

**Optimizing a National Transportation Program for Efficiency and Effectiveness – 14187**

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**ABSTRACT**

As one of the largest shippers of Class 7 (radioactive) material in the world, the U.S. Department of Energy (DOE) must maintain vigilance in ensuring its transportation practices result in safe and compliant shipments. In 1989, the DOE established the Office of Environmental Management to mitigate the 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 legacy of the Cold War. Many problems posed by its operations are unique, and include the transportation of unprecedented amounts of contaminated waste, water and soil, nuclear materials, and a vast number of contaminated structures. As the transportation of radioactive material increases, so does the possibility of a transportation incident involving radioactive material.

The challenge facing DOE is to make thousands of annual shipments in a safe and compliant manner. The DOE Office of Packaging and Transportation (OPT) is constantly evaluating and refining its programs for efficiency and effectiveness to ensure an exceptional safety and performance record at minimal cost. The services provided include a combination of technical assistance and operational support, compliance assessments, and coordination with internal and external stakeholders.

**INTRODUCTION**

Each year the DOE makes over 10,000 shipments of hazardous and radioactive material across America by highway, air and rail. The safe, secure, reliable and efficient movement of these materials is essential for completion of the vital missions of the Department, the safety of the public along DOE transportation routes, and continued stakeholder confidence in our ability to make safe and compliant shipments. In Fiscal Year 2012, DOE had two incidents resulting in Notices of Violation from the U.S. Department of Transportation (DOT). Over the past five years, DOE has averaged about the same number of shipments and violations each year. As a result, the DOE has demonstrated a consistent compliance rate of over 99.9% for its hazardous material shipments.

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. DOE transportation management authorities are provided in Title 41 Code of Federal Regulations (41 CFR) 109-40. DOE packaging certification authority for fissile and Type B packages has been granted under DOT regulations in 49 CFR 173.7(d) and is required to be maintained at least equivalent to the U.S. Nuclear Regulatory Commission (NRC) packaging certification activities.

The DOE policy implementation requirements are provided in DOE Orders 460.1, *Packaging and Transportation Safety*, and 460.2, *Departmental Materials and Transportation Management*. In addition, in 2002, DOE developed DOE Manual 460.2-1, *Radioactive Material Transportation Practices Manual*, through a collaborative effort including senior managers across the Department and external stakeholder groups to establish consistent protocols that would be followed for the transportation of radioactive materials and waste.

### **PROGRAM MISSION AND GOALS**

The OPT mission is to provide guidance, tools and support for DOE programs and contractors to assure safe, compliant, reliable and efficient transportation of hazardous and radioactive materials essential for the success of Departmental missions. DOE, like many Federal agencies, face numerous challenges when it comes to managing transportation efficiently. These challenges include unpredictable future funding, organizational issues related to talent acquisition and development, and slow acceptance to changes in existing processes and systems. By participating with internal organizations, external Federal entities and private transportation companies, OPT has identified best practices that must be maintained to enable the DOE to address declining budgets and loss of expertise, and to ensure compliance, safety and efficiency.

Critical best practices include consolidation of transportation systems and processes where possible; collaboration with agencies having similar missions and objectives; increased resources for federal transportation management groups; embracing mandated, freight payment processes; and targeting goals to better manage both outbound and inbound freight flows. Applying these best practices allows OPT to create a single source for transportation systems and data to better address work flow processes, transportation costs, and a pathway to efficiencies. There are many opportunities to improve on our transportation management practices and reduce operating costs. This is being achieved through optimization of operations across program lines with a flow down to site contractor activities. This requires consolidation of resources from different organizations across the Department and managing the transportation infrastructure in a collaborative manner instead of on an individual site or contractor basis.

OPT's overarching goals are to:

- Provide technical support for field P&T needs;
- Provide effective systems, policies, programs and tools to support DOE sites in making safe, secure, economical and compliant shipments;
- Ensure DOE transportation activities are supported by states and tribes; and
- Ensure policies and practices are risk-informed and performance-based.

OPT currently works across its programs and organizations to provide DOE sites the tools and services needed to accomplish the Departmental mission. This includes coordination with:

- Domestic and international regulatory agencies to assure DOE programs and contractors are well informed on the laws, regulations, and requirements for compliant shipments;

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- Departmental programs and contractors providing transportation services to DOE sites by making information and tools available for safe and compliant shipments; and
- State, tribal, and local communities to share information, participate in open dialogue, develop or enhance emergency preparedness, and pave the way for successful DOE shipments.

