

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



**Office of Packaging and Transportation
Annual Report FY 2015**

**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 hugely unique and include the transportation of large quantities of contaminated waste, water, and soil, and a vast number of contaminated structures during remediation of contaminated sites. The Department of Energy (DOE) completed more than 18,000 offsite hazardous material shipments over public roads totaling 4.3 million miles in fiscal year (FY) 2015, of which the EM completed 16,897 radioactive, hazardous material and waste shipments totaling over 3.4 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 shipments of radioactive and other hazardous materials are safe, regulatory compliant, carefully planned, executed, tracked, secure, timely and efficient to meet the needs of DOE programs and missions and to protect the health and safety of workers and the public. OPT provides centralized support, expertise, and efficiency that cannot be provided through a site-by-site approach.

Some major OPT accomplishments in FY 2015 include:

- Transporting hazardous materials over 4.3 million miles with no Department of Transportation recordable packaging and transportation accidents.
- Completing 32 package certification actions related to review and approval of new transportation packages, amendments, renewals, special approvals, and terminations.
- Completing 13 Motor Carrier Evaluation Program (MCEP) re-evaluations on motor carriers involved in transporting the Department's hazardous materials.
- Rewriting the MCEP Plan to be more cost effective and streamlined by incorporating a three tier, graded approach process and was updated to meet new Department of Transportation regulations.
- Coordinating with the Energy Facility Contractors Group to resolve Departmental transportation issues such as "Return to Service Impacts for Non-DOE Owned Transport Equipment". The Packaging & Transportation subgroup authored a paper that focuses on the use of best practices to limit the potential for radiological contamination of non-DOE owned transport conveyance equipment.
- Collaborating with subject matter experts from the Office of Science, Office of Nuclear Energy, and National Nuclear Security Administration to revise DOE Order 460.1C, *Hazardous Materials Packaging and Transportation Safety*.
- Providing 138 training courses in 17 different states to train over 1800+ 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.

- Providing assistance to the field in the conduct of transportation compliance self-assessments at Argonne National Laboratory, Ames Laboratory and the Moab site. These assessments sought to identify and capture lessons learned and cost avoidance opportunities while also implementing program and process enhancements for the packaging and transportation community.
- Hosting the 2015 Annual Meeting of the National Transportation Stakeholders Forum in partnership with the Western Governors' Association, Western Interstate Energy Board and the Tribal Caucus in Albuquerque, NM. More than 200 registrants at the event gathered from federal agencies, state, local, and tribal governments, private industry and other entities to receive 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 caucuses.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

ACRONYMS.....iv

1. OVERVIEW OF THE OFFICE OF PACKAGING AND TRANSPORTATION 1

2. Packaging and Transportation Highlights in Fiscal year 2015..... 2

 2.1 PROGRAM AND SITE SUPPORT 2

 2.1.1 Energy Facility Contractors Group (EFCOG)..... 2

 2.1.2 Packaging Management Council (PMC) 3

 2.1.3 Transportation Management Council (TMC) 3

 2.1.4 Support of Site Transportation Activities..... 3

 2.2 REGULATIONS, ORDERS AND STANDARDS SUPPORT 4

 2.2.1 DOE Order 460.1, “Hazardous Materials Packaging and Transportation Safety” 5

 2.2.2 DOE Technical Standards Program 5

 2.3 PACKAGING CERTIFICATION PROGRAM 6

 2.3.1 Package Certification Review Docket..... 7

 2.3.2 References and Links to Package Safety Regulations, Directives, and Guides 7

 2.3.3 Training and Education 8

 2.3.4 Tracking and Monitoring Technology 9

 2.3.5 Storage Packaging, Aging Management, and Disposal 9

 2.3.6 Transportation Safeguards and Security..... 10

 2.3.7 Packaging QAP Approval Program 10

 2.4 TRANSPORTATION RISK REDUCTION 10

 2.4.1 RADCALC- The Radioactive Material and Waste Transportation Safety Software 10

 2.4.2 Automated Transportation Logistics and Analysis System (ATLAS)..... 11

 2.4.3 Hazardous Materials Shipment Summary 12

 2.4.4 Transportation Incidents..... 14

 2.4.5 Packaging Quality Assurance Assessments and Oversight 15

 2.4.6 Site Assessments..... 15

 2.4.7 Motor Carrier Evaluation Program (MCEP)..... 15

 2.5 Emergency Preparedness and Outreach..... 16

 2.5.1 Transportation Emergency Preparedness Program (TEPP) 16

 2.5.2 The National Transportation Stakeholders Forum (NTSF)..... 17

3. SUMMARY AND NEXT STEPS..... 18

Acronyms

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
EFCOG	Energy Facility Contractors Group
EM	Office of Environmental Management
FY	Fiscal Year
GSA	General Services Administration
HazMat	Hazardous Materials
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
PCP	Packaging Certification Program

PMC	Packaging Management Council
QA	Quality Assurance
QAPD	Quality Assurance Program Description
RADCALC	Radioactive Material and Waste Transportation Safety Software
RAMPAC	Radioactive Material Packaging
RFID	Radio Frequency Identification System
SPRU	Separations Process Research Unit
SRS	Savannah River Site
TCAP	Transportation Safety and Oversight Compliance Assurance Program
TEPP	Transportation Emergency Preparedness Program
TL	Truckload
TTX	Table-top Exercise
UNR	University of Nevada-Reno

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*, which establishes DOE's transportation management 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*. The Manual was developed through a collaborative effort under the Senior Executive Transportation Forum (established by the Secretary of Energy in January 1998) to coordinate the efforts of Departmental elements involved in the transportation of radioactive material and waste.

The mission of OPT is to manage and establish policy, provide leadership, guidance, support, and oversight to assure that Departmental shipments of radioactive and other hazardous materials are safe, regulatory compliant, carefully planned, executed, tracked, secure, timely and efficient to meet the needs of DOE programs and missions 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:

Program and Site Support: Managing and coordinating the Departmental transportation logistics program including automated systems and tools, carrier evaluations, national freight rate tenders and contracts negotiations, and availability of commercial transport equipment to meet programmatic requirements.

