

What Does the New Millennium Offer for Hazardous Materials Transportation?

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The production, transportation, and use of hazardous materials (hazmat) are essential to the economy of the United States and to its technology-dependent society. Safe transport practices for hazardous materials are influenced by the increased harmonization and rationalization of regulations, better data, new technology, and cooperative efforts between shippers and carriers. These influences are expected to increase significantly and to realize benefits over the next 5 to 10 years. Unlike past changes in this area, which were often mode-specific (e.g., the use of head shields for rail transport or the improved monitoring of drivers' hours of service in highway transport), many of these changes will benefit several modes.

Some of the key issues and the progress expected in hazmat transportation are summarized here.

REGULATORY ISSUES

Harmonization and Rationalization of Hazmat Transportation Regulations

While regulatory requirements for the transportation of hazardous materials have been harmonized internationally through the United Nations Recommendations on the Transport of Dangerous Goods, harmonized requirements have not been established for environmental, worker, or consumer safety regulations. An ever-growing concern in the industry is the potential loss of coordination among hazmat regulations across these areas. The U.S. Department of Transportation (DOT), the Occupational Safety and Health Administration, the Consumer Product Safety Commission, the Environmental Protection Agency, and other agencies are attempting to harmonize their approaches to hazmat regulation. A harmonized system for all regulatory purposes would lead to greater consistency among the agencies and would promote safer transportation, handling, and use of chemicals. A more uniform, harmonized system also should reduce costs for companies involved in international trade.

An important, ongoing trend is the international harmonization of hazard classification and labeling systems. The United States and other countries are attempting to develop a globally harmonized system (GHS) for classifying and labeling chemicals. One purpose of GHS is to promote common, consistent criteria for classifying chemicals according to their health, physical, and environmental hazards. Another purpose is to develop compatible hazard labels, material safety data sheets for workers, and other information based on the resulting classifications. Harmonized criteria, symbols, and warnings will promote improved understanding of hazards and help to protect workers and other potentially exposed populations.

The Organization for Economic Cooperation and Development, which includes most industrialized nations, is coordinating the development of criteria for health and environmental hazard classification. The United Nations Committee of Experts on the Transport of Dangerous Goods is developing criteria for substances with physical hazards, including explosives, flammable substances and reactive substances. The International Labor Organization (ILO) serves as the Secretariat for the harmonization effort and will focus on hazard communication. Each of these international organizations involves affected industries and other nongovernmental organizations in its deliberations. This work is expected to be completed early in the new millennium.

Shipper and Carrier Registration; Fees for Emergency Preparedness and Response

Establishing and maintaining the capability to prepare for and respond to hazardous materials transportation emergencies will continue to be a major focus in the next century. Much of the funding for emergency preparedness and response at all levels of government will come through registration fees from shippers and carriers. One challenge will be to maintain equity in fee collection among entities of various sizes that deal with materials of differing hazards, as well as in the distribution of these funds to support improved safety. Another challenge will be to determine the level of safety desired and to assess whether the funding is sufficient to attain that level of safety. DOT is continually evaluating and trying to improve the adequacy of its registration program; however, state and local governments and the emergency response community believe that this funding must be increased and streamlined.

Risk-Based Regulatory Programs for Hazardous Materials

Congress has given the Research and Special Programs Administration (RSPA) within DOT the mission to administer a comprehensive, nationwide safety program to protect the nation from the risks to life, health, property, and the environment that are inherent in the transportation of hazardous materials. In conjunction with the public, industry, labor, states, and other national governments, RSPA has implemented uniform, hazard-based, national and international regulations that facilitate trade and maximize the safety and economic benefits of uniformity. As successful as this regulatory program has been, RSPA and many of its stakeholders recognize that a more risk-based regulatory program can provide additional benefits to public safety and economic vitality. To facilitate the implementation of a risk-based regulatory program, RSPA has begun to incorporate risk-based decision making throughout the administration of the regulatory program. A risk management process based on risk analysis and cost-benefit analysis is the basis for program policy and regulatory development. Key to the successful implementation of a risk-based regulatory program is the substantial involvement of hazardous material transportation stakeholders and the development of accurate information to support analyses of risks and cost-benefits.

DATA NEEDS AND AVAILABILITY

A major issue that will be addressed in hazardous materials transportation over the next 10 years is the need for more comprehensive and accurate data to support the development of regulations and to conduct risk assessments. Better data are critical to the implementation of effective and equitable regulations.

