features also add to overall system cost.

WIPP and NNPP own their shipping containers and the customized trailers and railcars. WIPP contracts with the carriers to ensure trailers are maintained to a single, high-quality standard, which ensures interchangeability (i.e., a carrier cannot refuse to use a trailer because it isn't "theirs"). NNPP owns casks and rail cars that are managed and maintained as a single unit. Rolling stock periodic/preventive maintenance is provided through special arrangements with Union Pacific Railroad located in Pocatello, Idaho, near the Navy's receiving site.

The FRR shipments are comparatively less frequent, and the overall schedule cannot always be predicted with certainty, which is part of the reason the program contracts out most equipment and carrier services. Although the FRR program has avoided procurement costs related to seldom-used specialty equipment, the relatively small number of service providers, and the small global inventory of spent fuel shipping casks, together with low volume and low scheduling predictability, has resulted in high

overhead costs. The current worldwide fleet of suitable casks is relatively small, and package availability is an important cost and schedule reliability factor.

Table 3 summarizes the variety of approaches used by WIPP, FRR, and NNPP for obtaining mission-critical transportation equipment and support services such as drivers and maintenance.

Table 3: Procurement Approaches for System Equipment

Equipment	Waste Isolation Pilot Plant			Foreign Research Reactor Program			Naval Nuclear Propulsion Program		
	Acquisition	Quantity	Comment	Acquisition	Quantity	Comment	Acquisition	Quantity	Comment
Cask	DOE-owned	84 TRUPACTs, 12 72-Bs and 1 10-160-B 15 HalfPACTs	1) Long lead-time procurement 2) Technology improving 3) Manufacturing base thin	FRR procures casks by contract through a shipper for about half its shipments. For the other half, casks are provided by the spent fuel owner.	Estimated 10-12 casks commercially available	1) Cask availability is key factor in system efficiency. 2) Global commercial cask fleet is small relative to global demand. 3) FRR services contract is cost-plus-fixed fee, overhead rate is increasing. 4) Requirements are established by task order	DOE-owned	24 M-140 containers	Ownership of shipping packages and rail cars is an industry practice in hazardous materials transportation.
Cask Maintenance	Contract – through M&O Contractor		1) Use cask manufacturer for major maintenance	Cask owner provides cask maintenance			In-house by support contractor		
Drivers	Contract – through carrier		1) Detailed contract requirements result in virtually dedicated driver pool 2) Drivers are assigned to tractors 2) Driver availability is key to carrier service	FRR contract shipper provides drivers, equipment, and maintenance and arranges for rail or overseas shipping. When foreign reactor owner is responsible, contract arrangements may vary.			Train crews provided by rail carriers		
Trailer	DOE-owned	60 3-place, 8 2-place	1) Purchase through carriers 2) Certified QA designs and manufacturing 3) Consistent design and maintenance ensures ability to transfer if carrier changes 4) Trailer assigned to carrier for use and maintenance				NA		

Equipment	Waste Isolation Pilot Plant			Foreign Research Reactor Program			Naval Nuclear Propulsion Program		
	Acquisition	Quantity	Comment	Acquisition	Quantity	Comment	Acquisition	Quantity	Comment
Trailer - Maintenance	Contract – through carriers		Maintenance is standardized so that trailers can be used by different carriers.				NA		
Tractor	Contract – through carrier		1) Trucking industry is low margin, volatile -- contract approach can establish more stability 2) GSA rules affected decision not to own tractors				NA		
Tractor Maintenance	Contract – through carrier						NA		
Rail Car	NA						DOE-owned	24 (1 per cask)	
Rail Engine	NA						Provided by RR		
Rail Buffer	NA						DOE-owned or provided by RR		
Rail Escort	NA						DOE-owned		
Rail Maintenance	NA						Provided by RR		Specialized facility for customer
Ocean Shipping	NA						NA		

5.3 Stakeholder Relations

5.3.1 Objectives

The team looked closely at DOE programs which have adapted their communications processes to meet the needs of their stakeholders and the public. OCRWM's goal is to identify successful best practices of recognized top stakeholder communications programs and incorporate the best principles, techniques, and tools they used.

