

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



**Office of Packaging and Transportation
Annual Report FY 2017**

**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 7,700 off-site hazardous material shipments over public roads totaling more than 2.6 million miles in fiscal year (FY) 2017 with no Department of Transportation recordable packaging and transportation accidents. Of that, EM completed approximately 5,700 (about 74% of DOE's total) radioactive, hazardous material and waste shipments totaling approximately 1.8 million miles.

The mission of the DOE Office of Packaging and Transportation (OPT), positioned within EM, is to protect the public and the environment by ensuring safe, compliant and efficient packaging and transportation of materials critical to successful DOE operations. OPT achieves this mission by conducting packaging and transportation assessments and oversight; assisting field sites; and developing, managing and advocating policies, orders, guidance and tools in accordance with DOE requirements and government regulations.

OPT provides 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 while providing support for the DOE complex.

Major OPT accomplishments in FY 2017 include:

1. Transporting hazardous materials more than 2.6 million miles with no Department of Transportation recordable packaging or transportation accidents.
2. Completing 51 packaging certification actions related to review and approval of new transportation packages, amendments, renewals, special approvals, and terminations.
3. Completing 7 Motor Carrier Evaluation Program evaluations on motor carriers involved in transporting the Department's hazardous and radioactive materials.
4. Providing 117 Transportation Emergency Preparedness Program courses in 17 States to train more than 1,960 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.
5. Hosting the 2017 Annual Meeting of the National Transportation Stakeholders Forum in partnership with the Council of State Governments – Northeast Regional Conference and the Tribal Radioactive Materials Transportation Committee in Pittsburgh, PA.

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Acronyms

ACTS	Authenticatable Container Tracking System
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	Certificate 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
HCO	Headquarters Certifying Official
HHG	Household Goods
HMR	Hazardous Material Regulation
IAEA	International Atomic Energy Agency
IP	Industrial Packaging
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
P&T	Packaging and Transportation
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
SCAC	Standard Carrier Alpha Code
SPRU	Separations Process Research Unit
SRG	State Regional Group
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
TRMTC	Tribal Radioactive Material Transportation Committee
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 which support 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 establish DOE's transportation management and packaging certification authorities and DOE Order (O) 460.1, *Packaging and Transportation Safety*, DOE Order 460.2, *Departmental Materials Packaging 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 (P&T) of off-site shipments and on-site transfers of hazardous and radioactive materials. DOE Order 460.2 establishes standard transportation practices for DOE elements to use in planning and executing off-site shipments of radioactive material including radioactive waste.

OPT's mission is to protect the public and the environment by ensuring safe, compliant and efficient packaging and transportation of materials critical to successful Department operations. OPT achieves this mission by conducting packaging and transportation assessments and oversight; assisting field sites; and developing, managing and advocating policies, orders, guidance and tools in accordance with DOE requirements and government regulations. Open communication and long-standing partnerships with our stakeholders are key tenets of mission success.

2. PACKAGING AND TRANSPORTATION HIGHLIGHTS IN FISCAL YEAR 2017

2.1 PACKAGING CERTIFICATION PROGRAM (PCP)

The OPT Headquarters Certifying Official (HCO) administers DOE's program for certification of Type B and fissile radioactive material (RAM) packaging. *Department of Transportation, Shippers – General Requirements for Shipments and Packaging*, 49 CFR 173, 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 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 prepares 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 National Nuclear Security Administration (NNSA) missions.

In FY 2017, the HCO issued 15 CoCs (i.e., includes new CoCs, revisions, renewals, and letter

amendments). The DOE CoC and Safety Evaluation Report provide written approval of packaging designs and authorizes use of the packagings for off-site shipments. Significant accomplishments and support to DOE include:

- Letter of Authorization to Revision 3 of DOE CoC 9978 issued in February to the Argonne Site Office, to authorize the Model 9978 package for shipment plutonium/americium laboratory standards to reduce the New Brunswick Laboratory material inventory.
- Revision 4 of DOE CoC 9519 issued in May to the Los Alamos Field Office to renew the Model SafeShield 2999A package design for 5 years.
- Revision 3 of DOE CoC Number 9516 issued in June to the Idaho Site Office, to authorize two new Pu-238 Oxide Fuel content configurations in the Model 9516 package in support of the DOE Space and Defense Power Systems Program, and to transfer the certificate holder responsibility from Office of Nuclear Energy (NE-75) to Idaho Site Office.
- Revision 12 of DOE CoC 9315 issued in June to the NNSA Office of Material Management & Minimization, to authorize the Model ES-3100 package for highly-enriched uranium metal or alloy turnings, fines, and powders with enrichments up to 100% for air transport from the United Kingdom to DOE.
- Revision 2 of DOE CoC 9168 issued in August to EnergySolutions, to authorize fissile payloads and maximize Cobalt-60 payloads in 30-gallon shielded drums for shipment in the Model 8-120B package for the Idaho Cleanup Project, and to renew the package design for 5 years.