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 and keeping program offices and the P&T community at DOE sites abreast of changes.

Packaging Certification: Managing the DOE Packaging Certification Program 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.

Transportation Risk Reduction: Optimizing Departmental transportation logistics by providing services such as evaluation of 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 to ensure activities are safe, secure, economical, and meet applicable regulatory requirements.

Emergency Preparedness and Outreach: Administering the Transportation Emergency Preparedness Program (TEPP) to address concerns expressed by corridor states and tribes about planning and preparedness along DOE shipping corridors.

2. PACKAGING AND TRANSPORTATION HIGHLIGHTS IN FISCAL YEAR 2015

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 Energy Facility Contractors Group (EFCOG)

OPT serves as federal advisor to the Energy Facility Contractors Group's Waste Management Working Group and its Subgroup on Packaging and Transportation. The purpose of the subgroup is to seek out and promote the best management and operating practices associated with the P&T activities across DOE and National Nuclear Security Administration (NNSA) facilities.

Presently, the EFCOG subgroup has been working to resolve DOE comments on the recently completed draft paper on the "Return to Service Impacts for Non-DOE Owned Transport Equipment." This document focuses on use of best practices to limit the potential for radiological contamination of non-DOE owned transport conveyance equipment. The goal of this document is 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 as a result of radiological clearance activities by DOE contractors. The subgroup recently completed a draft "Best Practice" on the "DOT/DOE Return to Service for Commercial Transportation Equipment" which is being reviewed by EFCOG experts throughout the complex. OPT expects that EM and the DOE Office of Environment, Health, Safety & Security (AU) will establish a Department position (e.g. Operating Experience) to distribute to the P&T community by the end of Fiscal Year (FY) 2016.

Energy Facility Contractors Group's Quality Assurance Working Group

OPT also serves as federal advisor to the EFCOG's Quality Assurance (QA) Working Group. The EFCOG Supply Chain Quality Task team and the Department contractor's Packaging Management Council (PMC) worked together to develop a QA Flow-down document that assists DOE contractors to select 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 contractors by tailoring NQA-1 requirements to specific packagings, applying NQA-1 requirements in a graded approach to packaging suppliers, and identifying the use of a Commercial Grade Dedication process if packaging suppliers cannot meet selected NQA-1 requirements. The draft document is presently under review by EFCOG. OPT expects release of the final document by December 2016.

2.1.2 Packaging Management Council (PMC)

OPT serves as federal advisor to the Department contractor's PMC. PMC addresses Departmental challenges with the 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 the packaging requirements for these materials, PMC provides a forum for the identification, analysis, and resolution of DOE packaging issues.

The PMC developed a draft Freight Container Guidance Document 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 an understanding of the 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 so there is no loss of content or increase of dose rate during transport. OPT with assistance from the DOE Technical Standards program office (AU-33) converted this guidance document into the "DOE Freight Container Handbook" that will be incorporated into DOE's Technical Standards. OPT expects issuance of the handbook by December, 2016.

2.1.3 Transportation Management Council (TMC)

In accordance with DOE Order 460.2, *Departmental Materials Transportation and Packaging Management*, OPT is the 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. The TMC provides a forum for identification, analysis, and resolution of traffic management, transportation operations, and transportation safety, and security issues in support of the Department's shipping needs. The TMC promotes DOE complex-wide cooperation, collaboration, and communication in traffic management, transportation operations, and motor carrier safety. One of TMC's many important activities is to negotiate and establish 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 developed a HHG bid specification, tariff rates, and a rating tool, which resulted in successful implementation of national tenders with 12 HHG motor carriers. TMC also successfully established 13 TL national tenders for the Department, and working with the General Services Administration (GSA), established 10 LTL tenders for the Department. Additionally, TMC worked with FedEx and UPS to establish new small package ground rates for FY 2015.

2.1.4 Support of Site Transportation Activities

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

- **West Valley Demonstration Project** - Transportation of Large Vitrification Components: West Valley Demonstration Project cleanup and decommissioning operations are underway, including the packaging, transportation and off-site disposal of all legacy waste. 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 and packaged 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 West Valley Demonstration Project in evaluating several transportation options and in development of the transportation plan and fact sheets for communication with external and internal stakeholders. OPT will continue to support transport of this shipment to the disposal site which should occur by then end of 2016.

- **Separations Process Research Unit (SPRU) Disposition Project** - OPT reviewed the current transportation plan developed by the contractor and provided technical assistance to the project office. The assistance was focused on the use of graded approach in the development of the transportation plan for low-level radioactive waste and mixed low-level waste shipments to the disposal sites using rail and trans-load facilities.
- **Moab Uranium Mill Tailings Remedial Action Project:** OPT provided technical assistance in developing and coordinating the DOT approval of the Moab project request to modify the special permit to authorize an increase in the payload weight and renewal in 2015.
- **EM Office of Nuclear Materials Disposition:** In 2015, OPT provided technical assistance to the Office of Nuclear Materials Disposition (EM-22) regarding the proposed plan for shipment of United States-origin highly enriched uranium in liquid form from the Atomic Energy of Canada Limited Chalk River Laboratories to the Savannah River Site (SRS). OPT participated in the discussions to develop responses to letters from the New York State Attorney General and members of the Congress. OPT staff also reviewed and commented on the transportation risks analysis performed in the “Supplement Analysis for the Foreign Research Reactor Spent Nuclear Fuel Acceptance Program-Highly Enriched Uranium Target Residue Material Transportation.”
- **Naval Reactors Program:** OPT provided technical assistance concerning class 7 packaging and operational information to the contractor for the Naval Reactors Program.

2.2 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 2015, over 47 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 for providing unified Departmental comments to requests for Notices of Proposed Rulemaking.

