Chapter **4**

Hazardous Materials Transportation Regulations

Photo credit: Ann Carroll, OTA staff

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Hazardous Materials Transportation Regulations

The current Federal regulatory system governing the transportation of hazardous materials developed over the past century with substantial industry involvement. Existing U.S. Department of Transportation (DOT) regulations are extensive and consist of detailed engineering specifications for containers, hazard communication requirements such as vehicle placarding, and handling and operating requirements for each mode of transport. Shippers and carriers of hazardous materials must also comply with general safety requirements for vehicles and vessels and with regulations pertaining to specific types of hazardous materials, worker safety, and environmental protection issued by other Federal agencies.

However, regulations contained in Title 49 of the Code of Federal Regulations (49 CFR), are not applied to most intrastate highway shipments. Moreover, international codes, less complex than their U.S. counterparts, are now widely used in the air and water modes. Finally, while many States have adopted 49 CFR wholly or in part, there is great variation among State regulations. Many State and local jurisdictions have enacted laws and regulations where there is an absence of Federal action or where Federal requirements are believed to be insufficient; examples include requirements for permits and registration, licensing of hazardous materials drivers, and notification requirements. Such requirements cause considerable controversy, as industry compliance may require substantial expenditures of time and money. Differing State and local requirements also impede the development of nationally standardized enforcement training. Although the Hazardous Materials Transportation Act (HMTA) contains a provision preempting State and local requirements that are inconsistent with their Federal counterparts, there have been no comprehensive efforts to assess the validity of existing non-Federal laws and regulations.

This chapter is divided into two major sections: the first part describes the development of the Federal role and examines the current regulatory framework; the second covers State and local requirements and questions related to regulatory consistency. For additional information on State and local activities, the reader is referred to OTA's Special Report, *Transportation of Hazardous Materials: State and Local Activities,* March 1986.

THE FEDERAL ROLE

Early History

In 1866, the first Federal law was passed regulating the transportation of hazardous materials, specifically shipments of explosives and flammable materials such as nitroglycerin and glynoin oil. [1] An 1871 statute established criminal sanctions against persons who transported specific hazardous commodities on passenger vessels in U.S. navigable waters in violation of Treasury Department regulations.[2]

Rail shipments of explosives during and after the Civil War were addressed by unmodified statutes and contractual obligations between shippers and carriers based on English common-law principles. Under the common law, common carriers were granted a public charter to operate and were obliged to provide service to anyone upon reasonable request, for reasonable cost, and without unjust discrimination. Carriers could, however, prescribe conditions under which certain freight would be accepted. A shipper was obliged to identify the hazards of a dangerous commodity, use adequate packaging, and provide a clear warning to the carrier of the shipment's hazards.

[1] Stat. 81, July 3, 1866"

[2] Stat. 441, Feb. 28, 1871. See Historical Note in 46 U.S.C. 170.

The establishment of the Interstate Commerce Commission (ICC) in 1887 marked the beginning of a Federal effort to impose a degree of regulatory uniformity on all modes of transportation.[3] While ICC requirements were first developed for rail transportation, they were eventually extended to other modes. As described below, ICC was the primary regulatory agency with authority over hazardous materials transportation through 1966.

ICC and the Bureau of Explosives

In 1908, Congress passed a law that would govern hazardous materials transportation for more than six decades. The Explosives and Combustibles Act (later called the Explosives and Other Dangerous Articles Act, or EODA) authorized ICC to issue regulations covering the packing, marking, loading, and handling of explosives and other dangerous substances in transit.[4] The statute also prescribed criminal penalties for shippers or carriers who violated ICC regulations. EODA codified many of the contractual obligations that had developed commercially between shippers and rail carriers.

Regulations adopted by ICC in 1911 to implement EODA were based on rail safety standards developed by the Bureau of Explosives, a division of the Association of American Railroads (AAR). Founded in 1905, the Bureau of Explosives developed standards for handling explosives and other dangerous materials by the railroads and assisted with the management of private contracts between shippers and rail carriers to promote development of uniform requirements. EODA amendments enacted by Congress in 1921 authorized ICC to utilize the services of groups such as the Bureau of Explosives in its hazardous materials safety programs Subsequently, ICC delegated extensive rulemaking and enforcement responsibilities to the Bureau.