Additionally, in November 2016, Revision D of DOE Exemptions E1403 and E1405 were issued to the Richland Operations Office (RL) for shipments of transuranic (TRU) waste to and from Hanford and Perma-Fix Northwest. In FY 2017, RL made a total of 19 shipments of TRU waste from Hanford to Perma-Fix Northwest for size reduction and repackaging under DOE Exemption E1403 and made 13 return shipment from Perma-Fix Northwest to Hanford in Waste Isolation Pilot Plant compliant packaging under Exemption E1405.

PCP is also the point of coordination for DOE in matters related to transportation and packaging safety with other Federal agencies, such as Department of Transportation (DOT), the Nuclear Regulatory Commission (NRC) and international agencies/organizations such as the International Atomic Energy Agency (IAEA). In FY 2017, PCP had 16 specific actions with other Federal agencies, primarily actions with DOT and NRC Certificates.

PCP manages the Radioactive Material Packaging (RAMPAC) online database (<https://rampac.energy.gov>) that contains approximately 4,300 certificate records. The database increased by 137 records during FY 2017. The database contains package information from DOE, NRC, and DOT-IAEA certificates, in order for RAMPAC users to conveniently query packaging and content parameters online.

The current listing of DOE, NRC and DOT/IAEA Certificates and RAMPAC database is found at: <https://rampac.energy.gov/home/package-certification-information/certificates>.

2.1.1 Package Certification Docket Review

Docket numbers are assigned to 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.

For fiscal year (FY) 2017, docket information is as follows:

Fiscal Year	2017
Docket open from prior years	17
Docket Opened	50
Dockets Closed	51

The current listing of dockets, status, timelines, statistics, and points of contact is found at: <https://rampac.energy.gov/home/doe-certification-review-docket/docket-statistics>.

2.1.2 Training and Education

PCP is the primary source of packaging specific training (11 total) 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 Materials Regulations (HMR) (49 CFR 172.704) for Type B and fissile radioactive material P&T analysis and activities. Training attendees are represented from multiple Federal (NNSA, DOT, NRC) and international agencies (e.g. foreign Competent Authorities) and commercial entities. In partnership with the University of Nevada-Reno (UNR), PCP awarded the first Graduate Certificate in Nuclear Packaging to Mr. Daniel Perlstein of the Nevada National Security Site (NNSS) in May 2017.

PCP provided the following courses in FY 2017:

Course Title	FY 2017
Thermal Modeling and Testing of RAM Packages*	Oct 17-21
Quality Assurance (QA) for Radioactive Material Packaging	Mar 20-24
Radioactive Material Packaging QA/QC: Part 1 Welding/NDE Quality Control*	Apr 19-21
Radioactive Material Packaging QA/QC: Part 2 Software Quality Control*	Apr 24-26
ASME Pressure Vessel Code for Nuclear Transport and Storage	Jun 19-23
Radioactive Material Package Operations and Leak Testing	Jul 10-14
SARP Review and Confirmatory Analysis	Aug 15-18
Nuclear and Other Radioactive Materials Transport Security	Sep 11-15

* Applied for Graduate Certificate in Nuclear Packaging accreditation at UNR

PCP is developing a graduate certificate in Nuclear Safeguards and Security with UNR. The curriculum outline was completed by PCP in September and submitted to UNR. Course development will begin in FY 2018.

The current listing of PCP Courses is found at:

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

2.1.3 References and Links to Package Safety Regulations, Directives, and Guides

PCP maintains valuable references and links to packaging safety regulations and guidance on RAMPAC. For the accomplishment period, PCP performed 17 updates via RAMPAC to these packaging resources.

Specific information of the References and Links to Package Safety Regulations, Directives, and Guides maintained by PCP is found at: <https://rampac.energy.gov/home/reference>.