In 2015, OPT, with assistance from the Carlsbad Field Office, received a two-year renewal of its request for exemption from the minimum 30-minute rest break provision of the Federal Motor Carrier Safety Administration’s hours-of-service regulations for commercial motor vehicle drivers. The exemption enables DOE's contract motor carriers and their employee-drivers transporting security-sensitive radioactive materials to be treated the same as drivers transporting explosives. The exempted drivers will be allowed to use 30 minutes or more of on-duty “attendance time” to meet the Hours of Service rest break requirements providing they do not perform any other work during the break. This exemption is effective from June 30, 2015 through June 30, 2017.

2.2.1 DOE Order 460.1, “Hazardous Materials Packaging and Transportation Safety”

OPT is the Department’s Office of Primary Interest for this Order and has responsibility for certifying 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*. On October 5th, the OPT submitted the final draft Order 460.1D, *Hazardous Materials Packaging and Transportation Safety*, and resolution of comments received from program offices and sites on this draft Order to the Office of Management (MA-90). The current final draft Order was developed by the team of federal subject matter experts from the Office of Science, Office of Nuclear Energy, Office of Environment, Health, Safety and Security, National Nuclear Security Administration and two major DOE sites. The final draft Order is still under review by the Directive Review Board and OPT is working to resolve any other issues related to finalizing the Order.

2.2.2 DOE Technical Standards Program

OPT is instrumental in identifying and pursuing specific technical activities and to support the successful development and approval of standards that are of particular interest to EM and DOE. OPT coordinates the development of DOE standards with the Office of Technical Standards Program (AU-33). OPT is working on the following two Handbooks:

- **DOE Handbook - Freight Containers**

In March 2015, AU-33 approved an OPT project for developing a resource handbook to assist the DOE packaging community in understanding the purchase, use, and maintenance of standard freight containers for use in disposal of radioactive material and radioactive waste. On April 20, 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 the DOE Technical Standards Program, (AU-33). This document is ready for 60-day review by DOE/NNSA sites through the REVCOM process. OPT expects to issue the DOE approved Freight Container Handbook by the end of 2016.

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

At the request of the DOE Office of Quality Assurance, Office of Environment, Safety, Health and Security (AU-33), 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 who 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 is working with Savannah River Nuclear Solutions and Los Alamos National Laboratory plans to incorporate a few examples of CGD application for procurement of DOT Type A containers from CGD qualified suppliers. The example packages will be based on the CGD process requirements defined in ASME NQA-1, Part II, Subpart 2.14, “Quality Assurance Requirements for Commercial Grade Items and Services,”

and related requirements in Part 1 of the ASME Standard. AU Office of Transportation Standards Program has approved the Project Justification Statement and the Handbook is scheduled for completion by June 2017.

2.3 PACKAGING CERTIFICATION PROGRAM

The Headquarters Certifying Official (HCO) administers the DOE program for certification of Type B and fissile radioactive material (RAM) packaging. 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 the requirements of 10 CFR Part 71, and drafts safety evaluation reports and certificates of compliance (CoC) of these designs for the HCO's approval and issuance. These CoCs are essential to domestic and international shipments of RAM in support of DOE and NNSA missions.

For FY 2015, the HCO issued 32 CoCs (i.e., includes new CoCs, revisions, renewals, and letter amendments), as compared to the range of 34-55 per year for the previous 5 years. Significant accomplishments and support to the Department include:

- Renewal of CoC Number 9516 issued in October 2014 for the Office of Space and Defense Power Systems, Office of Nuclear Energy. This package is essential to DOE shipments of plutonium dioxide heat source materials.
- Revision 4 of CoC Number 9979 issued in November 2014 for Savannah River to add Light Water Breeder Reactor unirradiated fuel rods as authorized contents.
- New CoC Number 9601 issued in January for the Model CASTOR THTR/AVR package design for repatriation of fuel elements from Germany to DOE.
- Letter of Authorization for three shipments of Chicago-Piles-5 contents in the Model 10-160B package from Argonne to the Nevada National Security Site (NNSS) for disposal.
- Revision 9 of CoC Number 9315 issued in March to remove the carbon restriction for highly enriched uranium in the form of U308 for domestic ground transport.
- New CoC Number 9013 issued in June for the Model Husman Irradiator for only storage or shipment under an approved and active DOE exemption. This CoC was essential to the repatriation of three irradiators (i.e., sources) from Mexico to DOE.
- Renewal of CoC Number 5957 issued in August for Model BMI-1 to allow the Idaho Site to use this package for storage only.
- Revision 5 of CoC Number 9979 issued in September to add Low Enriched Uranium cube assemblies and plates items as authorized contents, and to renew the CoC.
- New CoC 9228 issued in September, based on endorsement of NRC CoC 9228, Revision 26. This CoC will allow continuity of DOE spent fuel shipments from Oak Ridge National Laboratory (ORNL) to SRS in the Model 2000 package.

Additionally, in March the HCO issued Revision B of exemption DOE-E1301 to DOE O 460.1C to support weekly shipments of legacy waste from Portsmouth to NNSS for disposal. A total of 77 shipments consisting of nearly 4,000 packages were shipped under DOE-E1301 in FY 2015. Transuranic waste shipments to/from Hanford to/from Perma-Fix Northwest for size reduction and repackaging were performed under DOE-E1403 and DOE-E1405 respectively. A total of 25 shipments were made under these exemptions. The shipment of the Husman Irradiators from

Tuxtla-Guiterrez, Chiapas Mexico to NNSS under DOE-E1406 was completed July 23, and a shipment from Alaska to NNSS of nine Sentinel-25 Series packages and a Sentinel-100F package under DOE-E1402 and DOE-E1404 respectively were completed July 28. The shipment from Mexico was observed by PCP and a staff member (as subject matter experts) and repatriation of these irradiators was featured in the September edition of Nuclear News.

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 2015, PCP had nine specific actions with other federal agencies, primarily actions with DOT and NRC Certificates.

