

Transportation Issues:
Simply Random Occurrences or Rather Indicators of Programmatic Failures

Stephen O'Connor, Director
Office of Packaging and Transportation
Office of Environmental Management
U.S. Department of Energy
Washington, DC 20585

Dana Willaford
Transportation Safety
Oak Ridge Operations Office
U.S. Department of Energy
Oak Ridge, TN 37832

ABSTRACT

According to the U.S. Department of Transportation (DOT), approximately 1.2 million hazardous materials shipments are transported daily. The vast majority of these shipments are made safely and in regulatory compliance. As one of the largest shippers of Class 7 (radioactive) material the Department of Energy (DOE) must be vigilant in reviewing its transportation practices and occurrences to ensure safe and compliant shipments.

INTRODUCTION

In 1989, the DOE established the Office of Environmental Management (EM) 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, 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.

Based upon reports published during the period of 2000-2008 by the DOT Federal Motor Carrier Safety Administration, noncompliance rates for hazardous materials shipments have varied between 15 and 33 percent. DOT considers any rate above 10 percent by an individual shipper to be significant and warrants enforcement action.

In 2004, the EM Office of Packaging and Transportation (OPT) began collecting data on transportation incidents involving any offsite shipment of Class 7. This data, in addition to the data from the DOE Occurrence Reporting & Processing System (ORPS), is being used to assist DOE sites in monitoring the DOE shipments for safety and compliance, sharing lessons learned, and identifying potential programmatic failures or trends.

HISTORICAL PERSPECTIVE

In 2004, OPT also began collecting data on the number of offsite EM shipments along with information on the number of transportation events. In addition, in collaboration

with the State Regional Groups, OPT developed *Offsite Transportation Event Notification and Reporting* guidance. The intent of this document is to ensure appropriate response to all offsite transportation events (an occurrence that results in, or has the potential to result in, harm to the environment or the public). This document also provides the guidelines for emergency notifications and reporting of transportation operational contingencies (flat tires, adverse weather, etc.). The criteria for reporting a transportation event are found in the DOT regulations under Title 49 of the Code of Federal Regulations (49 CFR), Part 171.15(b), 49 CFR 390.5, 49 CFR 225.5, and the requirements of 10 CFR 71.95.

Using the collected data, OPT developed the EM hazardous material offsite shipment safety performance metrics. The safety performance metrics include the annual number of DOT reportable incidents, the non-reportable events requiring DOE headquarters notification, and the annual rate of DOT reportable incidents and non-reportable events per million miles traveled. For benchmarking purposes in this paper, only the annual rate of DOT reportable incidents per million miles are used.

OPT has evaluated EM hazardous material shipments since FY 2004. In FY 2008, for example, the EM program had a reportable rate of 0.21 accidents/million miles. This was based on 8,604 shipments and 5,635,950 miles. The data shows that an EM average 49 CFR 390.15 reportable rate of 0.19 accidents/million miles from FY 2004-2008 compared to approximately 0.5 accidents/million miles from Responsible Care Partners. Responsible Care Partners are commercial entities shipping hazardous materials, including radioactive, who share reportable accident data with industry organizations collecting the data.

BENCHMARKING WITH INDUSTRY

Fiscal Year	2004	2005	2006	2007	2008
EM HAZMAT SHIPMENTS					
No. of Shipments	22,931	24,393	17,393	7,802	8,604
Mileage Traveled – Highway & Rail	20,092,398	20,323,812	18,269,727	6,274,995	5,635,950
EM 49 CFR 171.15(b) Reportable Rate (No. per Million Miles)	0.15	0.15	0.16	0.16	0.35
Mileage Traveled – Highway	13,395,955	9,199,957	9,935,038	4,908,595	4,766,128
EM 49 CFR 390.15 Reportable Rate (No. per Million Miles)	0.30	0.11	0.32	0.00	0.21
RESPONSIBLE CARE PARTNERS HAZMAT SHIPMENTS					
Mileage Traveled- Highway	~3 Billion	~3 Billion	~3 Billion	~3 Billion	~3 Billion
Responsible Care Partners 49 CFR 390.15 Reportable Rate Average (2005/2006 Data) (No. per Million Miles)	~0.50	0.50	0.50	~0.50	~0.50