2.1.4 Tracking and Monitoring Technology

PCP, in conjunction with National Laboratory and commercial partners, continues to develop an impressive roster of packaging tracking and monitoring tools and systems. A brief description and updates on the technology follows:

- Radiofrequency Identification (RFID) tracking system Argonne U.S. (ARG-US): Integrated with DOE Tracking and Communication System (TRANSCOM). Established technology transfer and licensing agreement with Evigia Systems, Inc. Completed gamma and neutron source irradiation of five Evigia RFID tags in Aug 2017.
- CommBox and CommBox-Mini: Facilitates low-cost, flexible tracking of ARG-US RFID tagged packages. Issued US Patent No: US 9,514,431 in Dec 2016 for the CommBox.
- Remote Area Modular Monitoring (RAMM): Provides remote monitoring capability of facility conditions (nuclear power plants). Issued US Patent No: US 9,520,057 in Dec 2016 for RAMM. Incorporated an internet protocol camera into the RAMM unit in Feb 2017
- Traveler Tracking: Tracks and monitors risk-significant materials during transportation. Prototype Traveler was used to track and monitor the rail shipment of Equipos Nucleares cask tests in July and August from Baltimore, MD to Pueblo, CO. Patent application #15/435,640 for the Traveler was filed by PCP in Sep 2017.
- Authenticatable Container Tracking System (ACTS): Secure multi-sensor platform for monitoring nuclear material packages and containers during storage and transport. In-house testing to confirm functionality of ACTS on-board magnetic direction sensors completed in Dec 2016.
- Rapid Deployable Global Sensing Hazard Alert (SAV-EM): Phase 1 SAV-EM tracker successfully tested at the Savannah River Site in Oct 2017. Agreement reached with NAL Research to fabricate a “non-military” configuration for use by Federal, State and Local Governments, and first responders in Jul 2017.
- Internal Package Sensor Technology: Inherently safe, passive gas monitoring system. Issued patent (US Patent US 9,437,331 B2) in Sep 2016

Additional information on PCP Tracking and Monitoring Technology is found at:

<https://rampac.energy.gov/home/tracking-and-monitoring>.

2.1.5 Storage Packaging, Aging Management, and Disposal

PCP maintains resources such as new developments, papers, and guidance (on RAMPAC) for storage packaging, aging management, and disposal options at: <https://rampac.energy.gov/home/storage-aging-and-disposal>.

2.1.6 Packaging Exchange

PCP maintains a listing of government owned packaging available for transfer or loan to other government entities and commercially owned certified packaging available for lease or purchase. In August 2017, PCP notified DOE and DOE Contractor subscribers to RAMPAC of excess packagings available from the Separations Process Research Unit.

Additional and current information on the Packaging Exchange is found at: <https://rampac.energy.gov/home/packaging-exchange>.

2.1.7 Transportation Safeguards and Security

PCP sponsored the 5-day training course, Nuclear and Other Radioactive Materials Transport Security at the Argonne National Laboratory in September. Course references and materials are posted on the RAMPAC website at: <https://rampac.energy.gov/home/transportation/security>.

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

2.1.8 Packaging QAP Approval Program

DOE O 460.1D requires that registered users of Type B or fissile packages who participate in design, fabrication, procurement, use, or maintenance of packages certified by DOE and NRC 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 to 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 prepares a Quality Assurance Program Approval form for the HCO to issue. For FY 2017, the HCO approved six QAPD dockets.

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: <https://rampac.energy.gov/home/quality-assurance>.

2.2 TRANSPORTATION RISK REDUCTION

2.2.1 Analytical Computer Tools

2.2.1.1 Web Transportation Routing Analysis Geographic Information System (WebTRAGIS)

WebTRAGIS Transportation Route-Planning Software is managed and funded by OPT as 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. 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, WebTRAGIS has been used for Environmental Impact Statements for shipments of spent fuel from nuclear power plants and for virtually all environmental reviews requested by EM. WebTRAGIS maintains datasets for three common modes of transportation: highway, railway, and waterways. The system uses high density LandScan population data as well as Department of Homeland Security critical infrastructure points of interest and is compatible with RADTRAN software for performing population risk assessment and accident dosing models.

In FY 2017, WebTRAGIS implemented two new routing features for the highway mode. These features include a new routing option for DOE shipments to NNSS and improved reporting for highway routes passing through Native American Tribal lands. For NNSS, users who need to generate routes for DOE shipments to NNSS now have a routing option that restricts routes to those highways agreed to by DOE and the States of Nevada and California. As for Tribal lands, WebTRAGIS now reports all Tribal lands that a route passes through and the cumulative distances traversed for each reservation.

