

**U.S. Department of Energy  
Office of Environmental Management**



**Office of Packaging and Transportation  
Annual Report FY 2016**

**Prepared by the Office of Packaging and Transportation  
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## EXECUTIVE SUMMARY

The Office of Environmental Management (EM) was established to mitigate risks and hazards posed by the legacy of nuclear weapons production and research. The most ambitious and far ranging of these missions is dealing with the environmental impacts of the Cold War. EM operational requirements are unique and include the packaging and transportation of large quantities of contaminated wastes and soil, and a vast number of contaminated structures during remediation of contaminated sites. The Department of Energy (DOE) completed more than 8,400 offsite hazardous material shipments over public roads totaling more than 4.2 million miles in fiscal year (FY) 2016 with no recordable packaging and transportation accidents. Of that, EM completed approximately 6,800 (about 81% of the Department's total) radioactive, hazardous material and waste shipments totaling approximately 3.3 million miles.

The mission of the DOE Office of Packaging and Transportation (OPT), positioned within EM, is to manage and establish policy, provide leadership, guidance, support, and oversight to assure that Departmental-wide packaging and transportation of radioactive and other hazardous materials are safe, regulatory-compliant, carefully planned, executed, tracked, secure, timely and efficient. Through execution of its mission, OPT continues to support the needs of DOE programs, sites, and operations and to protect the health and safety of workers and the public. OPT provides DOE centralized support, expertise, and efficiency that cannot be provided through a site-by-site approach. This report serves to communicate accomplishments of the program and activities that OPT continues to champion for the DOE complex.

Major OPT accomplishments in FY 2016 include:

1. Transporting hazardous materials more than 4.2 million miles with no Department of Transportation recordable packaging or transportation accidents.
2. Completing 41 package certification actions related to review and approval of new transportation packages, amendments, renewals, special approvals, and terminations.
3. Facilitating the exchange of 75 excess U.S. Department of Transportation 7A Type A Fissile Qualified reusable containers from Oak Ridge Office to the Portsmouth and Paducah sites, and the Idaho National Laboratory.
4. Performing four Motor Carrier Evaluation Program (MCEP) evaluations on motor carriers involved in transporting the Department's hazardous materials. One of the MCEP evaluations was to add a new motor carrier to the MCEP list of approved transporters. This motor carrier supports the Moab Project in shipping of radioactive debris from Moab to the Crescent Junction disposal cell.
5. At the request of the Nevada Site Specific Advisory Board, OPT developed and provided an MCEP program training session for the Advisory Board. The training included a question and answer session for participating Board members.
6. Sponsoring and serving as the DOE advisor in coordination of the summer and winter DOE Transportation Management Council (TMC) and DOE Packaging Management Council (PMC) operations meetings. TMC and PMC meetings are attended by DOE/

National Nuclear Security Administration (NNSA) and their site transportation and packaging contractors. These meetings provide forums for identification, analysis, and resolution of traffic management, packaging and transportation operations, safety, and security issues.

7. Collaborating with subject matter experts from the Office of Science, Office of Nuclear Energy, and NNSA to revise DOE Order 460.1C, *Hazardous Materials Packaging and Transportation Safety*. The new Order, 460.1D, was approved by the Deputy Secretary on December 20, 2016.
8. Providing 138 Transportation Emergency Preparedness Program courses in 17 states to train more than 2,900 first responders. These sessions were planned and presented in partnership with state and tribal instructors, emergency responders, as well as with instructors from the DOE Radiological Assistance Program and the Waste Isolation Pilot Plant.
9. Hosting the 2016 Annual Meeting of the National Transportation Stakeholders Forum in partnership with the Southern States Energy Board and the Tribal Caucus in Orlando, Florida. More than 200 registrants at the event gathered from federal agencies, state, local, and tribal governments, private industry and other entities to communicate and exchange timely updates and presentations on packaging and transportation subjects and issues, and to participate in various breakout sessions on relevant topics. The Forum also presented an opportunity for Tribal Caucus and State Regional Groups to meet and discuss issues of significance to their regional caucuses.

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## Acronyms

ACTS	Authenticatable Container Tracking System
AGHCF	Alpha Gamma Hot Cell Facility
AHWG	Ad Hoc Working Group
ASME	American Society of Mechanical Engineers
ATLAS	Automated Transportation Logistics and Analysis System
AU	Office of Environment, Health, Safety and Security
CFR	Code of Federal Regulation
CGD	Commercial Grade Dedication
CoC	Certification of Compliance
DOE	Department of Energy
DOT	US Department of Transportation
EDI	Electronic Data Interchange
EFCOG	Energy Facility Contractors Group
EM	Office of Environmental Management
FY	Fiscal Year
GSA	General Services Administration
HazMat	Hazardous Materials
HCO	Headquarters Certifying Official
HHG	Household Goods
IAEA	International Atomic Energy Agency
IP	Industrial Packaging
KAMS	K-Area Material Storage
LTL	Less-than-truckload
MCEP	Motor Carrier Evaluation Program
MERRTT	Modular Emergency Response Radiological Transportation Training
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NQA	Nuclear Quality Assurance
NRC	Nuclear Regulatory Commission

NTSF	National Transportation Stakeholders Forum
OPT	Office of Packaging and Transportation
ORPS	DOE Occurrence Reporting and Processing System
PCP	Packaging Certification Program
PMC	Packaging Management Council
QA	Quality Assurance
QAPD	Quality Assurance Program Description
RADCALC	Radiation Calculation Transportation Safety Software
RAM	Radioactive Material
RAMM	Remote Area Modular Monitor
RAMPAC	Radioactive Material Packaging
RFID	Radio Frequency Identification System
RMS	Remote Monitoring System
SCAC	Standard Carrier Alpha Code
SPRU	Separations Process Research Unit
SRS	Savannah River Site
TCAP	Transportation Safety and Oversight Compliance Assurance Program
TEPP	Transportation Emergency Preparedness Program
TL	Truckload
TMC	Transportation Management Council
TRAGIS	Transportation Routing Analysis Geographic Information System
TTX	Table-top Exercise
UNR	University of Nevada-Reno
WebTRAGIS	Web Transportation Routing Analysis Geographic Information System

## 1. OVERVIEW OF THE OFFICE OF PACKAGING AND TRANSPORTATION

The Office of Environmental Management's (EM) Office of Packaging and Transportation (OPT) provides packaging and transportation services to the entire Department of Energy (DOE) complex. The Atomic Energy Act of 1954, as amended, gives DOE broad authorities to regulate all aspects of activities involving radioactive material that are undertaken by DOE or on its behalf, including transportation. Authorities for OPT flow from 41 Code of Federal Regulations (CFR) 109-40, *Transportation and Traffic Management*, and 49 CFR 173, *Department of Transportation, Shippers – General Requirements for Shipments and Packagings*, which establishes DOE's transportation management and packaging certification authorities, and DOE Orders 460.1, *Packaging and Transportation Safety*, DOE Order 460.2, *Departmental Materials and Transportation Management*, and DOE Manual 460.2-1, *Radioactive Material Transportation Practices Manual*. DOE Order 460.1 establishes safety requirements for the proper packaging and transportation of offsite shipments and onsite transfers of hazardous materials, including radioactive materials. DOE Order 460.2 establishes standard transportation practices for DOE elements to use in planning and executing offsite shipments of radioactive material including radioactive waste.