The key objective is to establish a mutually beneficial relationship with stakeholders – particularly with State, Tribal, and local governments – to advance reliable, safe operations. A foundation of these relationships is trust, which the benchmarked activities are intended to promote.

As each program's stakeholder processes have matured, activities and stakeholder interfaces have become more routine, even with regard to rapidly changing issues such as security and contingency planning. This relatively good overall coordination has not, however, always been the case. At one time or another, each program experienced times when shipments were effectively halted due to opposition from a State, local, or Tribal government. Stakeholder relations are not just an indication of functioning relationships among governments; poor relationships can have immediate and substantial operating costs.

WHAT CONSTITUTES TRUST?

A basic component of earning trust is compliance with standards, requirements and agreements, both in the letter and spirit of the law. An error, however inadvertent, undermines trust immediately. Many State contacts tend to be in law enforcement, or have law enforcement backgrounds, and are highly sensitive to ambiguous or misleading statements.

In situations where different agencies or organizations are not in agreement, and may even be adversaries, trust at a personal level can help demonstrate that DOE is acting in good faith, and following through on commitments. Trust among people helps build trust among entities.

- WIPP Representative

5.3.2 Findings

5.3.2.1 Focus on Safety as the Basis for Relationships

The importance of external stakeholder relationships is illustrated by the evolution of NNPP stakeholder relations. Early on, NNPP conducted its national security shipments in accordance with all applicable Federal regulatory requirements without the level of external stakeholder engagement it now practices. External stakeholder relations were developed to ensure continuation of operations after State and Tribal government actions in Idaho halted shipments in the early/mid-1990s. At that time, NNPP began to actively participate in DOE's spent fuel management environmental impact statement including engaging in spent fuel transportation outreach activities. Since then, this outreach effort has matured and enhanced NNPP's transportation operations, in large part by focusing stakeholder relationships on real, not perceived, safety

issues. NNPP's current accident exercise program helps ensure that State, Tribal, and local civilian emergency services organizations understand Navy spent fuel shipment operations, the low risk and extreme safety of the shipments, and how to effectively coordinate emergency response to an accident involving a shipment.

DOE transportation organizations follow the Department of Homeland Security and other Federal policies in recognizing local police and emergency services providers and State highway and transportation planning organizations as the first line of response for national security, natural emergencies, and highway safety. All organizations studied devote substantial resources to maintaining effective interfaces with stakeholders, and support emergency response training and exercises.

Special efforts are required to ensure State, local, and Tribal government involvement during rail shipments. Rail corridors and stops are private property and access is limited compared to highway shipments.

Safety is also the key message for public communications. WIPP notes that public messages must be consistent, unified, and focused on partnering to make safe and uneventful shipments. WIPP works to ensure that DOE, contractors, drivers, and State and Tribal partners carry the same message and that the program gives the partners all the information they need to understand how the safety partnership works.

5.3.2.2 Make Cooperative Shipment Planning the Rule, Not the Exception

Analysis of lessons learned reports from decades of radioactive waste shipments shows that stakeholder participation in shipment planning is one of the primary issues of concern to stakeholders, and establishes effective planning tools for operations. Each organization studied for benchmarking has involved stakeholders in development of some version of transportation planning.

Through its shipment accident exercise program, the NNPP validates with State, Tribal and local emergency services organizations the NNPP transportation emergency planning. The NNPP's planning covers communication links between the shipper (the, NNPP), carriers (the railroads) and civilian emergency response teams (State, Tribal, and local).

WIPP involves stakeholders in planning a broad range of program activities, including acquisition. WIPP representatives said that years of intensive cooperation resulted in program documents that were instrumental in creating smooth operations from the beginning of WIPP shipments, and that remain fundamental to current operations. Those planning documents include:

- The *Disposal Decision Plan*, a roadmap to the key steps leading to WIPP operations, including both onsite and transportation plans. Significant tasks and decisions leading to repository operations were reported at State

Regional Group and Tribal meetings, and stakeholders were given opportunity to comment;

- The *WIPP Transportation Safety Program Implementation Guide* (the "PIG"), a set of operating expectations negotiated with Western states that were later adopted by other regional organizations;
- The *WIPP Transportation Plan*, for which affected States prepared procedures for implementing their own functions under the PIG, and which continues to function as a planning basis that is modified by mutual agreement of States and WIPP; and
- Routing strategy plans and shipment preparations that were coordinated through the regional and Tribal meetings related to the Disposal Decision Plan.