OPT provides consistent and uniform guidance and tools to assist the DOE complex in maintaining compliance, safety and efficiency with DOE P&T activities.

### **TRANSPORTATION MANAGEMENT**

Automating the transportation management system is crucial to assuring safety and compliance. The DOE Automated Transportation Management System (ATMS) allows sites to electronically prepare shipments by determining best carrier rates, prepare shipping documents, and conduct a pre-audit of transportation bills. ATMS has been used within the Department for over 20 years. Over the past year, OPT has evaluated other transportation management systems and has determined the best path forward is to develop enhancements to its existing system.

One of the systems evaluated by OPT was the U.S. General Services Administration (GSA) to Transport Integrator/PayPort Express (TPI/PPE) transportation management system. The use of a government-wide centralized system was an attractive alternative to continued support of a DOE-maintained system. During the 9-month pilot of the new TPI/PPE system OPT found the system was very effective for general freight, but the system was not ready for the complex hazardous material shipments that DOE sites are required to make. However, OPT recognized the value of using the PPE portion of the GSA system, which allows DOE to automate the payment of freight bills, reduce the hands on process for verification, and better meet regulatory requirements for pre-payment audits. OPT will be working with the DOE sites to conduct a pilot program to evaluate the effectiveness of using the PPE portion of the GSA system with ATMS.

To improve access and reduce overall operating/maintenance costs, OPT began a transition of ATMS to the cloud to align with DOE datacenter consolidation initiatives driven by the DOE Chief Information Officer. ATMS is being updated to reduce hardware maintenance costs while providing users better access to information in a timely, targeted and prioritized manner. This will enable OPT to have better benchmark data and assist in reducing transportation costs across the DOE complex.

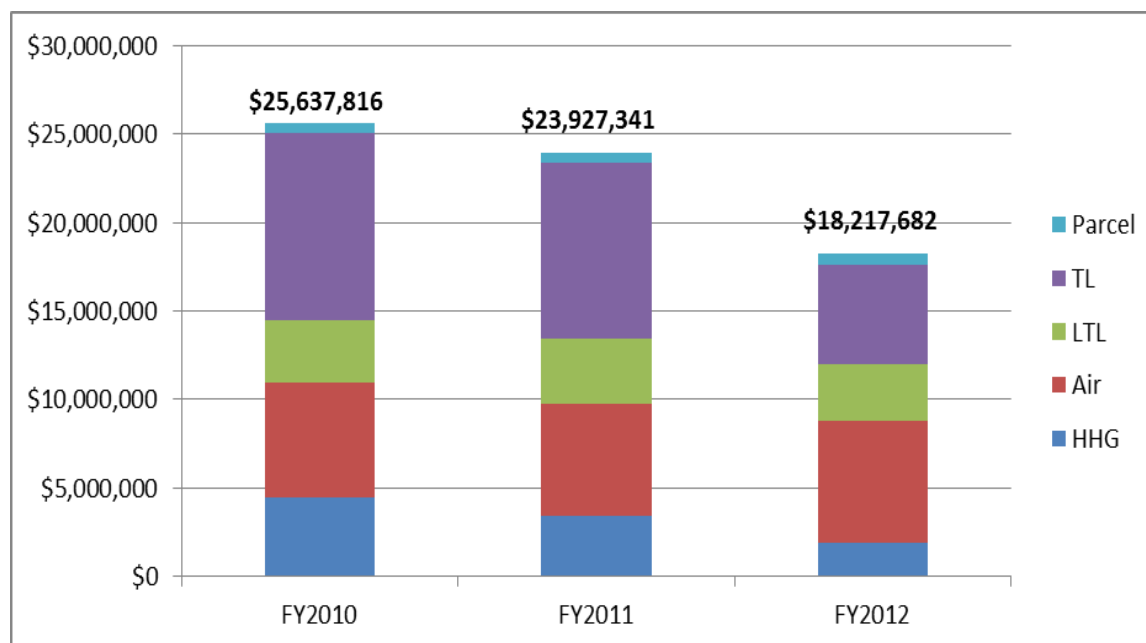
ATMS is a force-multiplier technology in that it provides significant cost savings to the DOE sites through the automation of activities that would otherwise be performed at significantly higher cost using manual operations, or through the use of unique automated systems at each site. ATMS provides a framework which enables management and operations to ensure risk informed and cost effective decisions are made on a consistent basis. This system combines transportation requirements into a centralized DOE-wide architecture and provides operational consistency which accounts for routine changes in contractor organizations responsible for conducting transportation activities at the DOE sites. The enhanced ATMS will provide guidance in critical decision processes involving selection of packagings, carriers, and shipment routes, and will