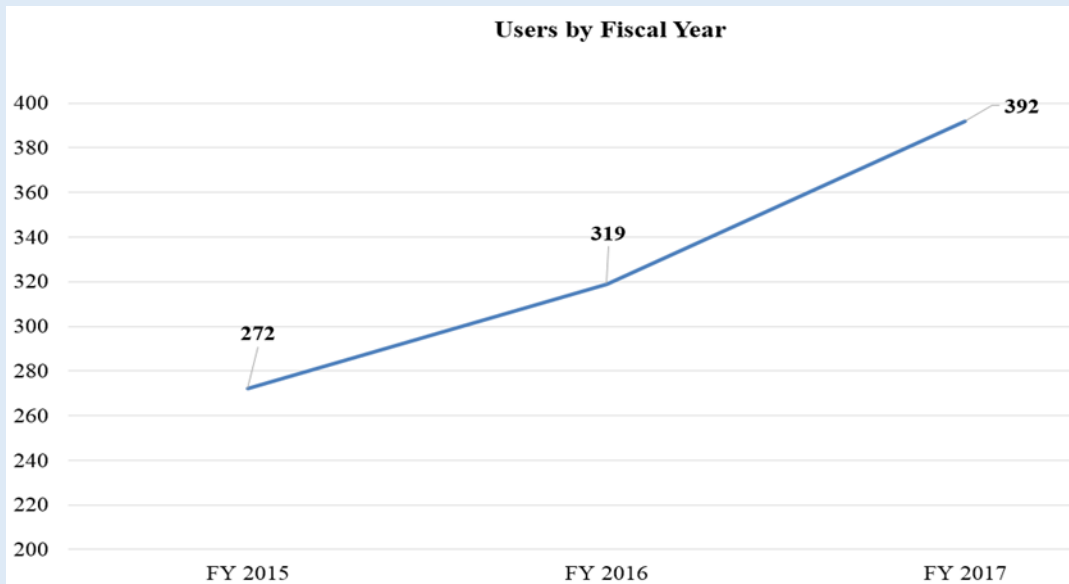
2.2.1.2 Radiation Calculation Transportation Safety Software (RADCALC)

OPT manages and funds RADCALC as a safety software tool accessible to operational-level transportation and shipping users at DOE/NNNSA 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 2017, efforts to fully qualify RADCALC 4.2 to NQA-1 requirements were ongoing, so sites continue to use RADCALC 4.1.

2.2.2 Automated Transportation Logistics and Analysis System (ATLAS)

ATLAS, managed and funded by OPT, is accessible through DOE's EM Cloud computing environment. ATLAS provides enterprise-wide information for visibility and analysis of DOE transportation management activities. The DOE EM Cloud is a private cloud environment for authenticated users to access and execute the ATLAS program from a secure, reliable, and sustainable platform.

In FY 2017, ATLAS added 73 users, for a total of 392 users across 34 DOE sites. As user acceptance of the system increases, the ATLAS team continues to collaborate with users and streamline efficiencies within the system allowing users to become more productive.



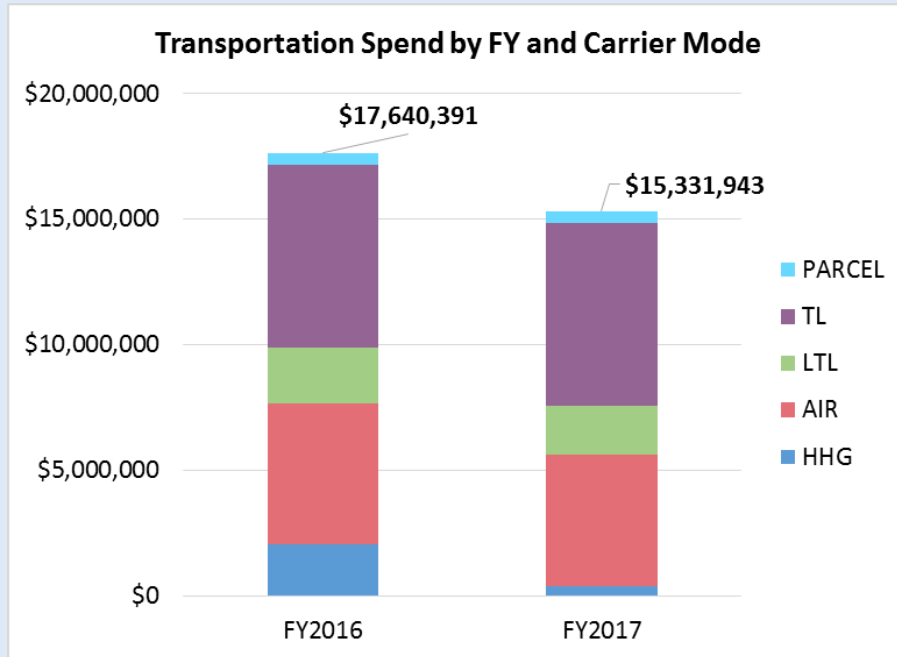
OPT continues to support the ATLAS Joint Application Development (JAD) working group. The JAD working group engages key users from all DOE user sites and implements system changes that offer increased efficiencies to end users.