The RAMPAC online database (<https://rampac.energy.gov>) contains over 4,000 certificate records and increased by 112 records during FY 2015. The database contains package information mined from DOE, NRC, and DOT- IAEA certificates, so that RAMPAC users can query packaging and content parameters online. RAMPAC web traffic was steady in FY 2015 with approximately 1 million total hits, and hits/month ranging from 73,000 to 99,000. (Deep Log Analyzer software used for these web traffic numbers).

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 Review Docket

Requests to 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 are assigned docket numbers and managed in accordance with a docket numbering system. For FY 2015, the docket information is as follows:

Fiscal Year	2015
Docket open from prior years	23
Docket Opened	29
Dockets Closed	32

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. These resources are updated regularly on RAMPAC. For the accomplishment period, PCP performed approximately 15 updates to these resources.

The work of the PCP is well represented (often by invitation) by managers and staff at conferences, professional societies, standards committees, and publications. In FY 2015, PCP submitted approximately 38 papers and presentations for publication, received 8 awards of

recognition, and was active or in leadership roles in numerous organizations such as the American National Standards Institute, American Nuclear Society, ASME, American Society for Testing and Materials, American Welding Society, Institute of Nuclear Materials Management, International Organization for Standardization, and the World Institute of Nuclear Security.

Specific information of the References and Links to Package Safety Regulations, Directives, and Guides maintained by the 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 460.1C, 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 primarily to retain technical qualifications. Training attendees include DOE packaging professionals as well as DOT, NRC, foreign Competent Authorities, and commercial entities. PCP class size is typically 15-20 students. PCP provided the following courses in FY 2015.

Course Title	FY 2015
Security of Nuclear and other of Radioactive Material during Transport – International Transport Security	Dec 8-12
Aspects of U.S. Domestic Security of Nuclear and other of Radioactive Material during Transport	Jun 22-26
Methods for Reviewing Safety Analysis Reports for Packages and Performing Confirmatory Analysis	Jul 21-30
Welding Criteria for Shipping Containers	Aug 4-5

The following PCP courses were 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, approved these courses for graduate credit in Mechanical Engineering from UNR. UNR also approved a graduate certificate program in nuclear packaging in June which applied to the Northwest Commission on Colleges and Universities, Redmond, WA to accredit the certificate program:

UNR Course Number	Course Title	Credits	Location
ME 691	ASME Pressure Vessel Code for Nuclear Transport and Storage	1	ANL
ME 692	QA for Radioactive Material Packaging	1	ANL
ME 694	Nuclear and Other Radioactive Materials Transport Security	2	ANL
ME 695	Safety Analysis Report for Packaging Review and Confirmatory Analysis	2	LLNL
ME 696	Management of Safety Analysis Report for Packaging (SARP) Preparation	1	SRNL
ME 697	Radioactive Material Package Operations and Leak Testing	1	SRNL

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

In response to the Fukushima Daiichi accident in 2011, PCP developed a Remote Area Modular Monitoring (RAMM) system for use at nuclear power plants. RAMM, with battery- powered, wireless-sensor-network provisions, provides remote monitoring capability of facility conditions, after the loss of on-site, off-site, and backup emergency powers. A prototype system was demonstrated at the Waste Management 2015 Conference in March. In addition to deployment at nuclear power plants, RAMM is being considered for monitoring spent fuel casks during extended, long-term, dry storage.

PCP uses NNSS, SRS's K-Area Material Storage (KAMS), and Argonne's Alpha Gamma Hot Cell Facility (AGHCF) as test beds to implement further developments to the ARG-US radiofrequency identification (RFID) system and other tracking and monitoring technologies. NNSS, KAMS, and AGHCF accomplishments are as follows.

- NNSS received six MK-III RFID tags from Evigia Systems, Inc. in December and obtained system operability for five of the six tags in June.
- In May, SRS completed Phase III testing in K Area to verify accuracy of Gamma and Neutron radiation monitoring and proper functionality of the MK-III RFID Monitoring System.
- Continuous remote monitoring of the AGHCF by the ARG-US RFID system that began in August 2013. Radiation levels for the entire facility are mapped in real time 24/7.

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 2015, PCP updated new developments, papers, and guidance (on RAMPAC website) for storage certification in anticipation of the need for DOE storage certification, in compliance with

10 CFR Part 72, due to the issues regarding the lack of a Federal repository. Additional information on Storage Packaging and Aging Management may be found at the following link: <https://rampac.energy.gov/home/storage-aging-and-disposal>

In addition, PCP added 32 technical papers and presentations on RAMPAC related to activities of the Deep Borehole project. PCP is a subject matter expert to the project with respect to licensing strategies, cask/canister system design requirements, and remote monitoring. Additional information on the Deep Borehole project may be found at the following link: <https://rampac.energy.gov/home/storage-aging-and-disposal/disposal>

2.3.6 Transportation Safeguards and Security

PCP sponsored two 5-day training courses at the Argonne National Laboratory: December 2014, “Security of Nuclear and Other Radioactive Material during Transport” and June 2015 “Aspects of U.S. - Domestic Security of Nuclear and other Radioactive Material during Transport.”

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 460.1C, and previous Orders, required “users”, that is, DOE and DOE Contractors that participate in the 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. This process requires “users” to submit their Quality Assurance Program Description (QAPD) and Subpart H compliance matrix to the PCP for independent review. The PCP QA reviews are managed with a docket numbering system and the status of the review is posted on RAMPAC. At the conclusion 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:

Fiscal Year	2015
HCO QAPD Approvals	17

The PCP performs independent QA Audits of DOE Site Contractors and their packaging suppliers for compliance with 10 CFR 71, Subpart H and requirements in CoCs. A final audit report was issued December 8, 2014, for the QA audit conducted September 8-10, 2014, at the Terminal Manufacturing Company for activities related to procurement, fabrication, welding, assembly, inspection and testing of the Model 9980 packaging. The audit identified one finding and twelve observations in their QA program.