Under EODA, all hazardous materials transportation activity was barred unless specifically authorized by ICC. As a consequence, ICC regulations were developed on a case-by-case basis in response to specific industry initiatives. Each time a new commodity or container was produced, a special permit had to be approved by ICC. This process is still used, and new permits are now known as exemptions. (For more information, see chapter 3.) Periodically, if ICC had granted a series of requests pertaining to a particular section of the regulations, that section would be revised and streamlined, usually for specific commodities. This pattern has continued, so that today's packaging authorizations are ad hoc and individual in character.

Over the next 40 years, the roles of ICC and the Bureau of Explosives continued to grow as rules originally designed for the railroads were applied to other modes of transport.[6] The U.S. Coast Guard was required to adopt ICC regulations for classification of hazardous materials and for marking, labeling, packing, and certification of portable containers.[7] Regulatory authority over highway transportation was given to ICC in the 1930s. The Civil Aeronautics Board (CAB), in conjunction with safety officials in the U.S. Department of Commerce, developed the first regulations for transportation of hazardous materials by air in the early 1940s. This was also done through wholesale adoption of ICC rules.[8]

ICC relied heavily on the technological expertise of nongovernmental groups for the development of

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[3] The Interstate Commerce Commission was created by the Interstate Commerce Act, 24 Stat. 529, Feb. 4, 1887.

[4] 18 U.S.C. *831-835 (831 has* been substantially rewritten, and 832-835 have been repealed).

[5] 41 Stat. 144, Mar. 4, 1921. See 18 U.S.C. 834, Historical and Revision Notes.

[6] In addition to the extension of Interstate Commerce Commission (ICC) rules to other modes of transport, other amendments to the Explosives and Other Dangerous Articles Act passed after 1921 increased the list of hazardous materials addressed by ICC and regulated shippers and common carriers (for rail and highway). See Historical and Revision Notes in 18 U.S.C. Chapter 39.

[7] 46 U.S.C. 170(7)(a). Additional laws were passed that applied to vessels carrying dangerous cargoes, some of which covered international shipments. See, for example, The International Convention for Safety of Life at Sea, 50 Stat. 1121, 1929; Tank Vessel Act of 1936, Chapter 729, 49 Stat. 1889, June 23, 1936; and the Dangerous Cargo Act of 1940, 54 Stat. 1023, Oct. 9, 1940. The influence of international regulations is discussed more fully later in this chapter. The U.S. Coast Guard was established by an act of Congress on Jan. 28, 1915 (14 U.S.C. 1).

[8] The Civil Aeronautics Board (CAB) was created in 1938 by the Civil Aeronautics Act. The purpose of the law was to regulate air carriers and promote the development of safe air commerce. The Federal Aviation Act, Public Law 85-726, Aug. 23, 1958, contained provisions authorizing the assessment of penalties for violations of the hazardous materials regulations and allowing exemptions from existing rules and regulations. See 49 U.S. C. 1472(h) and 142 l(c). The Federal Aviation Administration was established by this statute and assumed the noneconomic regulatory functions of CAB. CAB was continued as an economic regulatory agency.

new regulations, because the size and professional knowledge of in-house staff was limited.[9] In 1960, Congress extended ICC'S ability to use the services of outside organizations by authorizing the use of carrier and shipper associations in addition to the Bureau of Explosives.]" As a result of this action, the Tank Car Committee of AAR was given the authority to approve applications submitted to ICC for designs, materials, construction, conversions, or alterations of tank cars.

Formation of the Department of Transportation

In 1966, authority to regulate the transportation of hazardous materials was transferred from ICC, the Department of the Treasury, and CAB to a new Federal agency, DOT.[11] Within DOT, separate modal administrations were retained to preserve organizational continuity. Moreover, modal administration functions specified by the act could not be delegated to other Department administrations by the Secretary of Transportation.[12] Thus, although the Secretary had Cabinet-level responsibility for all transportation safety standards (including hazardous materials), each modal administration was allowed to promulgate independent regulations.

Under the new organization, the Federal Aviation Administration (FAA) was responsible for air transportation, the Federal Highway and Railroad Administrations for land, and the Coast Guard for water, Regulations for each mode of transport were published in different parts of the Code of Federal Regulations (CFR), The National Transportation Safety Board (NTSB) was also established to determine and report the cause of transportation accidents and conduct special studies related to safety and accident prevention. A separate entity, the Hazardous Materials Regulations Board, was created by the Secretary of Transportation to coordinate all hazardous materials activities within the Department. The Office of Hazardous Materials, which served as the staff for the Board, proposed revisions to the existing hazardous materials regulatory program.[13] However, each proposed change had to be considered and approved first by the affected modal administrations. Some of the major revisions planned by the Board, such as the development of container performance standards, have still not been implemented by DOT, although a rulemaking for such standards is now in progress.