WIPP discussed with States and Tribes their issues related to shipments and emergency response. States and Tribes also wanted to provide input regarding scheduling of shipments (i.e., during holidays and special events) and constraints such as availability of inspectors and emergency response personnel. In some states, such as Illinois and Colorado, legislation requires inspections.

For FRR, the State regional groups convene States affected by FRR shipments to review plans and operating procedures and provide information.

One FRR official noted that while including stakeholders in operations planning can add time and resource requirements, one result is greatly increased confidence that any reasonably predictable contingency has been prepared for. Conversely, lack of involvement, and the resulting consequences, can be extremely expensive. Initial long-term program planning included stakeholder contributions through town meetings and regional groups. Current planning processes are conducted through regional groups, and primarily with South Carolina and Idaho, the States where the receiving sites are located.

5.3.2.3 Build Relationships Using Training, Demonstrations, and Exercises

Of the practices and tools available to enhance stakeholder relationships, organizations studied agreed that transferring experience through training, technology and process demonstrations, and preparedness exercises are the most effective.

Emergency response training is a well established Federal activity that is supported through Department of Homeland Security, DOT, Department of Defense, and DOE programs. A primary recommendation for training was to coordinate with existing Federal emergency response training to avoid inconsistency or duplication. DOE stakeholder programs have benefited from integration with WIPP programs. Over time, WIPP and other DOE programs, such as the Transportation Emergency Preparedness Program (TEPP), have worked to make training content and delivery more consistent and, where appropriate, incorporate them into States' hazardous materials response training programs.

WIPP recommends demonstration of equipment capabilities by doing "road shows," using an actual (unloaded) shipping cask to show stakeholders what the cask looks like and how it functions as a robust system. This helps communicate and reinforce the transportation safety message. The cask demonstration program at WIPP was also tied to technical testing and development that is important to WIPP cask acquisition planning. (See discussion in Section 5.1.2.4.)

Approximately every other year since 1996, NNPP has coordinated a highly structured spent fuel shipment accident exercise. These exercises have been well attended by representatives from State and local governments and emergency response organizations. The exercises involve a complete rail consist (locomotive, buffer cars, cask car with an unloaded cask, and escort car) involved in a grade crossing accident with simulated injuries and radiological concerns by passersby. The objectives are to familiarize attendees with the shipping cask characteristics and shipping practices, exercise interactions between NNPP shipment escorts and railroad personnel and State and local responders, allow evaluation of simulated accident responses by government agency representatives, and exercise accident communications links. A consistent stakeholder observation from these exercises has been the inherent safety of radioactive material/spent nuclear fuel transportation in the formidable, robust Type B shipping casks. Nuclear myths are dispelled, and an understanding is gained that nuclear spent fuel transportation is not unusually risky and can be accomplished safely. The most recent NNPP accident exercise was held October 12, 2006, in Kenova, West Virginia, and involved over 100 participants and observers.

Participants in NNPP shipment accident exercises are involved in meetings beginning approximately 9 months prior to the date of the event. Six months in advance, the group has a planning meeting where event scenarios are developed. Three months prior, a "Table Top" exercise takes place where some role playing is carried out and scenarios are refined. Approximately one month prior to the event, there is a participants-only "dress rehearsal." There is also a run-through of high-level communications links developed and discussed during the Table Top. On the final exercise day, observers attend from throughout the region where the accident exercise is conducted. Participants include role players as local residents and news media. Local police and fire teams assume incident command and railroad operational and recovery personnel participate in the incident command. NNPP and State radiological health personnel conduct radiological surveys. "Real-world" media are invited to report on the exercise. These real-world media reports provide an opportunity for local citizens to learn about Navy spent fuel shipments.