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

2.4 TRANSPORTATION RISK REDUCTION

2.4.1 RADCALC- The Radioactive Material and Waste 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

(particularly radioactive) materials. OPT and its predecessor offices developed RADCALC beginning in 1995 as a safety software tool accessible to operational-level transportation staff at DOE sites to assure compliance with the 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 requires an update. Prior to performing software updates, the DOE Office of Standards and Quality Assurance (EM-43), OPT, the EM Consolidated Business Center, and the RADCALC contractor initiated a NQA-1 certification process for the software. Efforts are still underway to qualify RADCALC to NQA-1 requirements, and as such, OPT expects to release RADCALC version 4.2 by the end of 2016.

2.4.2 Automated Transportation Logistics and Analysis System (ATLAS)

OPT completed transition and enhancement of the Automated Transportation Management System (ATMS) in the beginning of October 2014. ATMS was enhanced and moved from a legacy hardware platform at the SRS Data Center to the DOE EM Cloud hosted at the Hanford Site. During this transition, ATMS was modernized into the Automated Transportation Logistics and Analysis System (ATLAS) and is now accessible through the web-based and highly reliable cloud solution. ATLAS provides enterprise-wide information for visibility and analysis of DOE transportation activities as required in DOE O 460.2A.

This cloud-based solution provides DOE with a common system for transportation management that replaces redundant and less effective systems, while promoting compliance with regulations. ATLAS provides DOE Programs with detailed and complex-wide information to support management decisions. The system is designed to be user-friendly, reduce transportation costs, and help shippers comply with transportation regulations, with input from DOE transportation experts.

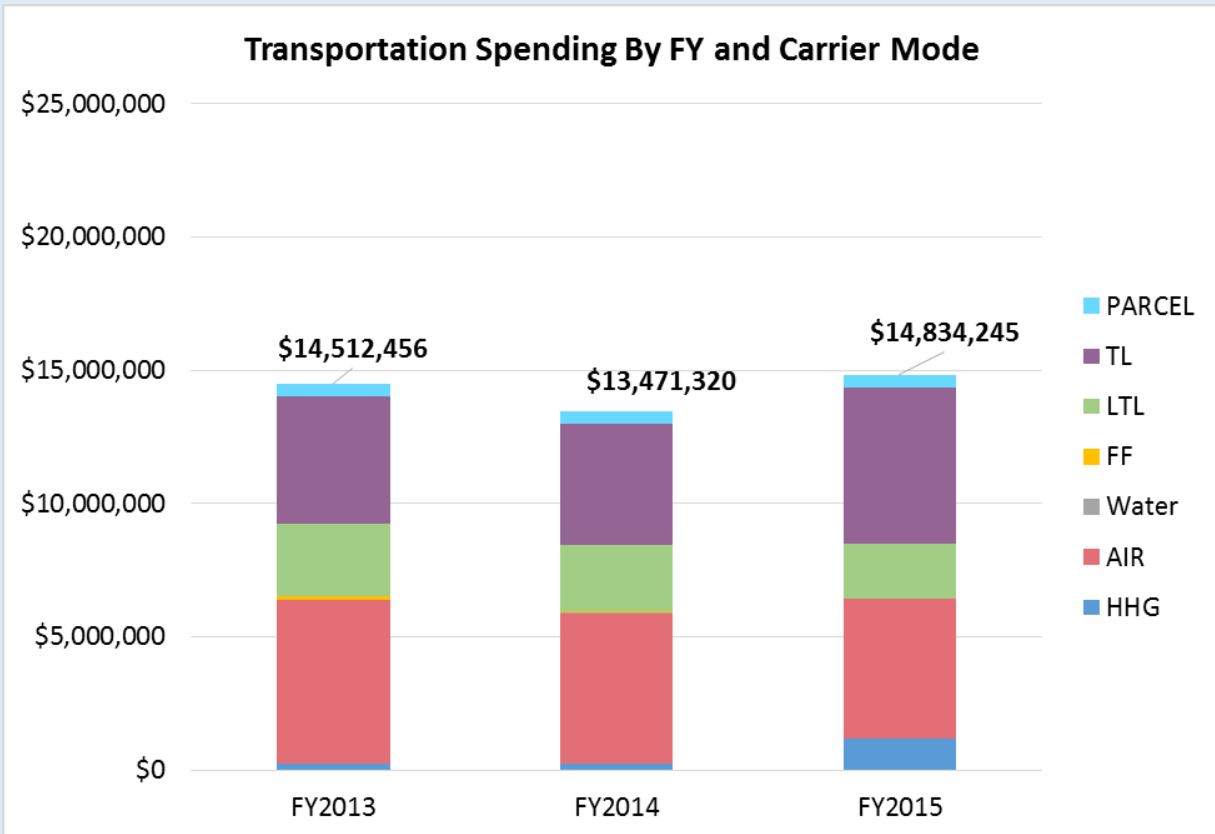
In FY 2015, ATLAS maintained system availability of >99% to support site day-to-day shipping activities and completed following system enhancements:

- Completed NRC forms 540/541 for shippers and forms 542/741 for receivers in Shipping Document Module.
- Incorporated updated DOE TL/HHG tenders in Rate/Route Module.
- Incorporated updated GSA LTL tenders in Rate/Route Module.
- Completed functionality to auto calculate accessorial charges based on shipper selection.
- Completed functionality to allow shipper to add technical name and description of waste proper shipping name on *Emergency Response Guide* attachments.
- Added multiple complex-wide and site-specific reports.
- Added standard GSA requested reports.
- Collaborated with UPS in resolving *Electronic Data Interchange* data accuracy and consistent format issues.
- Addressed ATMS-ATLAS post-migration user issues.
- Provided multiple training webinars to assist users in better utilizing ATLAS functionalities.
- Conducted webinars to better understand user issues and collect input for system upgrades.

- Conducted visits to mitigate site specific issues that were not suitable through remote links.

