

Quality Performance-Based Training Enhances Safe and Effective Transport Operations

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INTRODUCTION

A great deal of time, effort, and money is expended in the United States each year to achieve safety in transporting radioactive materials. Many of these resources go into research and development and technology programs that ultimately lead to sophisticated transport packages that will not release their contents under severe accident conditions. Statistics support the fact that the U.S. packaging systems are safe. There are only a few instances of minor radioactive material releases on record, and there has never been a fatality or serious injury attributed to the radioactive nature of the material being transported. The resources allocated to packaging have been well spent to achieve this safety record. With these quality packagings, the nuclear industry has essentially eliminated the potential for major physical consequence to the public or to the environment resulting from the radioactive nature of the material being transported.

The institutional network in the United States made up of the general public, special interest groups, Federal, state, local, and tribal government entities, however, remains unimpressed with the U.S. nuclear industry's performance. Members of the network know, from seeing or hearing about them, that transport accidents occur daily. They know that if hazardous shipments, especially radioactive shipments, are allowed to pass through their community, an accident will eventually occur, and they fear the potential consequences. This perspective results in a difficult political environment for the nuclear industry and others who must transport hazardous materials, specifically radioactive materials. As a result, no matter how safely radioactive materials are packaged, safety during transport continues to be questioned.

APPLICABLE REGULATIONS

There are Federal laws, state laws, and formal regulations that require that transportation personnel be properly trained and qualified. Transportation personnel may include persons associated with the classification of material; its packaging and preparation for transport; package storage and staging; vehicle loading, unloading and securement; as well as vehicle operators who transport the load to its final destination.

The following paragraphs identify some of the current and proposed regulations that have a significant impact on training requirements for hazardous material handling and transportation personnel.

Hazardous Material Transportation Uniform Safety Act of 1990

The U.S. Congress in 1990 reauthorized the *Hazardous Material Transportation Act of 1974* (HMTA). In this reauthorization, Congress addressed the issue of training for hazardous material transportation personnel and their employers.

Under the *Hazardous Material Transportation Uniform Safety Act of 1990* (HMTUSA), employers must certify that each employee has received appropriate training and has "been tested" in the appropriate transportation safety areas. The employer must maintain documented proof of the level of training and employee proficiency.

The U.S. Department of Transportation Docket HM-126F, "Training for Safe Transportation of Hazardous Materials"

The U.S. Department of Transportation's (DOT) Docket HM-126F, dated May 15, 1992, is the final rulemaking that requires persons involved with hazardous material transportation activities be trained and requires employers to certify these persons have been trained and tested. The rulemaking addresses the following four distinct training categories: (1) General Awareness and Familiarization, (2) Function Specific, (3) Safety Training and Personnel Protection, and (4) Driver Specific Training. Implementation of this rulemaking will be phased in with full compliance by April 1, 1993.

U.S. Department of Energy Docket HM-181, "Performance-Oriented Packaging Standards"

Docket HM-181, effective October 1, 1991, is the final rulemaking that will allow the United States a 5-year phase-in period to adopt performance-orientated packaging standards. The DOT "specification packaging" will be phased out, and new package configurations will have to be tested and documented as meeting international performance standards established through the United Nations, and a vibration standard unique to the United States. In addition, the U.S. system for classifying and describing hazardous materials will be changed to coincide with the international hazard classification system of nine hazard classes with associated divisions. Some regulations unique to the U.S. domestic system will be retained, however. They address diverse topics such as bulk shipments, classification of anhydrous ammonia, consumer commodity and combustible liquid exceptions, hazardous substances, and poison inhalation hazard regulations. New communication and emergency response information standards enacted in 1991 and unique to the domestic system continue.

This major rulemaking will require U.S. employers to completely revise existing training programs and will require, in all practical purposes, teaching a dual system for 3 to 5 years.

U.S. Department of Transportation Docket HM-169A, "Compatibility to IAEA Standards," Notice of Proposed Rulemaking

Docket HM-169A, dated November 14, 1989, could be finalized in late calendar year 1992. If enacted as proposed, it would define Low Specific Activity (LSA) Radioactive Materials based on the International Atomic Energy Agency (IAEA) Safety Series No. 6 regulations. The IAEA regulations place LSA materials into five separate categories [LSA I, LSA II, LSA III, Surface Contaminated Objects (SCO) I, SCO II]. These categories of radioactive materials would require packaging into three types of Industrial Packages (IP-1, IP-2, IP-3). Each of the three IPs would be performance-oriented to ensure materials are contained during normal handling and transport. The new defining criteria for LSA materials and for using industrial packaging will impact training programs for all persons packaging and transporting these radioactive materials.

The U.S. Department of Energy (DOE) uses a formal DOE Order system to communicate departmental policy and requirements to field offices and contractors. Specific Orders address training issues that impact transportation personnel.

U.S. Department of Energy Order 5480.3, "Transportation and Packaging of Hazardous Materials, Hazardous Substances and Hazardous Wastes"

This DOE Order requires specific training for persons involved with packaging and transporting hazardous materials and hazardous wastes, and emphasizes that persons must be properly trained and qualified.