DOE Manual 460.2-1 was developed through a collaborative effort under the Senior Executive Transportation Forum (established by the Secretary of Energy in January 1998) to coordinate efforts of Departmental elements involved in the safe transportation of radioactive material and waste. Subsequent updates also reflect the continuing collaboration of DOE and outside organizations such as the Tribal Caucus and State Regional Groups, on transportation of radioactive material and waste. The Manual is composed of transportation practices that establish a standardized process and framework to include interacting with State, Tribal, and local authorities, other Federal agencies, and transportation contractors and carriers regarding DOE radioactive material shipments.

The mission of OPT is to manage and establish policy, provide leadership, guidance, support, and integrated oversight to assure that Departmental shipments of radioactive and other hazardous materials are safe, regulatory compliant, carefully planned, executed, tracked, secure, timely and efficient. Through execution of its mission, OPT continues to support the needs of DOE programs, sites, and operations and to protect the health and safety of workers and the public. Open communication and long-standing partnerships with our stakeholders are key tenets of mission success.

OPT constantly seeks opportunities for cost savings and leveraging Departmental resources to use economies of scale. By doing this, sites reduce operating expenses associated with packaging and transportation (P&T) activities and are able to apply more of their funds to other mission support needs. OPT provides the following services for the Department including our EM sites:

***Program and Site Support:*** Managing and coordinating the Departmental transportation logistics program including automated systems and tools (e.g. Automated Transportation Logistics and Analysis System [ATLAS], Transportation Routing Analysis Geographic Information System [TRAGIS], Radioactive Transportation Model [RADTRAN], Radiation

Calculation Transportation Safety Software [RADCALC]), motor carrier evaluations, national freight rate tenders and contracts negotiations, and availability of commercial transport equipment to meet programmatic requirements.

**Transportation Risk Reduction:** Optimizing Departmental transportation logistics by providing centralized services such as serving as DOE lead on the DOE Transportation Management Council (TMC) and Packaging Management Council (PMC), evaluation of P&T safety and performance metrics, identifying opportunities for improvements and risk reduction, performing site P&T compliance assessments, and managing the DOE motor carrier evaluation program (MCEP) to ensure activities are safe, secure, economical, and meet applicable regulatory requirements.

**Packaging Certification:** Managing the DOE Packaging Certification Program (PCP) for certification of fissile and Type B packagings which conform to U.S. Department of Transportation (DOT) and U.S. Nuclear Regulatory Commission (NRC) requirements. The DOE authority to execute the DOE PCP is recognized under 49 CFR 173, *Department of Transportation Shippers – General Requirements for Shipments and Packagings*.

**Regulations, Orders and Standards Support:** Monitoring transportation regulatory actions by reviewing Federal Register, International Atomic Energy Agency (IAEA), and other agency documents that may impact DOE operations to keep program offices and the P&T community at DOE sites abreast of changes.

**Emergency Preparedness and Outreach:** Administering the Transportation Emergency Preparedness Program (TEPP), as required by 44 CFR 351, *Radiological Emergency Planning and Preparedness*, and DOE Manual 460.2-1A to address concerns expressed by corridor states and tribes about planning and preparedness along DOE shipping corridors and to provide training to first responders. Serving as Chair of the National Transportation Stakeholder's Forum (NTSF), which is the mechanism that DOE communicates at a national level with states and tribes about DOE's shipments of radioactive waste and materials,

## 2. PACKAGING AND TRANSPORTATION HIGHLIGHTS IN FISCAL YEAR 2016

### 2.1 PROGRAM AND SITE SUPPORT

OPT maintains a transportation logistics program that includes automated systems/tools, carrier evaluations, negotiation of national freight rate tenders/contracts, and availability of commercial transport equipment to meet programmatic requirements.

#### 2.1.1 Packaging Management Council (PMC)

OPT serves as federal advisor to the Department and National Nuclear Security Administration (NNSA) contractor's PMC. PMC addresses Departmental challenges with selection, procurement, design, fabrication, loading, and movement of certified and approved packages containing hazardous/radioactive material. Due to the diversity in technical and regulatory knowledge required to fully understand packaging requirements for these materials, PMC provides a forum for identification, analysis, and resolution of DOE packaging issues.

PMC developed a final Freight Container Guidance Document in Fiscal Year (FY) 2016 for



DOE contractors who want to use standard freight containers as Industrial Packaging (IP) Type IP-1, Type IP-2, or Type IP-3 for domestic purposes based upon the DOT regulations. The document provides guidance for procurement, use, and maintenance of standard freight containers as radioactive material packaging since freight containers are not normally fabricated to transport radioactive materials. It provides additional practices and methods needed to ensure compliance with the DOT regulations to ensure there is no loss of content or increase of dose rate during transport. As a result, OPT submitted the Freight Container Guidance to DOE Office of Technical Standards Program (run by DOE's Office of Environment, Health, Safety and Security (AU), Office of Quality Assurance for development into a DOE Handbook.

### ***2.1.2 Transportation Management Council (TMC)***

In accordance with DOE Order 460.2, *Departmental Materials Transportation and Packaging Management*, OPT serves as federal sponsor and advisor for the Department's Transportation Management Council. TMC membership is made up of DOE and NNSA federal personnel, and DOE/NNSA contractors involved in traffic management, transportation operations, and transportation safety activities. TMC provides a forum for complex-wide collaboration, identification, analysis, and resolution of motor carrier safety, traffic management, transportation operations, transportation safety and security issues in support of Departmental shipping needs. OPT sponsored and assisted in coordinating summer and winter TMC operations meetings. Site DOE and NNSA federal and contractor transportation personnel discussed topics such as new DOT regulatory requirements, transportation lessons learned, metrics, and site transportation accomplishments.

One of TMC's many important activities is to negotiate and put in place national transportation tender rates for the Department. These national tenders are with household goods (HHG), truckload (TL), and less-than-truckload (LTL) motor carriers. In FY 2015, TMC and the TMC federal advisor developed a HHG bid specification, tariff rates, and a rating tool. This resulted in successful establishment of 12 HHG national tenders for the Department. Additionally in FY 2015, the TMC established 13 TL national tenders for the Department, and worked with the General Services Administration to establish 10 LTL tenders for the Department. In FY 2016, OPT exercised a provision in the tender bid specification to extend all of the FY 2015 national tenders for a year through the end of calendar year 2016. This was done at the convenience of the Department to take advantage of using FY 2015 perceived lower rates as compared to projections for FY 2016 rates and fuel costs. Also, in FY 2016, OPT and TMC reached an agreement with United Parcel Service to establish new, cheaper small package ground rates for FY 2017.