Transportation Spending by Mode

Transportation spending in the past 3 years is presented in the chart below. Overall, transportation cost is in the range of \$13-15 million annually; however, not all sites/contractors use ATMS/ATLAS, so transportation spending is likely higher.



2.4.3 Hazardous Materials Shipment Summary

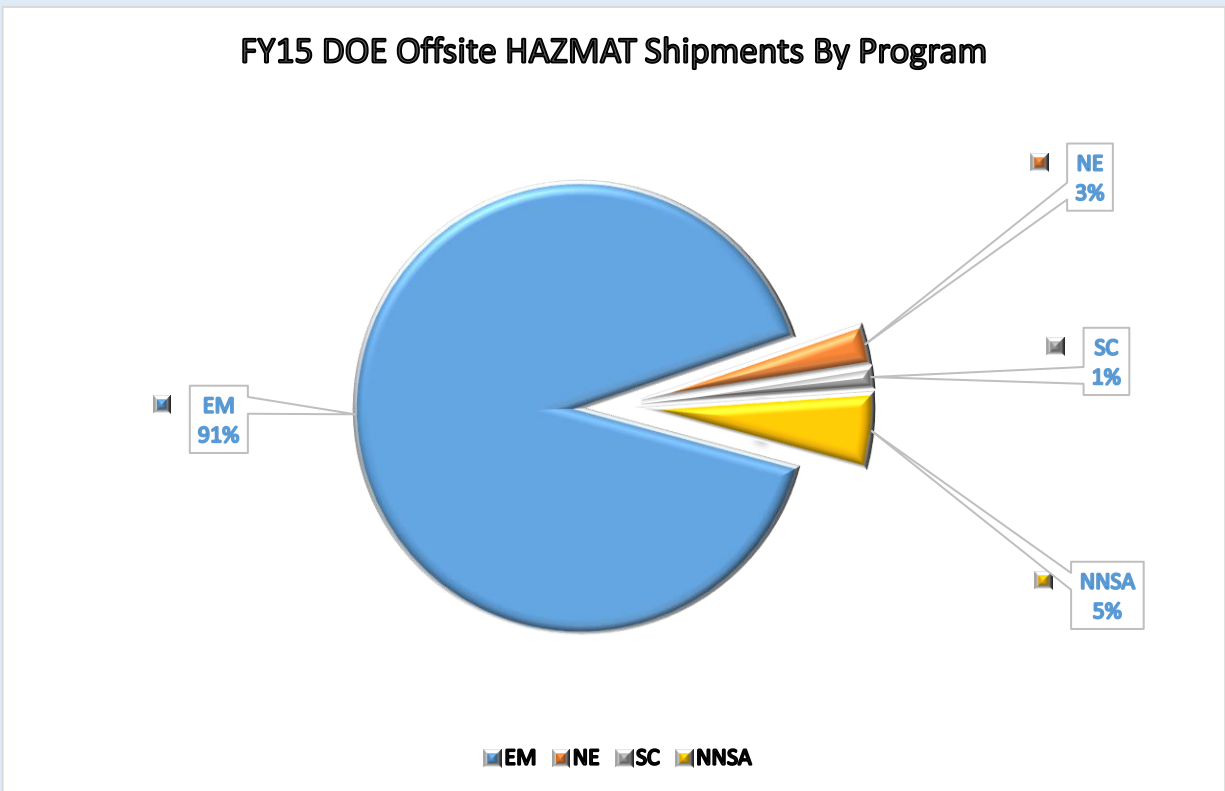
Data obtained from ATLAS queries and data calls from non-ATLAS user sites show that DOE completed more than 18,000 offsite hazardous material shipments totaling 4.3 million miles in FY 2015. Sub-category level information is not always available and the data calls did not capture all shipments, since there are currently no effective means for readily obtaining this information from all program offices. OPT is working to develop a mechanism to more readily gather this information in the future.