The DOT, the U.S. Environmental Protection Agency (EPA), and the Occupational Safety and Health Administration (OSHA) also define training requirements in *Code of Federal Regulations (CFR)*, Titles 49, 40, and 29, respectively, for workers in specific industrial applications. These Federal requirements have been adopted by the DOE and applied to contractor operations. The requirements apply equally to fixed facilities and transportation operations.

KEY PROGRAM ELEMENTS FOR DEVELOPING EFFECTIVE TRAINING

The following paragraphs identify key program elements necessary to ensure training courses are designed and conducted on performance-based principles and that those who receive this training can demonstrate competency on specific tasks.

The **Analysis Element** includes a needs assessment to determine who needs training and the type of training necessary to ensure knowledge and skills are communicated effectively. The following are steps in performing a needs analysis/assessment.

- Identify target audience
- Review regulatory standards and rulemakings
- Conduct needs survey
- Evaluate survey data
- Develop recommendations
- Draft work plan and schedule.

The **Analysis Element** also identifies training requirements for a worker based on job and task analysis. The following are steps in conducting a job task analysis.

- Identify minimum qualifications
- Identify minimum training standards
- Identify critical steps and procedures
- Determine knowledge and skill requirements for each task.

The **Design Element** takes the information assimilated during analysis to prepare a development plan and formulate learning objectives. The objectives focus on the overall training strategies and development of training materials. The following are steps in the design process.

- Develop training/evaluation standards
- Develop detailed work plan and schedule
- Determine entry-level skills and knowledge
- Develop terminal and enabling objectives

- Evaluate existing training and training materials for applicability
- Evaluate methods and strategies for delivery
- Prepare training development and administration guide
- Develop course outline and synopsis
- Develop learning measurement exercises.

The **Development Element** formalizes training strategies and instructional methodology, and includes the development of lesson plans, instructional aids, and student handout materials that will be valuable for use after course completion. Steps in developing lesson plans, training aids, student materials, and course assembly are defined below.

Development of Lesson Plans/Guides

- Develop flowchart of logic progression
- Develop outline for each module
- Separate research materials into topical areas
- Develop lessons plans for each module.

Development of Training Aids

- Draft development of visual aids to support each lesson and module
- Produce visual aids at graphics.

Development of Student Materials

- Select support materials such as text books and study guides
- Develop handouts including study manuals, reference guides, case studies, class room exercises, and props.

Course Assembly

- Assemble course materials into single program
- Obtain support materials for implementation.

The **Implementation Element** includes peer review and pilot testing to ensure technical accuracy of the training materials and effectiveness of the program before delivery to actual target audience. The following steps are included in the implementation element.

In-house testing

- Conduct in-house testing to sample audience
- Evaluate and update course material as applicable.

Pilot and Prototype Delivery

- Deliver pilot program at headquarters (HQ)
- Process course materials through Document Clearance
- Deliver prototype at selected site.

The **Evaluation Element** allows students an opportunity to evaluate the effectiveness of the training program against course objectives and validates the integration of the other elements. After the training program has been evaluated, the following steps should be taken.

- Review student comments
- Revise training materials as necessary
- Make course available to requesting sites.

The **Documentation Element** is the basis for establishing a formal certification program to certify the student's competency in performing the task or job function required, and is a basis for meeting accreditation objectives and criteria. The following are steps in the documentation element.

Program Documentation

- Prepare document file for course development materials
- Include in support work, as a minimum
 - Documented needs assessment
 - Job and task analysis
 - Minimum qualification and training standards
 - Course objectives and lesson plans
 - Course modules and training aids
 - Master files of graphics
 - Document release forms.

Certification

- Testing
- Documentation and record keeping.

Accreditation

- Documentation of program
- Evaluation by accreditation board.

BENEFITS OF PERFORMANCE-BASED TRAINING

Performance-based training can accomplish the following.

- Reduce student training time by focusing training efforts on the tasks and objectives that are important for each job or task performance, ensuring standardization of instruction associated with each task, providing documented evidence of student performance through effective testing, and building in appropriate levels of quality control.
- Identify the behaviors and skills necessary to perform the job safely and effectively by using job task analysis. Training can then be developed that addresses only the behaviors and skills desired. This eliminates unnecessary training for skills not needed for the job, reduces development time and cost, and reduces student and instructor classroom commitments.

- Ensure standardization of instruction methods and tools ensuring that all students receive effective training that meets learning objectives identified in the job task analysis. This minimizes impact of instructor variables.
- Provide necessary documentation of the training program and its effectiveness. Student performance is measured through testing and using questions and exercises that require demonstrating specific skills that correspond to learning objectives. This documentation is the necessary basis for student certification programs and training program accreditation.

Training programs effectively designed and developed using these techniques establish a strong instructional foundation that can meet technical training and retraining requirements in the ever changing regulatory environment associated with transportation safety.

U.S. DEPARTMENT OF ENERGY/TRANSPORTATION MANAGEMENT DIVISION PERFORMANCE-BASED TRAINING PROGRAMS

The following are examples of performance-based training programs from the DOE, Transportation Management Division:

TITLE: HAZARDOUS WASTE TRANSPORTATION AND PACKAGING WORKSHOP

LENGTH OF CLASS: Four and one half (4 1/2) days.