### ***2.1.3 Support of Site Transportation Activities***

OPT routinely supports transportation activities of DOE sites by providing information, coordination and guidance. Below are examples of this support.

- Beginning in FY 2016, OPT re-started conduct of telephonic/WebEx discussions with DOE P&T stakeholders. Quarterly P&T Field calls provide a forum for P&T experts from the Field, Headquarters (HQ) and other invited agencies to discuss items of interest, sharing of best practices, lessons learned, and to resolve issues raised during the calls. An average of 40+ participants were online for the June and September 2016 P&T calls.

- **West Valley Demonstration Project** - Transportation of Large Vitrification Components: West Valley Demonstration Project (WVDP) cleanup and decommissioning operations are ongoing, including packaging, transportation and off-site disposal of all legacy waste. As a result, three large components (melter and two tanks) used in the solidification of radioactive waste generated from nuclear fuel commercial reprocessing activities that ceased in 1972 were decontaminated, packaged and transported for off-site disposal in 2016. The NRC granted Special Package Authorization of the melter (approximately 190 tons) to ship as Type B material. OPT staff provided technical assistance to WVDP in evaluating several transportation options and in developing the transportation plan and fact sheets for communication with external and internal stakeholders throughout the year. The shipments were successfully delivered to the final disposal site in November 2016.

#### ***2.1.4 Energy Facility Contractors Group (EFCOG)***

OPT serves as federal liaison to the EFCOG's Waste Management Working Group and its Subgroup on Packaging and Transportation. The purpose of the subgroup is to seek out and promote best management and operating practices associated with P&T activities across DOE and NNSA facilities.

In June 2016, the EFCOG P&T subgroup submitted to EM a final report: "Return-to-Service Impacts for Non-DOE Owned Transport Equipment." This report focuses on use of best practices to limit the potential for radiological contamination of non-DOE owned commercial transport conveyance equipment. The goal of this document was to provide technical input to DOE to improve consistency in application of DOE and DOT requirements and reduce or eliminate situations where non-DOE owned transport conveyance equipment could incur return-to-service delays and costs as a result of DOE radiological clearance activities.

Recommendations include scenarios and methodologies that could assist to resolve conflicts between DOE Orders, Standards, and Federal regulatory requirements. The subgroup also completed and distributed a "Best Practice" on the "DOT/DOE Return to Service for Commercial Transportation Equipment" in April 2016. OPT provided input to the Office of Environment, Health, Safety and Security (AU) as guidance to be shared to the P&T community through an Operating Experience (OE) Report – Level 3 for distribution in FY 2017. An OE Level 3 report informs Senior HQ and Field Management when an event(s) or a trend(s) warrants attention by Senior HQ or Field Management but the issue does not warrant an OE-1 or OE-2 report. Also, OPT initiated the process to revise DOE Order 460.2A, "*Departmental Materials Transportation and Packaging Management*, dated 2004" to clarify application of consistent radiological contamination survey requirements for transport of radioactive materials and radioactive waste shipments. OPT expects to issue the final Order by the end of FY 2018.

OPT also serves as federal advisor to EFCOG's Quality Assurance (QA) Working Group. The EFCOG Supply Chain Quality Task team and the PMC collaborated to develop a QA Flow-down document that assists DOE contractors with selection of Nuclear Quality Assurance-1 (NQA-1) requirements for procurements of DOT packagings. This document was created in response to the NQA Technical Interpretation 10-1365 by the NQA-1 American Society of Mechanical Engineers (ASME) Committee. The document benefits DOE and contractors by tailoring NQA-1 requirements to specific packagings, applying NQA-1 requirements in a graded approach to packaging suppliers. The EFCOG Safety Working Group-QA Subgroup Chair

submitted the final document to OPT and the DOE Office of Quality Assurance for review in November 2016. OPT and AU plan to convert this document into the Departmental Standard using processes from AU's Technical Standards Program by the end of FY 2018.

## **2.2 TRANSPORTATION RISK REDUCTION**

### **2.2.1 Analytical Computer Tools**

#### **2.2.1.1 RADCALC – Radiation Calculation Transportation Safety Software**

OPT is responsible for developing, managing, and coordinating policies and procedures for transportation and packaging activities for DOE-owned materials, including hazardous and radioactive materials. OPT and its predecessor offices developed RADCALC as a safety software tool accessible to operational-level transportation staff at DOE sites to assure compliance with Federal P&T regulations. RADCALC is a technically robust tool that can perform complicated radioactive material shipping determinations. Due to recent changes in regulatory requirements by DOT, the current version of RADCALC 4.1 requires an update. Prior to performing software updates, the DOE Office of Standards and Quality Assurance, OPT, the EM Consolidated Business Center, and the RADCALC contractor initiated a NQA-1 certification process for the software. In 2016, efforts to fully qualify RADCALC 4.2 to NQA-1 requirements were ongoing so the sites continue to use RADCALC 4.1.

#### **2.2.1.2 RADTRAN – The Transportation Risk and Consequence Software**

RADTRAN is computer code that is used by the sites for analysis of the consequences and risks of radioactive-material transportation. This code is used to estimate risks associated with incident-free transportation of radioactive material and with accidents that might occur during transportation. RADTRAN has also been incorporated into INTERTRAN developed by the IAEA for performing international transportation risk assessments.

All major modes of commercial transport can be analyzed with RADTRAN, i.e., highway, rail, barge and ship and air. The Nuclear Regulatory Commission (NRC) and the DOT regulate carriage of radioactive material by all modes in the United States. Regulations promulgated by these regulatory agencies are contained specifically in Title 10 CFR Parts 71-73; for the NRC and Title 49 CFR Parts 171-178 for the DOT. These regulations establish maximum permissible package dose rates, maximum permissible dose rates to vehicle crew members, exclusive-use shipment criteria, packaging certification conditions and other features of radioactive materials transportation.

#### **2.2.1.3 WebTRAGIS – Web Transportation Routing Analysis Geographic Information System, Transportation Route-Planning Software**

WebTRAGIS is a standard transportation routing Geographic Information System application. The application is used by DOE sites, national laboratories, universities and other federal and state government agencies. Its population data capability has made it a useful application for analysis of potential routes used for shipment of hazardous materials including nuclear material and spent nuclear fuel. As a result, TRAGIS has been used for environmental impact statements for shipments of spent fuel from nuclear power plants, of nuclear materials between DOE facilities and between Department of Defense (DOD) shipments, and for virtually all environmental reviews requested by EM. WebTRAGIS maintains datasets for three common modes of transportation: highway, railway, and waterways. WebTRAGIS also uses high density LandScan population data as well as Department of Homeland Security critical infrastructure

points of interest and is compatible with RADTRAN for performing population risk assessment and accident dosing models.