In FY 2017, ATLAS maintained system availability of >99% to support site day-to-day shipping activities and completed several system enhancements including:

- Received approval from General Services Administration (GSA) in September 2017 acknowledging that ATLAS is designed and implemented to meet the GSA-required prepayment audit program in accordance with 41 CFR 102-118, Subpart D
- Completed developer compliance checks within the Shipping Documents module support the Shipper's Declaration of Dangerous Goods enabling ATLAS to meet FedEx FX-18 compliance requirements, thereby reducing transportation risks for air shipments
- Added 25 new carriers:
 - 3 carriers were added 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
 - 22 carriers were added to the Shipping Documents and Freight Bills Modules
- Updated ATLAS with correct Standard Carrier Alpha Codes by correlating Motor Carrier and DOT numbers and provided recommended "Doing Business As" and legal name changes as carriers are procured or merged with other entities
- Established direct Electronic Data Interchange with the following carriers:
 - FedEx (Air, Ground, Freight), UPS (Air, Ground, Freight), YRC Freight and DHL
- Incorporated updated DOE truckload/household goods tenders in Rate/Route Module
- Incorporated updated GSA less than truckload tenders in Rate/Route Module

Transportation Spending by Mode

Transportation spending by mode in FY 2016 and FY 2017 are presented in the chart below. Per ATLAS, transportation cost is in the range of \$15.3 - \$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

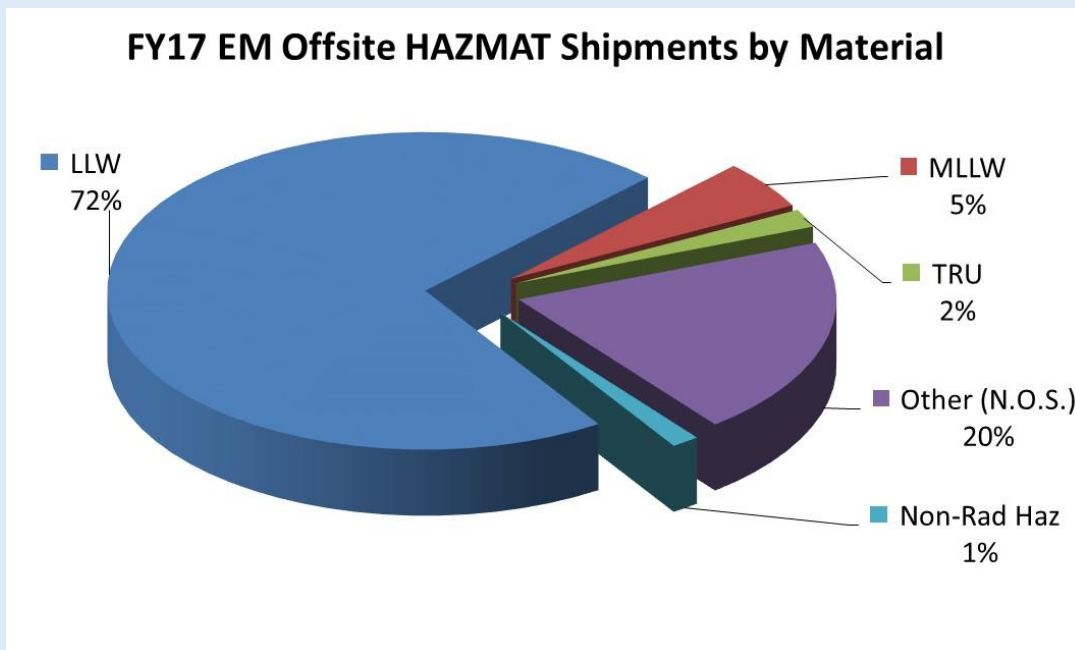
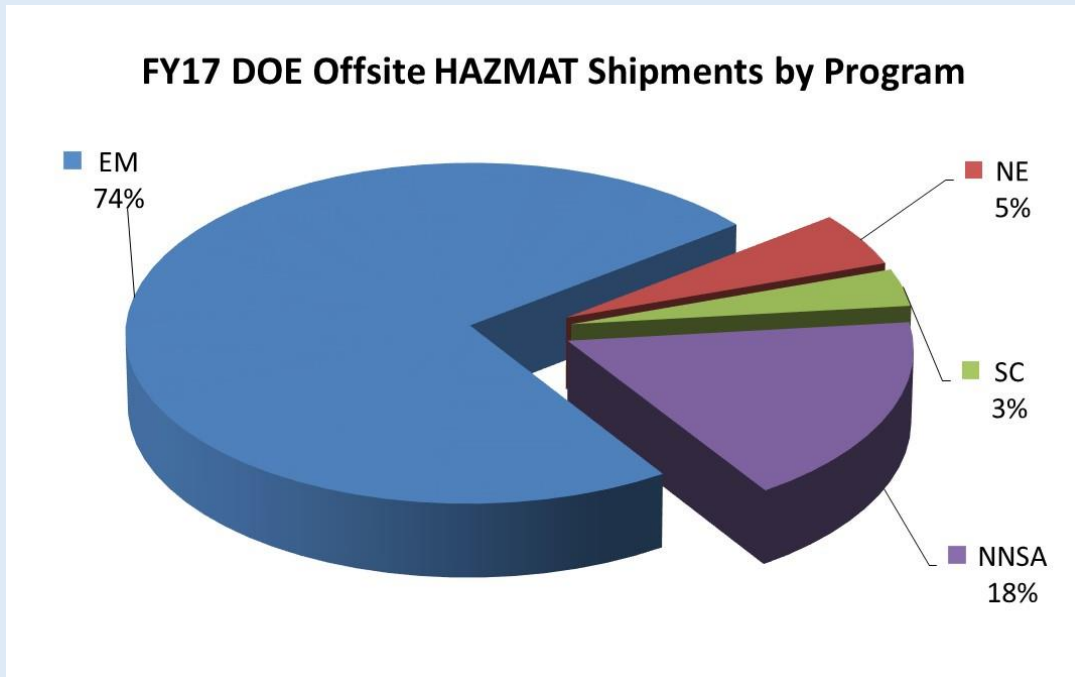
Data obtained from ATLAS queries and data calls from non-ATLAS user sites revealed that DOE completed approximately 7,800 off-site hazardous material shipments totaling more than 2.6 million miles in FY 2017.