Risk Assessments

Risk assessments that supply information to decision makers require good data to provide a foundation for their validity and to establish confidence in their output. Numerator data for risk assessments are based on counts of incidents and accidents that, in the past, have lacked comprehensiveness and completeness in reporting. The expansion of reporting requirements and the possible creation of links between several databases are among the improvements in numerator data that are on the horizon. Denominator data—indicating the level of exposure for hazardous materials transported—have been lacking, particularly for the air and highway modes, but advances are being made in the identification and development of new sources of information.

Although there is a growing recognition of the need and value of data in developing regulations and conducting risk assessments, much more can be done. Advances in information technology in conjunction with refinements to existing databases offer hope that the new millennium will see major progress toward satisfying the data needs of the hazardous materials community.

Use of Information and Communications Technology

Recent and forthcoming advances in information technology—such as global positioning systems (GPS), improved census data, and signaling system improvements—are expected to influence the safe transportation of hazardous materials as well as to provide better data for risk analyses and other risk management activities. These advances will produce the following benefits:

- Increased tracking of shipment locations and conditions to assist both shippers and carriers in normal and emergency operations;
- Improved accident avoidance technologies (e.g., positive train control, intelligent vehicles and highways, better marine navigation systems);
- Increased tracking of shipments to provide better statistical data on numbers of shipments, distances traveled, and involvement in accidents to improve the accuracy of risk assessments and the ability to make better risk control decisions;
- More immediate and informed notification of emergency responses in the event of an accident; and
- More tailored accident reports that meet risk analysis as well as other regulatory needs.

RADIOACTIVE WASTE

DOD and Department of Energy Facility Cleanup and Closure

One of the future challenges related to the field of hazardous materials transportation will be the cleanup and closure of many Department of Defense (DOD) and Department of Energy (DOE) facilities. Many of these facilities will generate significant quantities of hazardous and radioactive wastes to be transported to disposal or storage facilities. For example, DOE has estimated that the number of shipments of radioactive materials from its facilities will increase as much as five- to tenfold within the next 3 to 4 years. DOE's goal is to close some of its largest facilities (such as the Rocky Flats Environmental Technology Site) as early as 2006. These shipments will include a variety of waste streams that will be transported to many different disposal or storage facilities at different locations throughout

the United States. These shipments will pose a major logistical challenge to DOE and DOD. Given the public sensitivity to the types of materials being shipped, there also will be significant new institutional and public education issues to address. The sensitivity to transportation of certain types of hazardous materials can run to the extreme. The best example is the legal prohibition against DOD transporting chemical warfare stockpile materials to regional or national disposal sites. Yet these materials still must be disposed of under a rigid timetable as required by international agreements. As a result, DOD is spending millions of dollars building disposal facilities at each of the major chemical warfare materials manufacturing or storage sites to avoid any controversy over transportation. DOD also is developing sophisticated mobile treatment facilities—consisting of convoys of as many as 5 to 10 tractor-trailers—that can travel to various locations throughout the United States to dispose of smaller quantities of nonstockpile chemical warfare materials, such as chemical identification sets used for training.

Commercial Radioactive Waste Management Program

A special case related to the transport of nuclear materials involves the growing stockpile of spent nuclear fuel (SNF) stored on-site at many of the nation's 110-plus commercial nuclear reactors. Under the Nuclear Waste Policy Act of 1983 and subsequent amendments, DOE was required to take title to the material in 1998 and to arrange for its transportation and disposal with funds provided by a tax on utility rate payers. That deadline has passed, and the utilities are now in a lawsuit to force DOE to take action. A site at Yucca Mountain, Nevada, has been under intensive study for years, but will not be ready until at least 2010 if it is approved as suitable for deep geologic disposal. Many members of Congress have been promoting the construction of an interim storage facility at Yucca Mountain so that SNF can be moved from reactor sites in the near future, since some nuclear power plants are having serious problems finding suitable storage for the growing volume of SNF. Some nuclear service companies and utilities are working with tribal authorities to build interim storage facilities in Wyoming and Utah as an alternative to interim storage at Yucca Mountain.

In addition, DOE has solicited interest from industry in privatizing the entire transportation and storage operation. This issue is controversial for public interest groups and representatives from other stakeholder groups, including state and local governments. Because the program is essentially a cross-country transportation problem—most nuclear power plants are east of the Mississippi and the proposed storage and disposal location is in Nevada—this program raises controversy in virtually every state; many local governments and community interest groups will be involved. There will be significant challenges related to system and logistical planning, route designation, environmental assessment, emergency preparedness, institutional relationships, and safe transportation. DOE already has done a substantial amount of planning and preparation, but many stakeholder groups want more. When shipments begin, so will the political pressures.