### ***2.2.2 ATLAS – Automated Transportation Logistics and Analysis System***

OPT manages the maintenance and operation of DOE’s ATLAS. ATLAS is an integrated web-based logistics system allowing users to manage inbound and outbound freight shipments by highway, rail, and air. Its modules standardize and simplify shipment information such as Bills of Lading, freight bills, rate structures, and hazardous materials documentation for our DOE sites shipping operations to ensure compliance of shipments with applicable federal, state, and local regulatory requirements. ATLAS, accessible through DOE’s EM Cloud computing environment, provides enterprise-wide information for visibility and analysis of DOE transportation management activities and also delivers DOE sites an integrated, advanced transportation/ information business system.

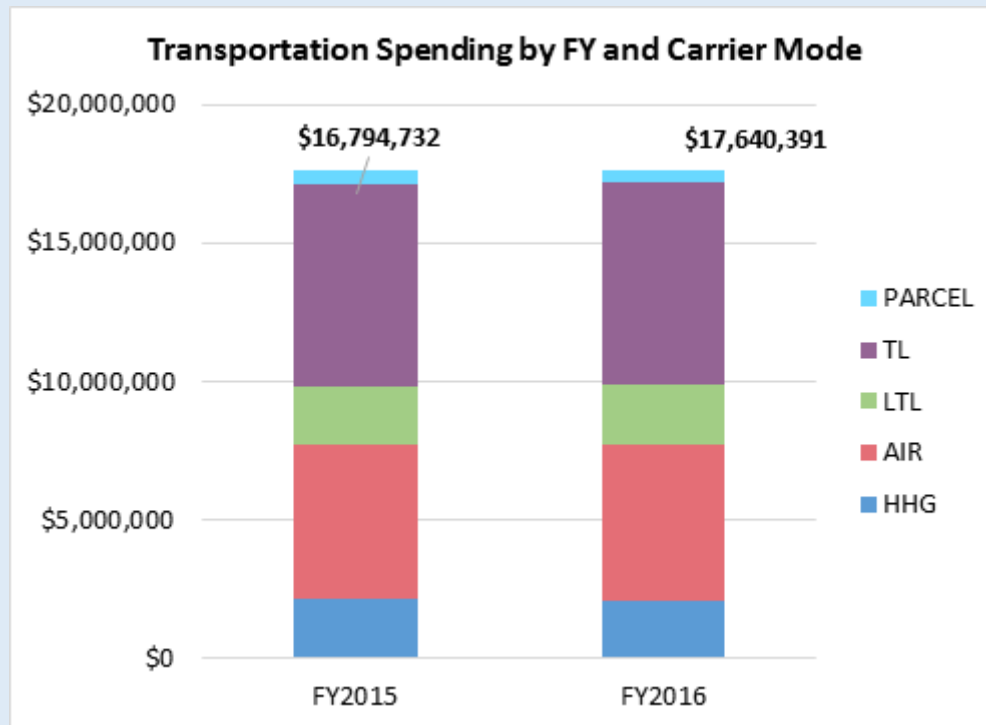
In FY 2015, upon the successful migration from Automated Transportation Management System to ATLAS, the system had a total of 272 active users across 34 DOE Sites. In FY 2016, ATLAS usage increased by an additional 47 users, now totaling 319 users. As user acceptance of the system continues to increase, identification of opportunities to generate efficiencies and greater productivity are more prevalent. These opportunities are documented and discussed through an ATLAS Joint Application Development (JAD) working group. The purpose of the JAD working group is to engage key users from all DOE user sites and implement changes to the system that offer increased efficiencies to end users.

In FY 2016, ATLAS maintained system availability greater than 99% to support site day-to-day shipping activities and completed the following system enhancements:

- Incorporated updated DOE TL, HHG and General Services Administration LTL tenders in Rate/Route Module.
- Added 11 high usage carriers to the Carrier Profile Module which is the centralized repository for registrations, certifications, permits, insurance information, and equipment types as well a general corporate contact information. There are currently 81 DOE carriers in this module.
- Coordinated with ATLAS Site Administrators to enroll additional sites in direct Electronic Data Interchange (EDI) to reduce or eliminate the sites’ third party costs associated with processing EDIs.
- Enhanced QA requirements to ensure management controls are commensurate with complexity of the activity, potential consequences of a failure, and probability of a failure.
- Implemented a process to identify and evaluate inactive carriers in the system.
- Reviewed and updated ATLAS as needed with correct Standard Carrier Alpha Codes by matching Motor Carrier and DOT numbers.
- Provided recommended “Doing Business As” and legal name changes as carriers are procured or merged with other entities.
- Developed a process for maintaining historical carrier data in the event they are procured or merged with other entities and in some cases, no longer used.

### Transportation Spending by Mode

Transportation spending in FY 2015 and FY 2016 for each carrier mode is presented in the chart below. Based on ATLAS, transportation cost is in the range of \$16.8 - \$17.6 million annually; however, not all sites/contractors are required to use ATLAS, so actual transportation spending is likely higher.



### 2.2.3 Hazardous Materials Shipment Summary

Data obtained from ATLAS queries and data calls from non-ATLAS user sites show that DOE completed approximately 8,400 offsite hazardous material shipments totaling more than 4.2 million miles in FY 2016.