DOE Shipments by Program Office/Mode

FY17	Air	Air Mileage *	Rail	Rail Mileage	Highway	Highway Mileage	Total Shipments	Total Mileage
EM	109	31,474	3,508	141,006	2,126	1,659,193	5,743	1,831,673
NE	14	0	0	0	387	174,211	401	174,211
SC	0	0	0	0	278	115,349	278	115,349
NNSA	46	2,180	0	0	1,323	468,856	1,369	471,036
DOE	169	33,654	3,508	141,006	4,114	2,417,609	7,791	2,592,269

* Air mileage accounts for mainly lab samples and isotopes. Highway mileage accounts for off-site public roads shipments only.

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



Note Other: Not otherwise specified small numbers of “checked” waste types (e.g., high-level radioactive waste (HLW), special nuclear material (SNM), spent nuclear fuel (SNF), Toxic Substances Control Act (TSCA), etc.) and predominantly with “unchecked” waste type (almost 90%) in ATLAS

2.2.4 Motor Carrier Evaluation Program (MCEP)

OPT manages and implements the DOE MCEP in accordance with DOE Order 460.2. 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. In FY 2017 there were 38 active, DOE evaluated carriers in the program. MCEP requires assessment of evaluated motor carriers every three years. OPT performed seven evaluations in FY 2017.

In May 2017, MCEP Implementation Plan and Procedures, Volume I, was revised to include clear programmatic roles and responsibilities and program criteria. OPT expects to issue a revised and updated MCEP Implementation Plan and Procedures, Volume II in FY 2018. OPT plans to update evaluation checklists to ensure that they meet any new requirements from the Federal Motor Carrier Safety Regulations and the HMR.

2.2.5 Transportation Occurrences

There were no DOT recordable transportation accidents involving DOE hazardous materials in FY 2017. A DOT recordable accident 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.

