

TRANSPORTATION OF RADIOACTIVE, HAZARDOUS, AND MIXED WASTES: MATERIAL IDENTIFICATION IS THE KEY

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ABSTRACT

This paper will discuss how material identification and classification will result in an accurate determination of regulatory requirements, and will assure safe and compliant shipment of radioactive, hazardous, and mixed wastes. The primary focus of the paper is a discussion of lessons learned by the Department of Energy in making waste shipments, and how this can be applied to future mixed waste shipments.

There will be a brief discussion of the Department's regulatory compliance program, including a presentation of compliance audit results, and how regulatory issues are addressed through effective information exchange, technical assistance, and compliance training.

A detailed discussion will follow, which describes cases involving material identification and classification problems. Examples will include both RCRA waste and uranium mill tailings shipments.

The paper will conclude with a discussion concerning the application of these lessons to future mixed waste shipments proposed by the Department.

INTRODUCTION

The Department of Energy (DOE), through its regulatory assurance efforts, has developed a methodology to assure regulatory compliance for its transportation activities. Central to this methodology is the concept of correct identification and classification of materials. DOE is involved in many environmental restoration and waste management activities throughout the United States. These activities are the result of operations in support of Defense Programs' nuclear weapons production which have left a legacy of radioactive and hazardous waste problems that must be corrected. To correct some of them requires the offsite transportation of the material.

Some of these sites are contaminated with some or all of the following waste: transuranic and low level radioactive waste, hazardous waste, and mixed waste (radioactive and hazardous combined). The transportation of these materials must be in accordance with stringent regulations.

Transportation of hazardous materials, substances and waste requires a step-by-step approach to assure regulatory compliance. DOE's approach is methodical and consists of the following critical elemental activities:

- Identification of the material, substance and/or waste,
- Classification of the material,
- Containment of the material,
- Compliance with the various regulatory controls,
- Communication of the nature of the hazard.

This paper will discuss how the DOE applies this methodology to assure regulatory compliance.

MATERIAL IDENTIFICATION - WHY IS IT IMPORTANT?

Initially, it must be asked, "What is the material to be transported?" Unfortunately, in today's regulatory environment, the answer to this question is sometimes not very simple. Shippers can no longer stop at a single regulatory cite, or even a single regulatory agency to obtain the answer. But, without this information, issues addressing the containment, mode of

transport, and the applicable transportation regulations cannot be answered.

The DOE's experience has been that the materials transported from these sites can be: 1) hazardous materials subject to the USDOT, 2) hazardous substances determined from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and/or, 3) hazardous waste as defined by EPA in the Resource Conservation and Recovery Act (RCRA).

Each piece of legislation, and each regulatory agency imposes requirements upon the transportation of these materials. Only through early identification can the applicable regulatory requirements be defined.

When should the material identification process begin? The DOE suggests that the transportation identification process begin early in the project planning process, and be well defined no later than the site characterization stage.

Planning is required to select the safe and efficient mode of transport. An analysis must be made of the containment to be used. In selecting the appropriate methods of transport, DOE has, on occasion, sought transportation regulatory exemptions. The exemption process generally takes several months. Sufficient lead time is needed to eliminate costly transportation activity delays.

In some of its activities, DOE has constructed unique transportation infrastructures to support the transportation function. An example is construction of a haul road for trucks to operate upon. Use of these designed infrastructures has been dictated largely by a need to satisfy institutional issues and eliminate damage and congestion to public transportation system. Material identification is essential to determine the cost benefit and success of the use of such an expensive activity.

Project management of transportation activities requires that DOE interact with the public, local and state/tribal governments. This is an important activity conducted by DOE in its remedial and restoration activities. Transportation concerns begin at the front end of the project and require that the material be properly identified to ensure accurate public information and appropriate institutional interaction as they relate to transportation.

CLASSIFICATION OF THE MATERIAL

The two most important steps in the method used by DOE are material identification and classification. The transportation regulatory requirements are unique in that after material identification and determination of the applicable regulatory requirements, then the material must be classified according to the DOT requirements to ensure the appropriate packaging for containment. This becomes extremely important when multiple types of materials are involved.

Examples of this situation can be found in the DOE's Uranium Mill Tailings Remedial Action Project (UMTRA) and the Formerly Utilized Sites Remedial Action Program (FUSRAP) transportation activities. For these projects, the material consists of a USDOT radioactive material, an EPA hazardous substance and in some cases an EPA RCRA mixed waste.

Proper classification of these materials under the transportation regulations leads to the correct selection of the packaging to be used and the communication devices, such as labels and placards, that are required during transport.

Improper classification can result in the selection of an incorrect or inadequate package, and improper hazard communication to emergency response personnel and the public. It can eliminate use of possible cost efficient modes of transport, and can result in substantial project delays and cost overruns.

The UMTRA Project recently encountered a situation where the material was incorrectly identified. This led to a shut down of operations while a regulatory exemption was sought. Additionally, there was a financial impact due to increased worker training requirements, and impacts on carrier selection and transportation rate negotiation.