TARGET AUDIENCE: Front line workers and their supervisors, waste engineers, and middle and upper management.

OBJECTIVES: To provide students comprehensive understanding of Federal hazardous waste packaging and transportation regulations.

COURSE CONTENT: Covers the DOT and EPA regulations as they pertain to the transportation of hazardous waste. Includes the relationship between the Federal regulations and applicable DOE Orders. The students gain a perspective of the EPA requirements and exceptions for the preparation packaging, and transportation as found in Title 40 CFR, Parts 260-265, 302, and 761, and Title 49 CFR, Parts 171-179.

TITLE: HAZARDOUS MATERIALS TRAINING FOR ONSITE TRANSPORTATION PERSONNEL

LENGTH OF CLASS: One (1) day.

TARGET AUDIENCE: Transportation personnel, including truck drivers, train crew members, warehouse workers, and supervisory personnel responsible for logistical activities as well as planners and schedulers.

OBJECTIVES: To provide students an overview of the DOT regulations as they pertain to hazardous materials, hazardous substances, and hazardous wastes.

COURSE CONTENT: Includes an overview of the relationship between the Federal regulations and applicable DOE Orders, covering transport personnel responsibilities and the proper application of these regulations commensurate with their job assignments. The course covers Title 49 CFR, Parts 171-179, Federal Motor Carrier Safety Regulations in 49 CFR, Part 383, 390-397, and DOE Order 5480.3.

TITLE: SHIPMENT OF RADIOACTIVE AND OTHER HAZARDOUS MATERIALS TRAINING COURSE

LENGTH OF CLASS: Four and one-half (4 1/2) days.

TARGET AUDIENCE: Front line workers and their supervisors, engineers, and management.

OBJECTIVES: To provide students comprehensive understanding of DOT regulations as they pertain to the movement of hazardous materials, with emphasis on radioactive materials.

COURSE CONTENT: Addresses the shippers' responsibilities and liabilities and instructs the students in properly applying the regulations commensurate with their job assignments. The course covers Title 49 CFR, Parts 171-173, with emphasis on radioactive materials packaging and transportation requirements.

TITLE: HAZARDOUS MATERIAL SHIPPING COURSE (COMPUTER ASSISTED TRAINING)

LENGTH OF CLASS: Self-paced, interactive computer program with flexible workbook exercises.

TARGET AUDIENCE: Employees who have had previous experience in hazardous materials shipments. This is an excellent requalification tool.

OBJECTIVES: To address the fundamental knowledge required to use the DOT hazardous materials shipping regulations contained in Title 49 CFR, Parts 171-173 and Part 178.

COURSE CONTENT: Includes site-specific data such as facility name and address, local experts, local DOE Orders, and company manuals. In this computer-assisted training program, workbook problems can be selected from the databank, or may be altered to incorporate real-life shipments.

TITLE: VEHICLE INSPECTION AND LOAD TIE-DOWN AND SECUREMENT TRAINING

LENGTH OF CLASS: One (1) day.

TARGET AUDIENCE: Transportation personnel, (i.e., managers, supervisors, specialists) who are authorized to release loads being transported offsite from DOE facilities.

OBJECTIVES: To provide instruction to the student on the DOT regulations as they pertain to the vehicle inspection and tie-down procedures.

COURSE CONTENT: Deals with the relationship involving Federal regulations and applicable DOE Orders and covers personnel responsibilities. It also instructs students in properly applying the vehicle inspection and tie-down regulations commensurate with their job assignments as required in Title 49 CFR, Parts 390-571, Title 10 CFR, Part 71.45, and DOE Order 1540.1.

SUMMARY

If the hazardous materials transportation industry is to reduce human error, reduce accidents, and improve its public image, there must be assurance that transportation personnel are properly trained and qualified to perform their jobs in a safe and efficient manner. This training must make them intimately aware of the hazards and risks associated with transport activities, ensure understanding of responsibilities and liabilities unique to their job, and ensure that they can competently perform functional duties vital to safety. To ensure that trained and qualified personnel are on the job, it is essential that the training be performance-based and require trainees to demonstrate functional proficiency.

Performance-based training has proven to be a highly effective means of ensuring personnel are qualified to conduct their assignments safely and efficiently. This training is designed around the basic premise that training must be provided that supplies the information necessary for each worker to perform their assigned duties at a predetermined and acceptable level of expertise and skill.

REFERENCES

DOE Order 5480.3: Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes, U.S. Department of Energy, Washington, D.C. (1985)

DOT Docket HM-126F, Training for Safe Transportation of Hazardous Materials, U.S. Department of Transportation, Washington, D.C., 95 FR 20944 (1992).

DOT Docket HM-169A, Transportation Regulations; Compatibility With Regulations of the International Atomic Energy Agency, U.S. Department of Energy, Washington, D.C., 54 FR 47454 (1989).

DOT Docket HM-181, Performance-Oriented Packaging Standards, U.S. Department of Transportation, Washington, D.C., 55 FR 52402 (1990).

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