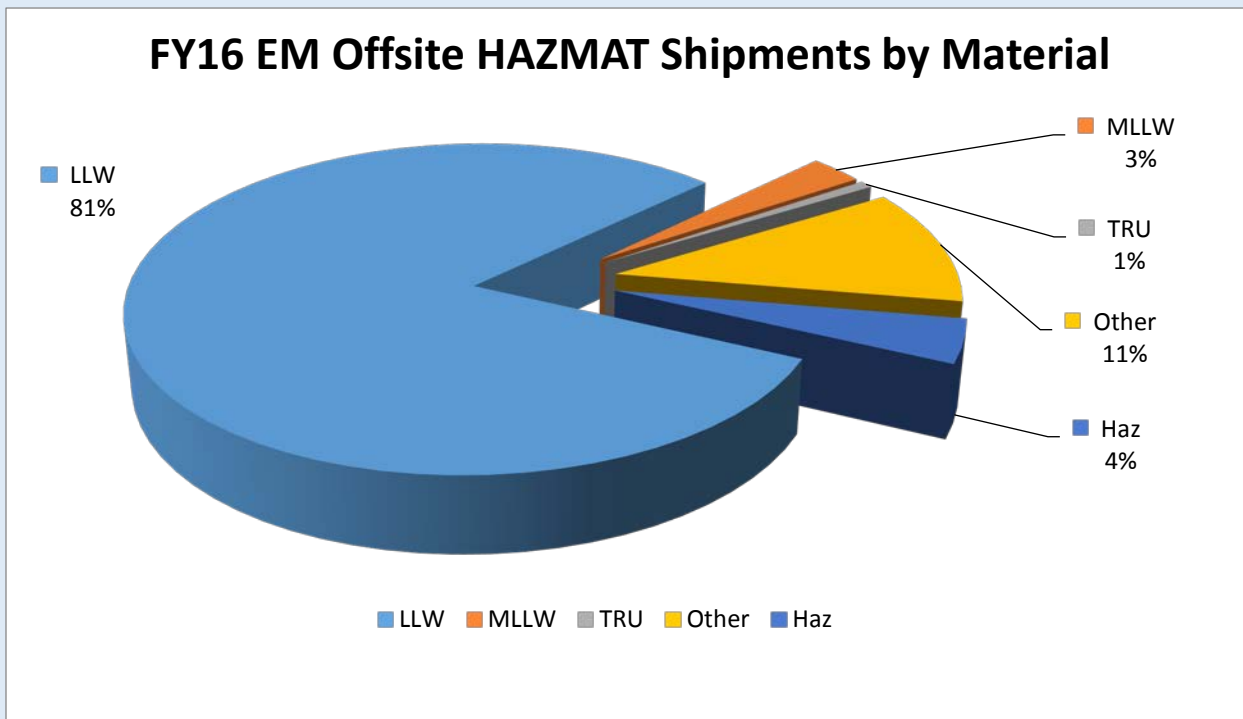
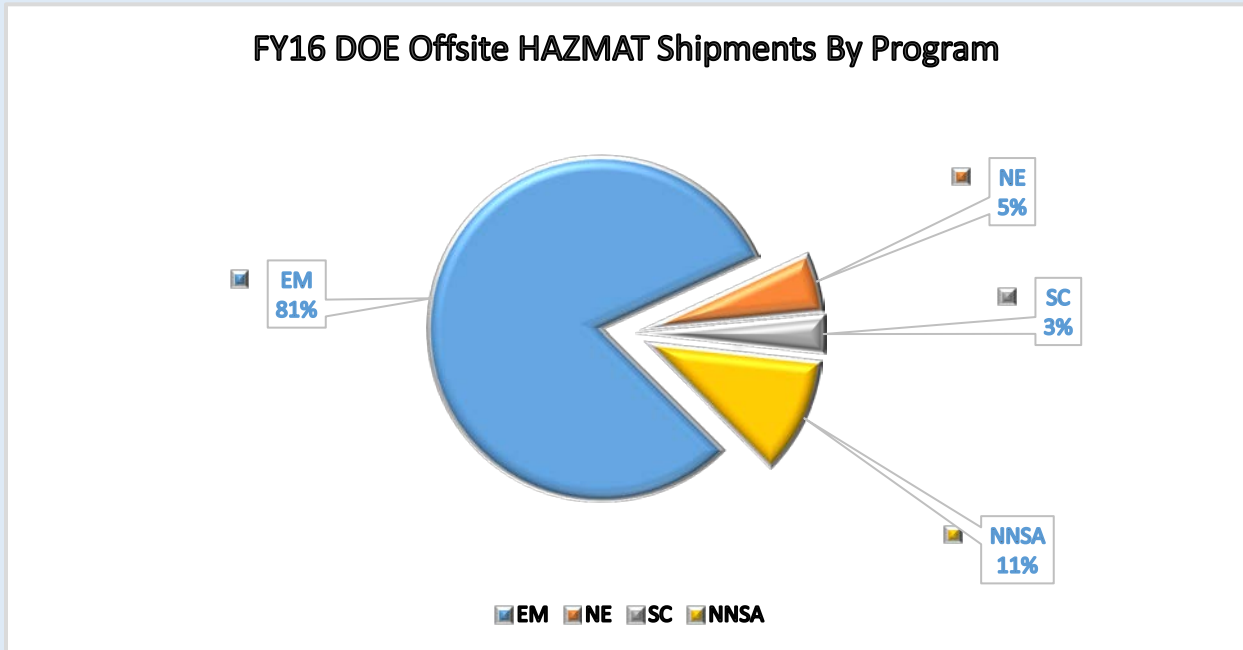
### DOE Shipments by Program Office/Mode

FY16	Air	*Air Mileage	Rail	Rail Mileage	Highway	Highway Mileage	Total Shipments	Total Mileage
EM	66	103,750	4,260	135,748	2,469	3,051,031	6,795	3,290,529
NE	82	65,613	0	0	366	229,726	448	295,339
SC	24	53,803	0	0	249	85,509	273	139,312
NNSA	105	113,646	0	0	805	374,461	910	488,107
DOE	277	336,812	4,260	135,748	3,889	3,740,727	8,426	4,213,287

\* Air mileage accounts for mainly lab samples and isotopes. Highway mileage accounts for offsite public roads

shipments only.

The following charts show a breakdown of shipments by DOE program and a breakdown by material for EM shipments.



### ***2.2.4 Transportation Incidents***

There were no DOT recordable transportation accidents involving DOE hazardous materials in FY 2016. A DOT recordable incident is defined as an occurrence involving a commercial motor vehicle on a public road in intrastate or interstate commerce, which results in: 1) a fatality; 2) injury to a person requiring immediate treatment away from the scene of the accident; or 3) disabling damage to a vehicle, requiring it to be towed. OPT developed reporting criteria that follows the Federal regulatory requirements of DOT and NRC to convey information on transportation incidents to our external stakeholders (e.g., State Regional Groups, tribes, etc.). The number of packaging and transportation occurrences has been trending downward over the last few years. In FY 2016, there were six transportation incidents compared to eight transportation incidents in FY 2015, involving DOE hazardous material shipments that met the reporting criteria. Upon review of lessons learned and DOE Occurrence Reporting and Processing System (ORPS) from these incidents, OPT noted non-compliance or less than adequate compliance for P&T activities in the following areas:

- Receipt inspections
- Undeclared Hazardous Materials (Hazmat) shipments
- Hazard communication violation
- Inadequate material characterization
- Packaging non-compliance
- Contamination/dose rate limits exceeded
- Conduct of Operations (Work process)

The collection of DOE's occurrence reports is relatively small at this point, but the following concerns emerge through causal analysis of ORPS across DOE sites. OPT uses ORPS reports as a tool to help determine if a generic or focus-based Transportation Safety and Oversight Compliance Assurance visit is necessary at a particular site. In addition, OPT disseminates corrective actions and lessons learned from ORPS to site packaging and transportation representatives.

Quality Assurance Program: Roles and Responsibilities are not clearly identified in the processes related to handling hazardous material and response to hazardous incidents.