eliminate errors in preparation of required shipping documents. Use of ATMS will reduce duplication, cost and redundancy of overlapping functions for specific mission areas encompassing logistics and operations, packaging development, safety, and regulatory compliance. The use of ATMS at a particular site as multiple contractors are used over time for transportation activities provides a stable platform for continued safe and compliant shipments, and a historical record that can be used for future transportation planning and logistics.

In looking for other opportunities to improve DOE's shipment efficiency, OPT is collaborating with the DOT on the Hazardous Materials Automated Cargo Communication for Efficient and Safe Shipments (HM-ACCESS) initiative to identify and eliminate barriers and reduce Departmental costs through the use of paperless hazard communication technologies. This approach is intended to improve the delivery of critical hazardous materials safety information throughout the transportation chain. The ATMS framework is being aligned to accommodate HM-ACCESS initiative as well as support the similar U.S. Environmental Protection Agency initiative on eManifest.

OPT uses a Transportation Management Council (TMC) to provide a forum for DOE sites and their contractors to identify, analyze, and resolve traffic management, transportation operations and transportation safety issues to support the shipping needs of DOE and its contractors. TMC promotes cooperation and communication across programmatic and contractor lines; effective resource utilization; consistent application of requirements; and standardization of traffic management, transportation operations and motor carrier safety.

Through the TMC, OPT is able to negotiate tender rates with carriers for the entire DOE complex. Over the past several years, the TMC has refined the DOE Rules Tariff to have carriers provide more consistent information. This allows the sites to select the carrier that will provide the best value to the Department in fulfilling their transportation needs. In FY 2012, TMC completed the renegotiation of tenders for both the Less-Than-Truck-Load (LTL) and Truck-Load (TL) carriers. Based on information from ATMS, DOE realized a cost saving through the use of its negotiated tenders in 2012 of 24.8%, or a \$6 million savings. The transportation costs reported in ATMS for the past 3 years are presented in Figure 1 (NOTE: this represents only those DOE sites using ATMS, currently about 20 shipping sites). Through the efforts of the TMC, and the enhancements with ATMS, OPT is moving the Department toward obtaining better carrier rates and using the enhanced ATMS features to provide more capabilities to users and ensure DOE shipments are made compliantly and efficiently.



**Figure 1. Total Transportation Spend By Year**

Another important aspect of safety is ensuring the Department uses only the best qualified carriers. The Motor Carrier Evaluation Program (MCEP) plays a vital role in maintaining DOE's excellent safety record in transporting hazardous waste and radioactive materials. The selection of responsible, effective, and efficient motor carriers is a critical part of ensuring transportation safety and security for certain types of DOE radioactive materials and hazardous wastes. MCEP provides standardized evaluation criteria, methodology, processes and procedures. It is used to evaluate commercial motor carriers either having contracts or agreements with DOE sites, or planning to transport certain DOE radioactive materials and hazardous waste.

Because MCEP only addresses certain carriers for radioactive and hazardous wastes, ATMS includes a Freight Logistics Management System (FLMS). FLMS includes the DOT Safety Measurement System data for those carriers that are used for shipments not requiring MCEP approval. This allows the sites to implement "due diligence" when selecting a carrier for shipments. FLMS incorporates a web-accessed Carrier Profile that provides the shippers with information on carriers such as insurance, certificates, registrations, and other pertinent information.

#### **PACKAGING OPERATIONS AND CERTIFICATION**

Ensuring the appropriate packages are available when needed is important to meet the mission of the DOE. OPT manages the DOE Packaging Certification Program (PCP) and the Packaging Management Council (PMC) to address packaging needs for the complex.