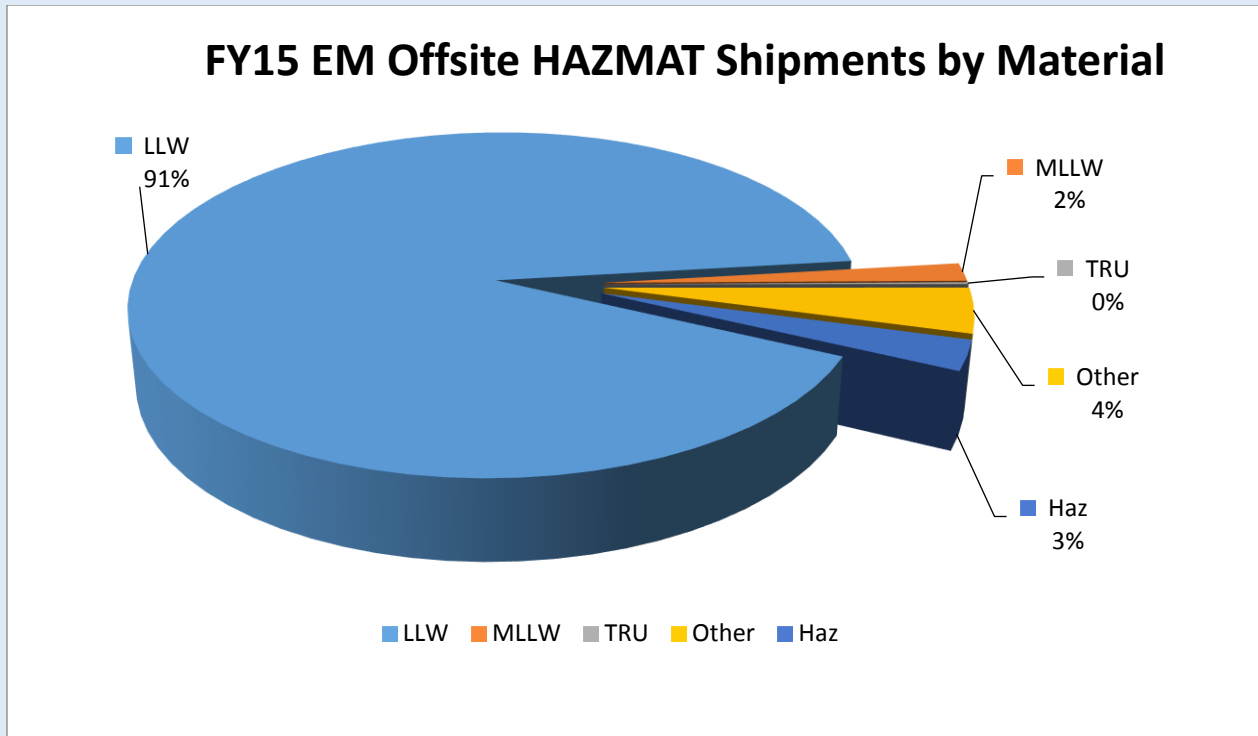
DOE Shipments by Program Office/Mode

	Air	Air Mileage	Rail	Rail Mileage	Highway	Highway Mileage	Total Shipments	Total Mileage
EM	70	97,089	4,536	241,391	12,291	3,048,189	16,897	3,386,669
NE	190	145,652	0	0	316	167,650	507	313,302
SC	38	65,237	0	0	221	67,989	259	133,226
NNSA	118	128,444	0	0	861	343,215	979	471,659
DOE	416	436,422	4,536	241,391	13,689	3,627,043	18,642	4,304,856

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.





2.4.4 Transportation Incidents

There were no DOT recordable transportation accidents involving DOE hazardous materials in FY2015. 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.). In FY 2015, there were eight transportation incidents involving DOE hazardous material shipments that met the reporting criteria:

- November 2014: *Classification*: A hazardous shipment was sent from Los Alamos National Laboratory to Pacific Northwest National Laboratory with an incorrect classification.
- November 2014: *Packaging and Labelling*: Packages of desiccant assembly products shipped from the National Security Campus - Kansas City to Sandia National Laboratories were not properly packaged or labeled.
- January 2015: *Shipping Paper*: On several occasions, used diesel and oil filters shipments from Sandia National Laboratories were signed by Fleet Services employees who were not trained or qualified and were not authorized to sign manifests for hazardous waste shipments.
- January 2015: *Packaging*: Roll off bins with Low Level Waste that was shipped from Technical Area 3 (TA-3) to TA-21 at Los Alamos National Laboratory for weighing was found to have loose closures.
- March 2015: *Packaging*: A low-level shipment arrived at EnergySolutions Clive Treatment and Disposal from Los Alamos National Laboratory with a B-12 box improperly secured (with nuts backed off and dropped).

- April 2015: *Classification*: A container of radioactive waste was shipped from Oak Ridge National Laboratory to the NNSS as DOT Non-Regulated when the characterization data indicated that it should have been classified as DOT Radioactive Material Class 7 surface contaminated object-I.
- May 2015: *Load Securement*: A shipment containing metal drums from Pantex arrived at Sandia National Laboratories with all containers loose from the binding and shipping pallet.
- June 2015: *Shipping Paper*: A Sodium-22 special form radioactive source in a shielded container was incorrectly shipped from the Critical Infrastructure Test Range Complex to the Materials and Fuels Complex at Idaho National Laboratory.

In FY 2016, OPT will collaborate with the EFCOG P&T Subgroup to compile Lessons Learned from Transportation Incidents.

2.4.5 Packaging Quality Assurance Assessments and Oversight

Providing support for QA evaluations of suppliers who provide commonly used DOT packaging and Type B & fissile packaging to DOE sites is an integral part of OPT's mission. To that end, OPT performs targeted and focused packaging QA assessments of suppliers and users and assists sites in implementation of an effective packaging QA program as necessary. In July 2015, OPT staff participated in the Commercial Grade Survey for DOT 7A Type A drums conducted by the team from Savannah River Nuclear Solutions at the drum supplier in Chicago, IL.

2.4.6 Site Assessments

DOE O 460.2, *Departmental Materials Transportation & Packaging Management*, requires P&T compliance evaluations be performed every three years. OPT uses 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. TCAP assessments have resulted in numerous cost efficiencies in site contractor activities.

Due to FY 2015 funding issues, OPT opted for a less intrusive assessment process on the sites by requesting and reviewing site self-assessments rather than performing onsite assessments. This approach, though cost effective, is not as effective as an onsite assessment of all areas of activity subject to the Orders. TCAP assessments for Argonne National Laboratory, Ames Laboratory and Moab were completed in FY 2015 with OPT assistance and coordination. OPT also performed a TCAP assessment upon request from the SPRU Project. SPRU Management appreciated the TCAP team's effort and thus sent a note of appreciation to OPT for the recommendations made by the team.

2.4.7 Motor Carrier Evaluation Program (MCEP)

OPT manages and implements the DOE Motor Carrier Evaluation Program in accordance with DOE Order 460.2. Currently there are 38 approved carriers in DOE's MCEP. MCEP is a safety tool used to determine the quality and capability of motor carriers, drivers, and equipment offered for transporting DOE/NSA radioactive materials and hazardous wastes. MCEP maintains and monitors a list of qualified motor carriers for their safety performance from which the DOE/NSA field offices and contractors select from to ship their radioactive materials and hazardous wastes. MCEP provides external stakeholders assurance that certain hazardous commodities will be transported safely and securely by defining criteria and methodology

needed to identify 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 the reevaluation of qualified motor carriers every 3 years. In FY 2015, thirteen MCEP reevaluations were performed; some of these MCEP motor carriers had not been reevaluated in 16 years due to budget constraints. In September 2015, the MCEP Plan was rewritten to be more cost effective and streamlined by incorporating a three tier, graded approach process and was updated to meet new DOT regulations.