In applying regulatory practices, OPT developed reporting criteria that follow 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 2017, there were 14 transportation incidents compared to 6 transportation incidents in FY 2016, involving DOE hazardous material shipments that met the threshold reporting criteria. Upon review of lessons learned and DOE Occurrence Reporting and Processing System (ORPS) incidents, OPT noted non-compliance or less than adequate implementation for P&T activities in the following areas:

- Conduct of Operations
- Regulatory Compliance
- Shipping Operations Quality Assurance
- Integrated Safety Management
- Hazard analysis including inadequate material characterization

OPT uses ORPS reports as a tool to help determine if a generic or focus-based Transportation Safety and Operations Compliance Assurance Program (TCAP) visit is necessary at a particular site. In addition, OPT disseminates corrective actions and lessons learned from ORPS to site packaging and transportation representatives via OPT Quarterly Field calls and emails. Future plans are to post OPT lessons learned on the public DOE OPT website as the EM Web Content Management Group develops new content for the EM website in FY 2018.

2.2.6 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 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 the sharing of P&T lessons learned and cost efficiencies in site contractor P&T activities.

Due to FY 2017 funding constraints, OPT was only able to perform one on-site TCAP review at Savannah River Site.

2.2.7 DOE-wide Risk-based Transportation Shipping Assessment Program

On September 26, 2017, EM Associate Principal Deputy Assistant Secretary for Regulatory and Policy Affairs approved the DOE Transportation Shipping Operations Assessment Program established by the DOE CO in response to plutonium shipping violations at the Los Alamos National Laboratory. DOE Order 460.1D authorizes the DOE Certifying Official (authority delegated to the Director of EM Office of Packaging and Transportation) to independently audit Type B radioactive and fissile material P&T operations and quality assurance programs to ensure compliance with regulations and the packaging Certificate of Compliance. An assessment at Oak Ridge was completed the week of October 30, 2017. For FY 2018, assessments will be conducted at DOE field offices in Oak Ridge, Idaho, Richland and West Valley to include Offices of Nuclear Energy and Science.

2.3 PROGRAM AND SITE SUPPORT

OPT provides various methods of program and site support to include maintaining 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.

2.3.1 Packaging Management Council (PMC)

OPT serves as Federal advisor to DOE and 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 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. After review, the Office of Environment, Health, Safety and Security (AU) Technical Standards Program published DOE-HDBK-5001-2017, *Procurement, Use, and Maintenance of Standard Freight Containers for Use in Transportation and Disposal of Radioactive Material and Radioactive Waste*, for complex-wide availability in October 2017.

2.3.2 Transportation Management Council (TMC)

In accordance with DOE Order 460.2, OPT serves as Federal sponsor and advisor for DOE's Transportation Management Council. TMC membership is made up of DOE and NNSA Federal and contractor personnel involved in traffic management, transportation and shipping operations and transportation safety activities.

To strengthen subject matter knowledge, 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 DOE shipping needs. OPT sponsored and assisted in coordinating summer and winter TMC operations meetings. During

these meetings, site DOE and NNSA Federal and contractor transportation personnel discussed several topics including:

- New DOT regulatory requirements
- Transportation lessons learned
- Core value metrics
- 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 2017, TMC and the TMC Federal advisor developed a HHG bid specification, tariff rates and a rating tool. This resulted in the Department successfully:

- Establishing 11 HHG national tenders
- Establishing 21 TL national tenders
- Working with the General Services Administration to establish 16 LTL tenders
- Exercising a provision in the tender bid specification to extend all of the FY 2017 national tenders for a year through the end of calendar year 2018

2.3.3 Support of Site Transportation Activities

OPT routinely supports transportation activities of DOE sites by providing information, coordination and guidance. An example of this support is Quarterly P&T Field calls to provide a forum for P&T experts from the Field, Headquarters and other invited agencies to discuss items of interest, sharing of best practices, lessons learned and to resolve issues raised during the calls. OPT conducted four quarterly calls during FY 2017. On average, 40+ stakeholders participate in the calls.

2.3.4 Energy Facility Contractors Group (EFCOG)

OPT serves as Federal liaison to EFCOG's Waste Management Working Group and its Subgroup on P&T. 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.

OPT also serves as Federal advisor to EFCOG's 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. The document benefits DOE and contractors by tailoring NQA-1 requirements to specific packagings and applying NQA-1 requirements in a graded approach to packaging suppliers.

Hazardous Material Shipments Occurrence Reporting and Lessons Learned

The EFCOG Waste Management P&T subgroup conducted an analysis of incidents that occurred over the last 3 years and provided recommendations for improvement in several areas. Although DOE has an excellent safety record regarding transportation of hazardous materials, occasional issues of non-compliance errors and miscues were identified in the P&T functional area.