OPT serves as the DOE certification authority for fissile and Type B packages in accordance with DOT and NRC requirements under authority granted under 49 CFR 173.7(d). PCP provides technical support, guidance and training to enhance the effectiveness and efficiency of the

package certification process, from the conceptual stage to termination of the packaging life. This improved efficiency and coordination has resulted in millions of dollars in savings to the Department over the past decade. OPT works closely with NRC to ensure consistency, prevent unnecessary NRC involvement in DOE package certification activities, and explore evolving analytical approaches for more accurate results. This partnership with NRC continues to strengthen and results in more efficient and effective use of Departmental resources complexwide.

OPT maintains a centralized repository for all PCP information at Radioactive Material Packaging (RAMPAC) website at <http://rampac.energy.gov>. Some of the key training courses listed in RAMPAC are also available to the international community:

- Preparation and review of Safety Analysis Reports for Packaging
- ASME Code compliance for packaging design and fabrication (e.g., analytical techniques, welding and nondestructive examination)
- Packaging operations and maintenance
- Packaging quality assurance
- Leak testing

The PCP training and guidance has resulted in an improved understanding of requirements by the DOE packaging designers, users and fabricators, and has resulted in efficiencies through higher quality applications for packaging certification, thus reducing the amount of time required for review and approval of the requests. The training offered by PCP is highly regarded and routinely attended by NRC staff and the international community.

The PCP serves as a the DOE focal point for review and approval of Quality Assurance (QA) Programs for design, fabrication, testing, maintenance and use activities of certified packagings, and performs audits on the implementation of the respective QA Programs. This centralized approach assures the Department maintains its vigilance on the proper implementation of QA requirements for critical activities to avoid potential safety concerns, which could result in a potential risk to workers, members of the public and environment; not to mention significant project delays and cost overruns.

PCP developed Radiofrequency Identification (RFID) technology to reduce costs associated with certain DOE radioactive material shipments. PCP coordinates the use of this RFID technology with interested DOE sites, Federal agencies, private sector and the international community. The RFID transmits continuous, almost real-time, information from sensors attached to transportation packages for tracking and monitoring and transmitted to a remote receiver located many miles away. Other benefits of the system include enhanced safety, safeguards, security and materials accountability. In addition, worker radiation exposure can be greatly reduced by decreasing the need for manned surveillance while having full access to real-time data and continuous monitoring of environmental conditions.

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PCP worked with the World Institute for Nuclear Security, the World Nuclear Transport Institute, and Argonne National Laboratory to develop guidance for this RFID technology and other electronic systems for tracking radioactive materials in transport. President Obama included information on the RFID technology for the Second World Nuclear Security Summit held in Seoul, Republic of Korea, in March of 2012.

OPT uses the DOE PMC to provide a forum for DOE site contractors to address complexwide challenges with the selection, procurement, design, fabrication, loading, and movement of packages containing hazardous and 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.

PMC developed supplier QA evaluation checklists, including review of specific critical design elements and welding requirements. These checklists are used by DOE contractors when procuring hazardous and radioactive material containers, and reduce the costs of each contractor developing their own evaluation criteria. PMC is also working to standardize current packaging specifications including appropriate QA requirements for the commonly used DOT-compliant 55-gallon drum. The working group is focused on reducing the costs associated with procurement of these types of drums by establishing one DOE drum specification to be used by all sites. Doing so will result in significant cost avoidance for the sites by providing the ability to procure standardized drums that meet the variety of site-specific safety requirements at a lower cost.

### **COMMUNICATION**

A key to ensuring safety, compliance and efficiencies is effective communication across programmatic lines. DOE has over 37 shipping sites, with hundreds of different contractors and carriers, which makes good communication with both internal and external stakeholders a significant component to our success. OPT uses a variety of crosscutting initiatives to assist in communications at all levels.

Transportation of hazardous material is one of the most regulated areas in the industry. Staying abreast of the changing requirements is vital to ensure compliance, safety and efficiency. OPT reviews proposed changes to domestic and international regulations and standards with potential impact on DOE operations, and coordinates and provides Departmental comments to the appropriate entities. In Fiscal Year 2012, OPT identified over 40 regulatory actions for review consideration.