2.5 Emergency Preparedness and Outreach

2.5.1 Transportation Emergency Preparedness Program (TEPP)

State, tribal, and local jurisdictions are responsible for responding to radiological transportation incidents. In FY 2015, EM completed 16,897 radioactive, hazardous material and waste shipments (~9,000 of these shipments were along a 200 foot length of public road at the East Tennessee Technology Park). To address concerns expressed by corridor states and tribes about preparedness, the TEPP ensures that responders have access to the 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 many of their hazardous materials preparedness programs.

TEPP FY 2015 major achievements include:

- Partnering with state and tribal instructors, along with instructors from the DOE Radiological Assistance Program and the Waste Isolation Pilot Plant, TEPP provided 138 courses, in 17 different states, with 1,809 responders trained. Of those responders attending TEPP courses, 599 received medical continuing education hours for their participation.
- TEPP representatives completed their efforts to update the online version of TEPP Model Needs Assessment. Changes include more in-depth questions and specific sections addressing the needs and expectations of the Public Information Officer and the State Radiation Authority. The Needs Assessment was finalized in May 2015. The automated database operation of the Needs Assessment will self-generate a report based on responses to answers from the official answering the assessment questions.
- TEPP representatives working with the New York Division of Homeland Security and Emergency Services and the NNSA Global Threat Reduction Initiative delivered two tabletop exercises (TTX) in New York on November 5 and 7, 2014. The combination threat and non-threat based tabletop exercises were held at the State Preparedness Training Center in Oriskany, near the I-81 corridor, and in Cheektowaga, along the I-90 corridor. A total of 108 players and observers attended the exercises which focused on the transportation of a Category I shipment of radioactive material.
- In San Diego, CA, on January 26-28, TEPP representatives conducted a Spanish-language Modular Emergency Response Radiological Transportation Training (MERRTT) session. A total of 45 students attended the session. This special MERRTT session was done in collaboration with Marco Olmos, Director of Government Relations and Training and the Federacion de Bomberos Hispanos. The program included a third day of practical exercises that included high activity radioactive sources.

- On March 18th, TEPP representatives facilitated a TTX with the Pennsylvania Emergency Management Agency, State Police, Bureau of Radiation Protection, and county personnel. The TTX scenario focused on a shipment of spent nuclear fuel and a radiopharmaceutical delivery vehicle. The county emergency response personnel involved in the TTX include representatives from the majority of counties along the I-79 and I-81 corridors that will be used as part of an NNSA spent fuel shipping campaign.
- In Cattaraugus, NY, on August 4th and 5th, TEPP conducted a MERRTT session for the Seneca Nations of Indians in support of the NNSA Canadian Shipping campaign. A total of 21 students attended the session.

2.5.2 The National Transportation Stakeholders Forum (NTSF)

OPT provides 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 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. The purpose of the NTSF is to bring transparency, openness, and accountability to DOE's offsite transportation activities through collaboration with state and tribal governments. In FY 2015, DOE hosted the Annual Meeting of the Forum in partnership with the Western Governors' Association, Western Interstate Energy Board and the Tribal Caucus. More than 200 registrants at the event held in Albuquerque, NM gathered from federal agencies, state, local, and tribal governments, private industry and other entities to receive timely updates and presentations on packaging and transportation subjects and issues, and to participate in various breakout sessions which covered such topics as Increasing Education for Emergency Response, Personnel Monitoring Technology and Rail Shipments and Oversight. The meeting also presented the opportunity for Tribal Caucus and State Regional Groups to meet and discuss issue of significance to their caucuses.

Several Ad Hoc Working Groups (AHWGs) were convened during 2015 to work 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 focused on social media, branding, fact sheets, consent-based siting.
- The *Management Plan AHWG*: The Management Plan is being written for the benefit of all NTSF stakeholders, who are active in planning meetings, leading and/or serving on working groups, and participating in NTSF's many activities related to the shipment of radioactive waste and materials. Specifically, the Management Plan will explain the roles and responsibilities of Planning Committee and AHWG members and other participants in conducting various activities, as well as the specific procedures that have proven to be successful in past efforts. The final product is anticipated for 2016.
- 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.

- The *Transportation Practices AHWG*: This AHWG was initiated to review and recommend, as appropriate, a revised set of the practices that are currently found in DOE Manual 460.2-1A, *Radioactive Material Transportation Practices Manual*. The current Manual establishes a set of standard transportation practices for Departmental organizations, including NNSA to use in planning and executing offsite shipments of radioactive materials including radioactive waste. A final product is expected in 2016.
- The *Rail/Routing AHWG*: This AHWG was established to (1) facilitate a dialogue between federal staff from DOE, the Federal Railroad Administration, Tribes and states, and other transportation stakeholders (2) develop a common understanding of how future rail shipments of spent nuclear fuel will operate, and (3) identify outstanding issues or questions to resolve in advance of commencing shipping campaigns. The goal of the AHWG is to identify key issues relating to rail transport from the NTSF community, address those issues and document work done through white papers (also called “issue papers”) and make that work available to the NTSF community. No products are expected until 2016 or 2017.

3. SUMMARY AND NEXT STEPS

Budgetary limitations created a more challenging operational environment during FY 2015. As such, OPT was not able to provide as much onsite assistance in support of field office contractor or subcontractor compliance evaluations as required by DOE Order 460.2A, *Departmental Materials Transportation & Packaging Management*, and 10 CFR 71, Subpart H, NRC P&T of Radioactive Material, with respect to QA, TCAP, and MCEP assessments or attend various stakeholder engagements as in previous years.

Within the constraints of available resources, OPT will seek to leverage existing programs and approaches from other Federal agencies and industry. Some specific activities planned for FY 2016 include:

- Explore innovative ways to improve TEPP training courses such as computer-based training and “How to” videos, addition of new or state of the art equipment, and website additions that enhance responder readiness for response to transportation incidents involving radioactive material.
- Complete enhancements to the MCEP, with emphasis on identifying efficiencies within the program and aligning the program with the Federal Motor Carrier Safety Administration. Compliance, Safety, Accountability Program and reviewing how the Department of Defense and industry partners address carrier evaluations.