During FY 2015-2017, the average normalized event rate is low (0.66% 3 year average). It appears that a negative trend is emerging. Normalized events have increased by over 20% per year over the evaluated 3 year period (from 0.49% in FY 2015 to 0.84% in FY 2017). Based on

the 3-year period analyzed, the most prevalent areas of weaknesses were in (1) packaging errors; (2) incorrect marking and labeling; (3) errors in shipping papers; and (4) improper characterization and classification. Many of the events evaluated related to human factor failures where knowledge, skill and proficiency in implementing the rigors of safe packaging and transport of hazardous materials is an apparent factor.

The EFCOG report suggested that OPT could collaborate with EFCOG and National Training Center (NTC) to take advantage of NTC training capabilities to offer a standardized P&T shippers course used DOE wide.

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 2017, OPT identified and communicated 16 actions including safety advisories to the DOE P&T community. OPT also 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 460.2A, "Departmental Materials Transportation and Packaging Management"

OPT initiated the process to revise DOE Order 460.2A to clarify application of consistent radiological contamination survey requirements for transport of radioactive materials and radioactive waste shipments and to incorporate DOE Manual 460.2-1A into the revised Order. After EM approval, OPT submitted the Justification Memorandum for Order revision to the Director, Office of Management.

2.4.2 DOE Technical Standards Program

OPT is instrumental in identifying and pursuing specific P&T technical activities and supporting 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 AU. OPT contributed to the following handbook:

- **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 (CGD) Application Handbook for the DOE complex. 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 American Society of Mechanical Engineers 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. AU has put this project on hold.

2.5 EMERGENCY PREPAREDNESS AND OUTREACH

2.5.1 Transportation Emergency Preparedness Program (TEPP)

In FY 2017, EM completed approximately 5,700 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 hazardous materials preparedness programs.

TEPP FY 2017 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 117 courses, in 17 different States. Of 1,961 responders attending TEPP courses, 431 received medical continuing education hours for their participation.
- Partnering with the Utah State Fire Marshal's office in May 2017 to provide a patient decontamination discussion at the Utah Governor's Safety Summit in Layton, Utah.
- Presenting an overview of TEPP at the Northwest Tribal Emergency Management Council Meeting in Suquamish, WA in May 2017.
- Working with the State of West Virginia Threat Preparedness Coordinators and numerous county officials to train response personnel on transportation accidents involving radioactive material. Training included the conduct of exercise Operation Dawson Storm in July 2017, which involved numerous organizations from all levels of local and State government.
- Conducting a tabletop exercise for Louisville, KY emergency services in September, 2017.
- Conducting training sessions in FY 2017 to support the NNSA Canadian shipping campaign
- Finalizing and releasing new TEPP training videos. These videos are being shared with instructors across the country on the new MERRTT thumb drive.



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). NTSF is the mechanism through which DOE engages at a national level with States, Tribes, Federal agencies and other interested stakeholders about DOE's shipments of radioactive waste and materials, as well as occasional high-visibility shipments that are non-radioactive. NTSF brings transparency,

openness and accountability to DOE's off-site transportation activities through collaboration with State and Tribal governments. To memorialize this commitment, DOE has Cooperative Agreements in place with our State Regional Groups and Tribes.

In FY 2017, DOE hosted the Annual Meeting of the Forum in partnership with Council of State Governments – Northeast Regional Conference and the Tribal Radioactive Materials Transportation Committee in Pittsburgh, PA. More than 200 registrants from Federal agencies, State, Local and Tribal governments, private industry and other entities gathered to communicate and exchange timely updates and presentations on packaging and transportation subjects and issues. The Forum also presented opportunities to attend breakout sessions and a tour of Holtec International.

Several *Ad Hoc* Working Groups (AHWGs) were convened during the 2017 meeting to address 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.
- *Spent Fuel Transportation Materials AHWG*. This AHWG provides input to the DOE Office of Nuclear Energy on developing, revising and improving various transportation and related information materials.
- *Spent Fuel Rail/Routing AHWG*. This AHWG addresses issues relating to rail transport and routing for shipments of commercial SNF.
- The *180(c) AHWG*: This AHWG will provide pertinent background material, issue papers and recommendations for DOE management to assist in development of a revised Policy Statement for Section 180(c) of the Nuclear Waste Policy Act. This AHWG specifically relates to the DOE program on spent fuel storage.

The FY 2017 OPT Annual Program Report is available for download at:
www.energy.gov/em/services/waste-management/packaging-and-transportation.

Email us at: askpat@hq.doe.gov.