Correct material identification and classification saves time and money as well as heartache and upheaval.

CONTAINMENT OF THE MATERIAL

This activity is based upon the proper identification and classification of the material in the transportation regulatory scheme. Within the DOE, this activity is considered a top priority. It is also a very costly activity.

The purpose of material containment is to provide a package that will meet the transportation regulatory requirements, be cost efficient and comply with storage and disposal site acceptance requirements.

Decisions about material containment for transportation should be addressed immediately after site characterization is completed. This will allow for adequate planning for any pre-shipment material handling, storage, and packaging. Ignoring this step can result in costly re-packaging activities.

Decisions about the mode of transport and the ability to procure appropriate packaging can be made after analyzing the options permitted by the applicable transportation regulations.

This material containment is one of the costliest activities performed by the DOE. The volumes of the materials to be transported can be substantial. The UMTRA project is in the process of cleaning up approximately 24 million tons of uranium mill tailings at 24 inactive sites in 10 states and more than 5 thousand "vicinity properties" (residence, businesses and open lands where the tailings were used as fill dirt or other uses that contaminated the area).

Packaging 24 million tons is an expensive proposition. Alternative methods of containment can be used, such as bulk transportation by motor and/or rail. This choice carries with it specific regulatory requirements. Exceptions to these requirements, in the form of regulatory exemptions, are available to the DOE and are being integrated into their compliance strategy for these projects.

COMPLIANCE WITH VARIOUS REGULATORY CONTROLS

Regulatory controls consist of those activities with which the DOE must comply before, during, and after the actual transportation function.

Some of the controls are:

- Training of employees,
- Routing,
- Radiation and contamination controls,
- Hazard controls.

DOE activities relating to the transport of radioactive materials present unique challenges to compliance with the various regulatory controls.

DOE has a comprehensive training program that is available for employees and contractors performing any of the transportation functions. Specific radioactive material training, RCRA waste, and EPA substance requirements are addressed in the training courses.

The ultimate course in the transportation of radioactive materials is a one week advanced workshop that requires the student to pass a comprehensive written test.

DOE must comply with routing requirements. DOE is cognizant of the public perception and institutional issues when transporting hazardous materials, substances and wastes. Transportation plans prepared for shipping campaigns consider the regulatory requirements, time of day, traffic congestion and other risk considerations.

For example, in preparing for the movement of approximately 825 truck loads of uranium metal and hazardous substances from the Elza FUSRAP site in Oak Ridge, Tennessee, the transportation plan included the interaction of the fire and response agencies of the city of Oak Ridge. The participation of these agencies resulted in a transportation plan that surpassed the regulatory routing controls.

DOE complies with regulatory controls and its own policies set forth in DOE Orders concerning the contamination of packages, vehicles and property released to the public. Hazard controls relating to vehicle and packaging access are practiced by DOE to minimize public exposure. Lack of control and compliance can lead to expensive and embarrassing incidents.

COMMUNICATE THE NATURE OF THE HAZARD

Regulatory agencies require the hazard to be communicated to the transport worker, public and emergency responder. This is the final activity performed by DOE before shipment, and is addressed in their transportation plans.

The methods of communication involve proper shipping documents, marking the package and transport vehicle, labeling the package and placarding the transport vehicle.

The development of the appropriate information to communicate is based upon having identified and classified the material correctly. Additional information beyond that

required by the regulations is optional for DOE or may sometimes be required as the result of an exemption obtained from the regulatory agency.

Improper communication of the hazard, based upon an improper material classification can have a profound negative effect in two major areas: emergency response, and material handling.

DOT has developed communication devices such as labels and placards to give emergency response personnel information about the shipment. This allows them to plan their response actions appropriate to the hazard(s) of the cargo. If the hazards are not correctly identified, response actions could be taken that would result in excessive personnel exposure, or even death.

The hazards associated with a material also dictate how a material is to be stored, treated, and/or disposed of. Material that is misrepresented due to improper classification can cause incidents due to improper separation and segregation during storage. It could also cause environmental and regulatory incidents due to improper treatment or disposal.

The DOE has recently had to address concerns with some of the hazardous waste shipments originating from its facilities. These shipments, prepared by an outside vendor, did not correctly utilize the DOT hazard classification scheme. Areas of non-compliance associated with these shipments included:

- improper shipping documentation,
- improper packaging,
- improper labeling,
- shipment of forbidden materials,
- improper/inadequate emergency response information.

In addition to the material handling and emergency response concerns with these areas of noncompliance, there is also the possibility of permit violations for the disposal facility. Everyone is relying upon the shipper's identification and classification of the material.

SUMMARY

Every individual coming into contact with the material from beginning to end of the transportation cycle must take actions based upon the original identification and classification of the material. A single error in the classification of a material can lead to, at best, multiple regulatory violations with the threat of civil and criminal penalties. At worst, it could result in environmental damage and loss of life.

The DOE, through its regulatory compliance program, follows the methodology described in this paper to assure that materials are correctly identified, packaged, and transported in the most timely, economical and safest manner possible.