Hazardous and Radioactive Materials Packaging: HazMat transportation procedures require conduct of periodic inspections to ensure integrity of the packaging material.

Hazardous and Radioactive Materials Shipments: Shipping papers are missing or not prepared properly as required per DOT Regulations.

Emergency Response: Emergency response telephones are for emergency calls only while DOT-regulated materials are in transport by truck/train or stored incidental to transportation.

Training: Additional functional-specific training may be necessary for HazMat employees. Also, additional training for HazMat, securing packages/materials may be necessary.

### ***2.2.5 Motor Carrier Evaluation Program (MCEP)***

OPT manages and implements the DOE MCEP in accordance with DOE Order 460.2. In FY 2016 there were 40 evaluated carriers in DOE's MCEP. MCEP is a safety management tool used to determine the quality and capability of motor carriers, drivers, and equipment offered for transporting DOE/NNSA radioactive materials and hazardous wastes. MCEP maintains and monitors a list of evaluated motor carriers from which DOE/NNSA field offices and contractors select to ship their radioactive materials and hazardous wastes. MCEP provides external stakeholders (e.g. states, Tribes, Government Accountability Office) assurance that certain hazardous commodities will be transported safely and securely by defining criteria and methodology needed to identify, monitor and manage quality motor carriers. It also eliminates the need for duplication of evaluations when multiple sites are using the same motor carrier, resulting in a significant cost savings for the Department.

MCEP requires reassessment of evaluated motor carriers every three years. In FY 2016, three MCEP reevaluations were performed; some of these MCEP motor carriers had not been reevaluated in 20 years due to budget constraints. Additionally, one new motor carrier was evaluated and added to the MCEP list of approved transporters to support the Moab Project with their upcoming shipping campaign to transport radioactive debris from Moab to the Crescent Junction disposal cell via highway. The Moab Project normally ships their residual radioactive materials via rail.

In September 2015, the MCEP Implementation Plan and Procedures was rewritten to be more cost effective and streamlined by incorporating a three tier, graded approach and was updated to meet new DOT regulations. In FY 2016, OPT developed and provided MCEP evaluator training on the new 2015 MCEP program and process to interested participants attending the 2016 Contractors Transportation Management Association conference held in San Diego, California. Additionally, at the request of the Nevada Site Specific Advisory Board, OPT developed and provided to the Board an MCEP program and process training session. The training included a question and answer session for participating Board members.

### ***2.2.6 Packaging Quality Assurance Assessments and Oversight***

An integral part of OPT's mission is to provide support for QA evaluations of DOE packaging suppliers who supply commonly used DOT packaging and Type B & fissile packaging to DOE sites. OPT is responsible to perform targeted and focused packaging QA assessments of suppliers and users and assist sites in implementation of an effective packaging QA program as necessary. In FY 2017, plans are underway to engage with sites in ensuring site performed QA assessments evaluate the flow-down and implementation of QA requirements to packaging subcontractors and its DOE suppliers.

### ***2.2.7 Site Assessments***

DOE O 460.2A, *Departmental Materials Transportation & Packaging Management*, requires performance of P&T compliance evaluations every three years. OPT utilizes and manages the Transportation Safety and Oversight Compliance Assurance Program (TCAP) as a peer review process to assist sites and their contractors in conducting compliance reviews of their P&T activities to meet DOE O 460.2A. Historically, OPT performs three to four TCAP onsite reviews per fiscal year. TCAP assessments have resulted in the sharing of P&T lessons learned and cost efficiencies in site contractor P&T activities.



Due to FY 2016 funding constraints, OPT staff did not perform TCAP on-site reviews, but opted for a less intrusive desktop assessment process of the sites by requesting and reviewing site self-assessments rather than performing onsite assessments. This approach, though more economical, is still an acceptable method to assess and evaluate P&T operations and activities in accordance with Orders and Regulations. In FY 2016, OPT provided assistance and coordination for a TCAP assessment at the Portsmouth Gaseous Diffusion Plant (Piketon, OH).

### **2.3 PACKAGING CERTIFICATION PROGRAM (PCP)**

The OPT Headquarters Certifying Official (HCO) administers the DOE program for certification of Type B and fissile radioactive material (RAM) packaging. 49 CFR 173, *Department of Transportation, Shippers – General Requirements for Shipments and Packaging*, Section 7(d) recognizes DOE authority to use packagings made by or under the direction of DOE for transportation of Class 7 (radioactive) materials when evaluated, approved, and certified by DOE against packaging standards equivalent to those specified in 10 CFR Part 71, *Nuclear Regulatory Commission, Packaging and Transportation of Radioactive Material*. The DOE Packaging Certification Program (PCP) performs certification reviews and confirmatory analysis of Type B and fissile radioactive material package designs to verify compliance with requirements of 10 CFR Part 71, and drafts safety evaluation reports and certificates of compliance (CoC) of these designs for HCO approval and issuance. These CoCs are essential to domestic and international shipments of RAM in support of DOE and NNSA missions.

For FY 2016, the HCO issued 41 CoCs (i.e., includes new CoCs, revisions, renewals, and letter amendments), as historically compared to the range of 31-55 per year for the previous 5 years. The DOE CoC provides written approval of packaging designs and authorizes use of the packagings for off-site shipments. Significant accomplishments and support to the Department include:

- Completed DOE Certificate Rev 13 for Model 9975 (revised thermal evaluation for consistency with IAEA regulations) in Feb 2016
- Terminated DOE Certificates for Model 9977 (transport and storage) in June 2016
- Completed Special Form Capsule – DOT Certificate of Competent Authority (renewal) in July 2016
- Completed Model TRUPACT-III - DOE Certificate Revision 0 based on NRC Certificate 9305 Revision 9 for EM-4.21 in September 2016

PCP is also the point of coordination for the Department in matters related to transportation and packaging safety with other federal agencies, such as DOT, NRC, and international agencies/organizations such as the IAEA. In FY 2016, PCP had 15 specific actions with other federal agencies, primarily actions with DOT and NRC Certificates.

PCP is responsible for managing the Radioactive Material Packaging (RAMPAC) online database (<https://rampac.energy.gov>) that contains over 4,000 certificate records. The database contains package information mined from DOE, NRC, and DOT- IAEA certificates, so that RAMPAC users can conveniently query packaging and content parameters online.

The current listing of DOE, NRC and DOT/IAEA Certificates and RAMPAC database may be found at the following link:

<https://rampac.energy.gov/home/package-certification-information/certificates>

### **2.3.1 Package Certification Docket Review**

Docket numbers are assigned to requests for PCP for package certification actions and issues with DOE, NRC, and DOT/IAEA certificates and packages, and DOE Exemptions from DOE Site/Field/Program Offices and managed in accordance with a docket numbering system.