Over the course of several years, WIPP designed and implemented a comprehensive transportation demonstration program. Through coordination with the States and Tribes, the CBFO developed an outreach program for stakeholders. The objectives included:

- Demonstrate the operational readiness of the WIPP procedures,
- Demonstrate the readiness of the carriers,

- Participate in readiness exercises with the States and Tribes,
- Verify the training of the State and local emergency responders, and
- Demonstrate to the elected officials and public the robustness of the system components.

To start the demonstration program, WIPP acquired "road show" trucks with demonstration TRUPACT-IIs, which were originally fabricated as actual packagings but were rejected because they did not meet NRC specifications. The drivers were specially selected and trained to meet with the public and elected officials and to answer questions about safety and truck operations. The public and elected officials were able to assess the casks and watch a demonstration of the TRANSCOM tracking system. Other key components included:

- The States took the lead role for scheduling and conducting meetings with their elected officials and their citizens.
- WIPP developed and presented emergency responder training and conducted exercises of the State/Federal response systems. Emergency medical, State response planning and development, and risk communications training was also provided to the States and Tribes.
- WIPP made "dry runs" before making actual shipments. All the players (DOE, carrier, States, and Tribes) became familiar with their roles and the roles of the other players. Where appropriate, modifications were made to the plans and procedures and then retested.
- WIPP repeated the same steps before shipping on new routes.

5.3.2.4 Work through Well-Established Stakeholder Networks

Experience at DOE sites includes decades of interaction, negotiation, and sometimes litigation between Federal programs and governmental and nongovernmental organizations. Resulting written agreements and well-established professional relationships have formed the foundations of mutual understanding concerning hazardous, publicly sensitive, or changing facility functions. Spent fuel and nuclear waste shipping operations involving DOE sites recognize and rely on these established frameworks.

State regional groups have served various roles as critics, advisors, and communications centers for many Federal activities, and today they are a focal point of planning and communication for WIPP, FRR, and NNPP shipping. The DOE-sponsored TEC is cited as another major stakeholder outreach forum by all three Federal programs.

Lessons learned analyses from past shipping campaigns emphasize important roles played in stakeholder relations planning by electric utility organizations where spent fuel originates. The utilities have developed close local relationships in emergency planning, and close relationships with State, local, and Tribal governments.

5.3.2.5 Integrate Stakeholder Relations and Technical Operations

WIPP, FRR, and NNPP manage stakeholder relations through personnel who are engaged in the extended origin-to-receiver logistics network and who have training and experience in relevant technical operations. At FRR, stakeholder relations are managed and implemented by program technical personnel, with some assistance provided by Idaho Field Office public relations staff. At WIPP and NNPP, stakeholder management and outreach is part of central logistics management. For WIPP, during site characterization and licensing, stakeholder communication for these activities and for transportation were provided by the same WIPP staff. WIPP recommends training and updating stakeholder relations personnel in the technical execution of the program to the extent needed to act as ambassadors and negotiators for the program.

Stakeholder relations for the current FRR program are conducted by the operating personnel who carry out other planning and logistics for shipments. For FRR shipments, this means that stakeholder programs are handled by different organizations based on the final destination of the shipment. SRS and INL managers handle stakeholder relations along their respective shipping routes, with support from site public affairs offices as needed.

5.3.2.6 Manage Commitments to Planning Partners

Building strong working relationships with States and Tribes ensures strong partnerships on agreements and commitments to make safe, secure shipments. All of the shipping programs in this study emphasized the importance of accurately recording and tracking commitments so all participants remember them.

Although Federal funding is always subject to changes and uncertainty through the appropriations process, WIPP found it helpful to show States that the program was committed to trying to provide stable funding from one year to another for preparedness programs. Fluctuations in funding can make it difficult for States to plan and prepare, and this can lead to delays in emergency preparedness.