OPT is establishing a DOE P&T Corporate Board serve as a consensus-building and coordinating body to address the Departmental P&T needs and strategies across the DOE complex. The Board will address, coordinate and consider each program's radioactive material and waste P&T activities and issues; and will seek to leverage resources where practical. The Board will also be a forum to implement new policies or requirements, and interface with the other communities of

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practice within the Department. OPT uses peer review approach for evaluating P&T compliance at the DOE site. The OPT Transportation Compliance Assurance Program (TCAP) is the process used to assist sites and their contractors in conducting compliance reviews of P&T activities. TCAP assessments serve as an independent review of site transportation and packaging activities to ensure compliance, identify efficiencies, and to share best practices and lessons learned across the complex. The assessments have resulted in cost savings in site contractor activities and promoted sharing of information and insights between site contractors.

Over the past year, OPT worked with the ANSI N14 Standards Committee on P&T of Radioactive Materials (N14) to issue the following standards:

- N14.1, *Packaging of Uranium Hexafluoride for Transport*
- N14.7, *Guide to the Design and Use of Shipping Packages for Type A Quantities of Radioactive Materials*
- N14.36, *Measurement of Radiation Level and Surface Contamination for Packages and Conveyances*

OPT also participated at the international level to incorporate existing ANSI standards into the International Standards Organization (ISO). ISO Standards 7195, *Packaging of Uranium Hexafluoride (UF<sub>6</sub>) for transport*, and 12807, *Leakage Testing of Packages*, are based on ANSI N14.1 and N14.5, respectively. ISO has agreed to consider transforming N14.7 and N14.36 into ISO standards mentioned above.

OPT partners with the DOE Energy Facility Contractors Group through a P&T Subgroup (PTSG). The purpose of the PTSG is to resolve complexwide P&T issues, and identify and promote the best management and operating practices associated with the P&T activities at DOE facilities. PTSG works to ensure complexwide integration and knowledge transfer while supporting cost effective and efficient hazardous and radioactive materials and wastes P&T options.

DOE recognizes that our shipping activities have an impact on communities beyond our site boundaries. Communication and coordination are important to build and maintain strong partnerships with our external stakeholders. The National Transportation Stakeholders Forum (NTSF) is the mechanism through which DOE communicates at a national level with states and tribes about the Department's shipments of radioactive waste and materials, as well as occasional high-visibility shipments that are nonradioactive. 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. The NTSF is valuable in maintaining our partnership with our stakeholders and to address any issues before they become impediments to completing our shipping activities.

OPT manages the DOE Transportation Emergency Preparedness Program (TEPP) as a national program to integrate transportation radiological emergency preparedness activities, and address emergency response concerns of state, tribal and local officials affected by the Department's radiological shipments. The goal of TEPP is to establish consistent policies and implementing



procedures, build public and institutional confidence, and prepare jurisdictions to respond effectively to a radiological transportation incidents.

For over 10 years, TEPP has provided assistance to state and tribal jurisdictions along DOE transportation corridors by preparing responders through training and exercises to effectively manage radiological transportation incidents. TEPP technical assistance helps states and tribes meet an array of hazardous materials transportation and emergency response regulations, rules and requirements. A variety of tools are maintained by TEPP, such as needs assessments, model procedures, training and exercise scenarios, and are available for state and tribal authorities to use in building radiological response programs. All of these tools can be found on the TEPP website at [www.em.doe.gov/otem](http://www.em.doe.gov/otem).

### **CONTINUOUS IMPROVEMENT**

OPT intends to continue providing and enhancing the tools and assistance needed by the DOE sites to ensure safe and compliant shipments. OPT will continue to seek and identify effective ways to work with its internal and external stakeholders: across DOE organizational lines, other Federal entities and industry partners, and its external stakeholders to improve on Departmental P&T practices. OPT will continue to focus on some key areas:

- Prioritize and implement opportunities with the largest potential impact.
- Enhance the Departmental transportation infrastructure and accessibility to transportation data to identify potential cost savings, improved methods, and potential problems.
- Continue building relationships with other Federal entities, industry, and states and tribes for coordination, collaboration, and sharing of resources and services.

### **CONCLUSION**

The OPT mission is to provide useful guidance, tools and support for DOE sites to assure safe, compliant, reliable and efficient transportation of hazardous and radioactive materials essential for the success of Departmental missions. The programs and systems managed by OPT to provide these services has resulted in millions of dollars in savings to the DOE sites, and ultimately the American taxpayers. OPT is constantly working to maintain, refine and enhance the infrastructure necessary to manage and implement this suite of programs and systems necessary to provide the most effective Departmental P&T operational assistance, logistics and stakeholder communication.