For FY 2016, docket information is as follows:

<b>Fiscal Year</b>	<b>2016</b>
Docket open from prior years	20
Docket Opened	46
Dockets Closed	49

The current listing of dockets, status, timelines, statistics, and points of contact may be found at the following link:

<https://rampac.energy.gov/home/doe-certification-review-docket/docket-statistics>

### **2.3.2 References and Links to Package Safety Regulations, Directives, and Guides**

The PCP maintains valuable references and links to packaging safety regulations and guidance on RAMPAC. For the accomplishment period, PCP performed three updates via RAMPAC to these packaging resources.

Specific information of the References and Links to Package Safety Regulations, Directives, and Guides maintained by PCP may be found at the following link:

<https://rampac.energy.gov/home/reference>

### **2.3.3 Training and Education**

PCP is the primary source of packaging specific training to this unique profession and program. Training is sponsored by PCP, in accordance with DOE Order 460.1D, for initial or recurrent training as required by the Hazardous Material Regulation (49 CFR 172.704) for Type B and fissile radioactive material P&T activities. Training attendees include DOE packaging professionals as well as DOT, NRC, foreign Competent Authorities, and commercial entities. PCP provided the following courses in FY 2016:

Course Title	FY 2016
QA for Radioactive Material Packaging <sup>1</sup>	Mar 21-25
Welding/Non-destructive Evaluation Criteria for RAM Packages, Pressures Vessels, Piping and Other Applications	Apr 19-21
Management of Safety Analysis Report for Packaging (SARP) Preparation <sup>1</sup>	May 16-20
SARP Generalist	Jun 6-10
ASME Pressure Vessel Code for Nuclear Transport and Storage <sup>1</sup>	Jun 20-24
RAM Package Operations and Leak Testing <sup>1</sup>	Jul 11-15
SARP Review and Confirmatory Analysis <sup>1</sup>	Aug 9-18
Nuclear and Other Radioactive Materials Transport Security <sup>1</sup>	Aug 22-26
Supply Chain and Logistics Excellence	Aug 15-Sep 2

<sup>1</sup> Approved in FY 2015, by the University of Nevada – Reno (UNR) for graduate course credit in Mechanical Engineering, and the Northwest Commission on Colleges and Universities, Redmond, WA.

The current listing of PCP Courses may be found at the following link:

<https://rampac.energy.gov/home/education/packaging-university>.

#### **2.3.4 Tracking and Monitoring Technology**

PCP, in conjunction with National Laboratory and commercial partners, continue to develop an impressive roster of packaging tracking and monitoring tools and systems. In addition, applications involved conducting multiple road tests to demonstrate successful integration of CommBox and DOE Transportation Command (TRANSCOM) in January 2016. PCP manages Radiofrequency Identification (RFID) tracking system Argonne U.S. (ARG-US):

- Remote Area Modular Monitor – monitor for nuclear and spent storage facilities
- CommBox – an all-in-one robust, compact – Global System for Mobile communication /Global Positioning System module
- SAV-EM – Rapid Deployable Global Sensing Hazard Alert System
- InPAC – Internal Package sensor technology for monitoring package environments (e.g. gas generation)

Additional information on PCP Tracking and Monitoring Technology may be found at the following link: <https://rampac.energy.gov/home/tracking-and-monitoring>.

#### **2.3.5 Storage Packaging, Aging Management, and Disposal**

In FY 2016, PCP updated new developments, papers, and guidance (on RAMPAC website) related to storage certification. Updates were in anticipation of the need for DOE storage certification that complies with 10 CFR Part 72, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste*. Additional information on Storage Packaging, Aging Management and Disposal is at the following link: <https://rampac.energy.gov/home/storage-aging-and-disposal>.

#### **2.3.6 Transportation Safeguards and Security**

In support of transportation security efforts, PCP displayed an ARG-US advanced surveillance technology exhibit at the Nuclear Industry Summit held in conjunction with the 4th World

Nuclear Security Summit, Washington DC, March 30-April 1, 2016. Also, PCP organized and conducted two breakout sessions on Security Tracking and Monitoring Applications at the NTSF in National Transportation Stakeholders Forum, Orlando, FL in June 2016.

Additional information on the topic of Transportation Safeguards and Security may be found at the following link: <https://rampac.energy.gov/home/transportation>.

### ***2.3.7 Packaging QAP Approval Program***

DOE O 460.1D requires users, DOE and DOE Contractors, that participate in design, fabrication, procurement, use, or maintenance of packages certified by DOE and NRC, to have a Quality Assurance Program that complies with requirements of 10 CFR Part 71, Subpart H, *NRC Packaging and Transportation of Radioactive Material – Quality Assurance*. This process requires users submit their Quality Assurance Program Description (QAPD) and Subpart H compliance matrix to the DOE PCP for independent review. PCP QA reviews are managed with a formal docket numbering system and the status of the review is posted on RAMPAC. Upon completion of the review, PCP drafts a Quality Assurance Program Approval form for the HCO to issue. For the accomplishment period, the HCO approved the following QAPD dockets:

<b>Fiscal Year</b>	<b>2016</b>
HCO QAPD Approvals	12

PCP performs independent QA Audits of DOE Site Contractors and their packaging suppliers for compliance with 10 CFR 71, Subpart H and requirements established in CoCs.

The current listing of QA dockets and resources may be found at the following link: <https://rampac.energy.gov/home/quality-assurance>.

## ***2.4 REGULATIONS, ORDERS AND STANDARDS SUPPORT***

OPT has responsibility for coordinating the Department’s review, comment, and participation with other program and site offices on international and domestic regulations and standards on P&T of hazardous materials including radioactive materials and waste. During FY 2016, over 35 actions including safety advisories were identified and communicated to the DOE P&T community. When necessary, OPT coordinates inputs from the field and other DOE organizations to provide unified Departmental comments to requests for Notices of Proposed Rulemaking.

### ***2.4.1 DOE Order 460.1, “Hazardous Materials Packaging and Transportation Safety”***

OPT is the Department’s Office of Primary Interest for this Order and has authority to certify packages for fissile and Type B materials and associated safety roles and responsibilities for all DOE elements except NNSA. On January 15, 2015, the Directive Review Board approved the justification memorandum related to EM’s intent to revise Order 460.1C, *Packaging and Transportation Safety*. The final draft Order was developed by a team of federal subject matter experts from the Office of Science, Office of Nuclear Energy, AU, NNSA, and two major DOE sites. The final Order, 460.1D, was approved by the Deputy Secretary on December 20, 2016.

### ***2.4.2 DOE Technical Standards Program***

OPT is instrumental in identifying and pursuing specific P&T technical activities and to support successful development and approval of standards that are of particular interest to EM and DOE.