All of the shipping programs studied found that working-level solutions were generally an effective and satisfactory way to resolve issues with stakeholders. Internal agency coordination is necessary to ensure that working-level agreements reached with stakeholders are coincident with the positions of senior DOE management. Trust in stakeholder relationships is undermined if stakeholders receive different messages from DOE management and staff. Furthermore, communications between States or Tribes and DOE that consist primarily of letters at a government-to-government level, such as between a Governor and the Secretary of Energy, may indicate a need for better staff-level communication.

Building trust in negotiating with Tribes presents special challenges, given the sociopolitical context and issues of sovereignty. Elected Tribal leaders and officials change frequently (often annually), creating challenges to long-term agreement

negotiations. Two Tribes are located along NNPP routes. Relations and coordination with the Tribes is an important part of the NNPP stakeholder relations program.

The Evolution of WIPP's Public Outreach and Communications Program

Only one of the Federal programs, WIPP, relied extensively on highly-specialized sustained public outreach and institutional organizations outside the logistics team.

Before commencing operations, WIPP had a 17-person outreach organization and additional resources at work for years. WIPP continues to maintain stakeholder relations experts as part of the core logistics team.

For the 2 years before and after startup of shipments, staffing and funding for the WIPP communications organization was substantial. The staff communicated with stakeholders through speaking engagements, tours, provision of information materials and various outreach activities. The original staff functioned not only as communication support for transport operations, but also for site characterization and the disposal licensing of WIPP, which helped to integrate the technical aspects of the shipment with the stakeholder communication needs. Currently, there are 4 communications staff, 3 training staff, and 1 DOE representative assigned to stakeholder outreach. WIPP continues to have communications experts as partners on technical teams.

WIPP incorporated the following elements into their stakeholder program:

- Santa Fe Information and Outreach Office – This information and outreach office was located to be accessible to the population and stakeholders most opposed to operation of WIPP.
- Tour Program, Speakers Bureau, Exhibits and Road Shows –The "road show" included a WIPP truck and trailer with TRUPACT-II shipping containers.
- Publications – Regular publications, monthly calendars, involvement opportunities, quarterly *TRU Progress* with in-depth information about events and activities, and an array of fact sheets.
- Intranet and Internet media - Electronic newsletters and media relations material are provided via intranet and the Internet. *WIPP Watch* is an electronic newsletter used to inform more distant stakeholder-partners about late-breaking news. These e-mail publications allow CBFO to tell its story quickly, without having to be concerned about misinterpretation and perhaps distortion that may occur in the mass media. CBFO used this publication in final months leading to opening, when rumors and incorrect information about court rulings and regulatory decisions could have confused or unhinged cooperative efforts.
- Prior to WIPP opening, a survey was conducted to judge movement in terms of public acceptance. WIPP indicated a baseline was needed in order to judge improvements.
- Third-party credible spokespersons to help communication efforts.

In FY 2005, the WIPP communications budget was about $3.5 million.

5.4 Continuity Planning

5.4.1 Objectives

Continuity planning ensures that in the event of an emergency that has system impacts, normal business operations will be protected. Continuity planning is distinguished from vehicle-specific enroute emergency incidents and accidents. Emergencies might include hurricanes, tornados, power blackouts, and communications disruptions that affect operations service centers.

DOE Orders and Department of Homeland Security guidelines provide the foundation for continuity planning, and program-specific guidance has also been developed. Due to increased security concerns affecting NNPP and NNSA that limited the scope of off-normal event discussions, this study focused on recommendations from WIPP.

5.4.2 Findings

5.4.2.1 Integrate Back-up Plans and Communications

WIPP centralizes the primary communications center and support for the key logistics functions – TRANSCOM, vehicle and cask inspections, training - at the receiving site, because that is where the operations intersect.

Redundant systems for the TRANSCOM communications system, which is the primary tool for communications with vehicles and drivers, are at locations within 60 miles of the site. Additional back-up is provided through the satellite and communications systems of QUALCOMM© Inc., located in San Diego, California. QUALCOMM© maintains back-up systems for TRANSCOM at undisclosed locations in other parts of the country.