Table 1

COMPLIANCE INDICATORS

Generally, oversight activities at individual DOE sites give the best picture of overall compliance rates for DOE shipments. However, ORPS data can also be used as an

indicator of problem areas within transportation programs where improvements can be made. When comparing DOE occurrences to outside benchmarks, it is important to remember the ORPS reporting criteria does not entirely match with DOT incident reporting criteria found in 49 CFR 171.15 and 171.16. The majority of DOE reporting criteria is much more conservative and includes reporting “incidents” which are significantly below the DOT reporting criteria. The review of the ORPS data identified several areas where improvements could be made, but did not indicate a systemic failure of a transportation program at any particular DOE site or for DOE as a whole.

In addition to noting the overall number of transportation occurrences and associated regulatory noncompliances that may occur in a given year, consideration must be given to the nature of the noncompliance itself. An evaluation of the transportation occurrences reported in ORPS identified the presence of one or more of the significant causal factors (precursors) that have been identified by DOT and the National Transportation Safety Board as contributing to incidents, including hazardous material releases and/or fatalities.

Figure 1 shows that DOE continues to have a number of occurrences where the material to be transported has not been properly identified. The precursor “improper characterization” in this chart reflects materials mis-identified as to physical form, chemical composition, and/or characterization required by a regulatory agency (e.g., DOT and the Environmental Protection Agency). This category also includes shipments where bar codes or other package identifiers were incorrect such that package contents did not reflect the accompanying paperwork or authorization. The next highest categories of precursors are for inadequate/improper hazard communication and packaging. This would necessarily follow from improperly characterizing a material.

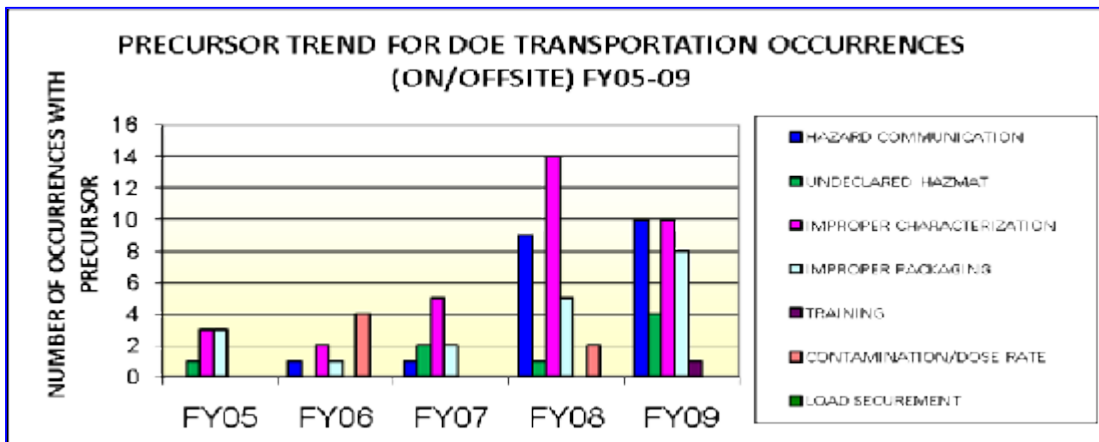


Figure 1

For transportation occurrences reported in Fiscal Year (FY) 2009, approximately 86 percent were associated with offsite transportation (see Figure 2). It should be noted that undeclared hazmat shipments can generally also be counted as improper characterization, hazard communication and packaging requirements, so the numbers of these three precursors would actually be higher than as shown in Figure 2 if the number of undeclared hazmat shipments was included.

Direct comparisons with Nuclear Regulatory Commission (NRC) licensees or other hazmat shippers are difficult to make, however, there is some commonality as to the predominant types of errors that are made by shippers. Data from DOT and NRC all

indicate compliance problems with packaging and hazard communication. Inadequate material characterization is also an underlying theme for many shipments that subsequently are improperly packaged and/or have improper hazard communication.