OPT coordinates development of DOE standards with the Office of Technical Standards Program, within the office of AU. OPT is working on the following two Handbooks:

- **DOE Handbook - Freight Containers**

In March 2015, AU approved an OPT project for developing a resource handbook to assist the DOE packaging community in understanding procurement, use, and maintenance of standard freight containers for use in disposal of radioactive material and radioactive waste. On April 20, 2015, OPT submitted the final draft of DOE-HDBK-5001-2016, “*Procurement, Use, and Maintenance of Standard Freight Containers for Use in Transportation and Disposal of Radioactive Material and Radioactive Waste*” to AU. The DOE approved Freight Container Handbook is expected to be issued in 2017.

- **DOE Handbook – Commercial Grade Dedication Application**

At the request of AU, OPT is participating in a team of experts assembled to develop a Commercial Grade Dedication Application Handbook for the DOE complex. Commercial Grade Dedication (CGD) efforts have become more important for DOE as it has become difficult to find competitive suppliers for safety systems and components which are qualified to ASME NQA-1, and Quality Assurance Requirements for Nuclear Facility Applications. The NQA-1 CGD process provides an alternative to using NQA-1 qualified vendors by allowing users to purchase commercial grade systems and components and upgrade them to NQA-1 quality.

The purpose of the proposed Handbook is to provide best practices which meet NQA-1 CGD provisions. OPT along with PMC and EFCOG QA experts plan to develop standard CGD processes for inclusion into the Handbook for site procurement of DOT packagings used in nuclear safety applications. DOT CGD package examples will be provided. OPT is working with the AU staff to publish the Handbook by the end of 2017.

## **2.5 EMERGENCY PREPAREDNESS AND OUTREACH**

### **2.5.1 Transportation Emergency Preparedness Program (TEPP)**

In FY 2016, EM completed approximately 8,400 radioactive, hazardous material and waste shipments. State, tribal, and local jurisdictions are responsible for responding if there are DOE radiological transportation incidents along DOE routes. As required by 44 CFR 351, *Radiological Emergency Planning and Preparedness*, TEPP ensures that responders conduct needs assessments, have access to plans, training, and technical assistance necessary to safely, efficiently, and effectively respond to radiological transportation accidents. State, tribal and local response organizations, Federal agencies and other national programs have integrated portions of TEPP planning tools and training into a majority of their HazMat preparedness programs.

TEPP FY 2016 major achievements include:

- Partnering with state and tribal instructors, along with instructors from the DOE Radiological Assistance Program and the Waste Isolation Pilot Plant, to provide 138 courses, in 23 different states. Of 2,932 responders attending TEPP courses, 974 received medical continuing education hours for their participation.
- For the second consecutive year, TEPP representatives worked with State of Virginia Emergency Management and US Environmental Protection Agency officials to conduct a full scale exercise in Tazewell, VA. The full scale, multi-location HazMat exercise conducted in

October 2015 was designed around numerous fixed facility and transportation chemical and radiological material spill incidents.

- In November 2015, TEPP representatives made final production edits to the Modular Emergency Response Radiological Transportation Training (MERRTT) training videos. Final draft videos were offered to the TEPP Training Working Group for review/comment and piloted during training sessions conducted between January and April 2016. Final videos were offered for viewing at the NTSF in Orlando, FL in June 2016.
- On June 22, 2016, the Nevada Field Office, supported by TEPP, conducted a Public Information Officer-focused tabletop exercise (TTX). TTXs are part of a commitment made to Nevada stakeholders to continue emergency preparedness exercises associated with low level waste shipments being transported to the Nevada National Security Site for disposal. This TTX was requested by the City of Las Vegas Mayors Office, allowing media communication specialists to exercise their actions in the event of a transportation emergency. A total of 50 people attended the TTX, representing 18 city, county, state, tribal and federal government organizations. In addition to those present, the TTX was also conducted as a video telephone conference with state radiological health staff in Carson City.

### ***2.5.2 National Transportation Stakeholders Forum (NTSF)***

OPT is required, per DOE O 460.2, to provide support and communication with internal stakeholders (e.g., field sites, program offices, and contractors) as well as external stakeholders (e.g., State Regional Groups, tribes, industry groups, and other Federal agencies). Transparent communication is a key focus of OPT activities.

NTSF is the mechanism through which DOE and NNSA communicates at a national level with states and tribes about DOE's shipments of radioactive waste and materials, as well as occasional high-visibility shipments that are non-radioactive. To memorialize this commitment, DOE has Cooperative Agreements in place with our State Regional Groups. The purpose of NTSF is to bring transparency, openness, and accountability to DOE's offsite transportation activities through collaboration with state and tribal governments. In FY 2016, DOE hosted the Annual Meeting of the Forum in partnership with Southern States Energy Board and the Tribal Caucus in Orlando, FL. More than 200 registrants gathered from federal agencies, state, local, and tribal governments, private industry and other entities to engage across different jurisdictions, receive timely updates and presentations on packaging and transportation subjects and issues. The meeting afforded the opportunity to participate in various breakout sessions which covered topics such as Security Tracking and Monitoring Applications, Testing and Certification for Spent Nuclear Fuel Transportation Containers and Tools for Informing States, Tribes and the Public about Consent-Based Siting. The meeting also allowed the Tribal Caucus and State Regional Groups to meet and discuss issues of significance to their caucuses.

Several Ad Hoc Working Groups (AHWGs) were convened during 2016 to work face-to-face on specific tasks.

- The *Information & Communications AHWG*: This AHWG has two focal areas: external and internal. Externally, it provides input to DOE on developing, revising, and improving various DOE public information materials. Internally, it addresses identified needs of NTSF in support of the membership. Projects initiated in 2015 and continuing in 2016 focused on social media, branding, fact sheets, and consent-based siting.

- The *180(c) AHWG*: This AHWG will provide pertinent background material, issue papers and recommendations to present to DOE management to develop a Revised Policy Statement and a description of the scope and schedule of the pilot/evaluation project for Section 180(c) of the Nuclear Waste Policy Act, a draft Implementation Plan, a draft Grant Guidance document, and a draft Technical Assistance Plan. This AHWG is specifically related to the DOE program on spent fuel storage.
- *Transportation Practices AHWG*: This AHWG reviewed and recommended a revised set of practices that are currently found in DOE Manual 460.2-1A. The current Manual establishes a set of standard transportation practices for DOE organizations, including NNSA, to use in planning and executing offsite shipments of radioactive materials including radioactive waste. This AHWG completed its work in 2016.
- The *TEPP Training AHWG*: This AHWG will help DOE develop, revise and maintain training programs that ensure emergency responders are effectively trained for response to radiological transportation incident involving DOE radioactive material.

The FY 2016 OPT Annual Program Report is available for download at:  
[www.energy.gov/em/services/waste-management/packaging-and-transportation](http://www.energy.gov/em/services/waste-management/packaging-and-transportation).

Email us at: [askpat@hq.doe.gov](mailto:askpat@hq.doe.gov).