In the event the TRANSCOM equipment fails on the vehicle, drivers are to report the equipment problem via satellite or secure cellular telephone. The drivers are to report to the TRANSCOM Central Monitoring Room every 2 hours until the vehicle can be repaired or the equipment replaced. Specific procedures are described in the WIPP Transportation Plan and the PIG, and have been incorporated in carrier contracts by reference.

Administrative, scheduling, procurement, human resources and most program support functions are located at the CBFO offices in downtown Carlsbad. Maintaining continuity of these functions is addressed under DOE Notice 150, *Continuity of Operations*.

Emergency communication procedures include criteria for involving the DOE Emergency Operations Center and DOE Joint Information Center.

6.0 SUMMARY OF FINDINGS, SUGGESTED NEXT STEPS

6.1 Summary of Findings

Benchmarking and identifying best practices are not "one shot" activities—they are process tools for continuous improvement. This is especially true in a field like logistics, where competition and technology innovations drive constant change. Although this interim report should therefore be considered a "snapshot" of results to date, the project team believes these findings are significant.

Table 4: Preliminary Logistics Benchmarking Findings*

Business Process	*Findings*
5.1. Business Model	5.1.2.1 Extend logistics team to include waste origin/destination sites
	5.1.2.2 Build multidisciplinary matrix teams
	5.1.2.3 Keep logistics management hands-on and delegation chains short
	5.1.2.4 Extensively pilot test and refine plans, equipment and operations
	5.1.2.5 Develop and manage to comprehensive transportation plans
	5.1.2.6 Integrate new developments in tracking, emergency technology
	5.1.2.7 Consider QA impacts of cask certification on OCRWM
5.2. Contract Management/Outsourcing	5.2.2.1 Consider Federal experience in tailoring outsourcing strategies
	5.2.2.2 Maintain strong control of mission-critical assets and functions
5.3. Stakeholder Relations	5.3.2.1 Focus on safety as the basis for relationships
	5.3.2.2 Make cooperative shipment planning the rule, not the exception
	5.3.2.3 Build relationships using training, demonstrations and exercises
	5.3.2.4 Work through well-established stakeholder networks
	5.3.2.5 Integrate stakeholder relations and technical operations
	5.3.2.6 Manage commitments to planning partners
5.4. Continuity Planning	5.4.2.1 Integrate backup plans and communications

* The category numbering system corresponds to sections in the report.

Many of the findings are simply things that logistics team members should strive to incorporate into their planning efforts and their day-to-day work (e.g., "make cooperative planning the rule, not the exception"). However, the team's research and analysis has resulted in some findings that could be implemented by OCRWM on a programmatic level in the near-term and could also inform future studies on best practices.

6.2 Suggested Next Steps for Additional/Expanded Analysis

1. Compare a detailed checklist of benchmarked findings with current OCRWM program plans.
2. Compare Federal project benchmarks with commercial logistics trends and practices.
3. Identify additional candidate benchmarking partners with logistics enterprises unrelated to SNF transportation. Subjects could include elements of the SDDC,

other hazardous materials shippers, SNF logistics enterprises in foreign countries, or commercial logistics companies within the United States.

4. Work with WIPP, FRR, and NNPP to consider more detailed analysis of additional logistics components/factors, such as:
    a. Load and shipment planning and dynamic routing and consolidation to optimize loading efficiency, asset utilization, and carrier availability;
    b. Asset tracking, communications, and security network technology;
    c. Onsite loading and unloading process improvement; and
    d. Carrier, equipment management, and equipment maintenance contracting.
5. Examine and recommend developing tailored outsourcing solutions where specialized markets or market limitations exist.
6. Develop specific recommendations for OCRWM planning timelines based on Federal experience in acquisition and operations.

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[14] In 2006, members of the project team visited a primary carrier for radioactive materials, as well as munitions and other hazardous materials for DOE and the Defense Department. The company's CEO described in detail how its drivers, tracking systems, communications and other equipment is state-of-the-art and costly, because of high

Federal customer requirements, and this specialized service has a limited market. The CEO specifically put it this way: “We pay top dollar for the best equipment and drivers. We don’t backhaul Kleenex.”