OVERSIGHT ACTIVITIES

In June 2009, the DOT Pipeline Hazardous Materials Safety Administration (PHMSA) notified DOE it had received six complaints within the past 20 months concerning shipments from DOE sites. Representatives from PHMSA indicated they were concerned with the apparent inadequate consideration of existing characterization of waste/material, packaging, lack of understanding of the regulations by DOE contractors, and inadequate DOE oversight of its packaging and transportation activities. PHMSA also indicated their concern with safety and compliance because the additional funding DOE received under the American Recovery and Reinvestment Act will increase the number of hazardous material shipment.

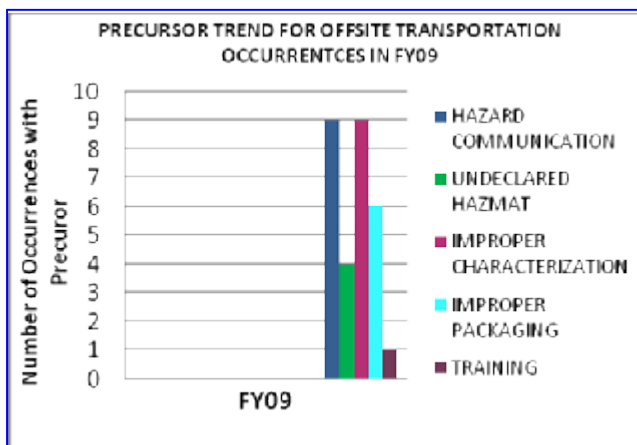


Figure 2

In July and October 2009, DOE met with PHMSA to discuss the concerns and provide feedback on DOE oversight programs and actions being taken to address DOT concerns. In the meetings, DOE made it clear that its expectations are to have zero incidents for its shipments and 100 percent compliance. DOE also presented information to demonstrate that management systems are in place to ensure packaging and transportation activities are performed in a safe and secure manner, and to ensure compliance with applicable regulatory requirements. These management systems include operational safety assessments, onsite reviews/assessments, self-assessments, performance evaluations, and other activities associated with evaluation of the contractor/subcontractor organizations and DOE organizations managing or operating the sites.

In addition, DOE provided an overview of specific DOE requirements (Orders) for oversight/assessments of packaging and transportation and occurrence reporting, and an overview of one of the assessment programs used evaluate contractor performance. In particular, the Transportation Safety and Operations Compliance Assurance Program (TCAP) is one of the programs used to assess DOE site activities, resolve packaging and transportation issues in a timely manner, and share best practices and lessons learned across the DOE complex.

The TCAP contains nine performance objectives addressing the development and implementation of policies, procedures and requirements in a systematic and consistent manner to ensure safety, security and compliance for all DOE shipments. The performance areas cover:

- General Management of Transportation Programs:
- Hazardous and Radioactive Materials Packaging:
- Hazardous and Radioactive Materials Shippers:
- Traffic Management Operations:

- Motor Carriers:
- Railroad Operations:
- Transportation Emergency Response:
- Hazardous Materials Employee Training: and
- Transportation Security Plans

NEXT STEPS

Some actions DOE has implemented in response to the improper characterization issues raised by DOT and indicated in ORPS reports are to increase focus on the transportation training of contractors responsible for making waste determinations and packaging selection decisions. OPT has established a working group of waste contractors and transportation operational personnel to provide a forum for knowledgeable field/site personnel involved in waste generation, characterization, packaging, and transportation to review and comment on existing processes, procedures, and requirements used in preparing radioactive materials for shipment. The intent is to identify best practices and opportunities for improvement, and obstacles facing field organizations when preparing to make DOT compliant shipments.

SUMMARY

Overall, the DOE transportation program has an exceptional safety and compliance record. Since 2004, DOE has safely completed over 100,000 hazardous materials shipments using multiple modes of transport, both domestically and internationally.

DOE is committed to making its transportation program “best-in-class” for the industry by continuing to seek opportunities for improvements on its safety and compliance record, and is focused on reducing the upward trend noted in its transportation and occurrences.