Legislation pertaining to hazardous materials transportation was passed in 1970 imposing modest requirements on DOT.[14] However, DOT was unable to implement the statute as staff increases requested by the Department were not approved by Congress.[15] The provisions of this law were incorporated into the HMTA of 1975.

The Hazardous Materials Transportation Act of 1975

Persistent administrative and organizational difficulties in the early 1970s led DOT to seek legislation that would consolidate hazardous materials regulatory authority. However, little happened until the crash of a 707 cargo jet hauling several tons of hazardous materials in 1973. " The accident inquiry clearly showed a general lack of compliance

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[9] See U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Hazardous Materials Transportation* (Washington, DC: U.S. Government Printing Office, 1979), pp. *24-25.*

[10] 18 U.S.C. 834(e).

[11] The U.S. Department of Transportation was created by the Department of Transportation Act, Public Law *89-670,* 49 U.S.C.1651. Economic regulatory functions stayed with the Interstate Commerce Commission, the Civil Aeronautics Board, and the Federal Maritime Commission.

[12] The Department of Transportation Act states that: "The functions, powers, and duties specified in this Act to be carried out by each administrator shall not be transferred elsewhere in the Department unless submitted pursuant to provisions of Chapter 9 of Title 5, U. S, C., or by Statute." See 49 U.S.C. 1652(e).

[13] Regulatory revisions proposed by the Hazardous Materials Regulations Board in 1968 addressed the following topics: modal requirements, international consistency, container performance standards, labels for packages, and vehicle placards. In addition, the Board recommended the establishment of a centralized system for data collection, an increase in shipper and manufacturer inspections, and the development of training programs for emergency response personnel. See U.S. Congress, op. cit., pp. 31-32.

[14] The Hazardous Materials Transportation Control Act of 1970, Title 111 of Public Law 91-458, 49 U.S. C. 1761. The Secretary of Transportation was required to establish facilities and technical staff for evaluating hazards associated with hazardous materials; establish a central reporting system for hazardous materials accidents; conduct a review of all aspects of hazardous materials transportation and recommend appropriate steps to be taken immediately to provide greater control over shipments; and prepare an annual report for Congress on regulatory, enforcement, and exemption activities as well as accident and casualty statistics.

[15] U.S. Congress, op. cit., p. 33.

[16] National Transportation Safety Board, *Aircraft Accident Report,* NTSB-AAR-74-16 (Washington, DC: 1974).

with existing requirements due to fragmentation of the regulatory authorities, complexity of the regulations, lack of industry familiarity at the working level with Federal regulations, and inadequate government surveillance.[17] These findings echoed the conclusions of studies conducted by the National Research Council, the Comptroller General to Congress, and DOT.[18]

The HMTA was finally passed in 1975." The intent of the law was to improve regulatory and enforcement activities by providing the Secretary of Transportation with broad authority to set regulations applicable to all modes of transport. Specifically, the HMTA:

- expanded DOT's potential jurisdiction to any traffic "affecting" interstate commerce (49 U.S.C. 1802);
- authorized the designation of hazardous materials, defined as materials or classes of materials in quantities and forms that the Secretary of Transportation determines may pose an unreasonable risk to health and safety or property (49 U.S.C. 1803);
- authorized DOT to issue regulations related to packing, repacking, handling, labeling, marking, placarding, and routing; and expanded the regulated community to include those who manufacture, test, maintain, and recondition containers or packages used to transport hazardous materials (49 U.S.C. 1804);
- authorized the establishment of a registration program for shippers, carriers, and container manufacturers and reconditioners (49 U.S.C. 1805);
- codified DOT procedures for granting regulatory exemptions (49 U.S.C. 1806);
- provided the Secretary with the ability to conduct surveillance activities (e.g., hold hearings and conduct investigations), establish record-keeping requirements, and conduct inspections. Provisions of the 1970 Act were also included in this section of the HMTA, such as submission of an annual report to Congress (49 U.S.C. 1808);
- authorized DOT to assess civil and criminal penalties for violations of the HMTA (49 U.S.C. 1809); and
- defined the relationship between the Federal regulations and those of State and local governments, preempting non-Federal rules found to be inconsistent with the Federal program and establishing a procedure whereby DOT could waive preemption (49 U.S.C. 1811).

Shortly after the HMTA was enacted, the Secretary created the Materials Transportation Bureau (MTB) within the Research and Special Programs Administration (RSPA), which was designated the lead DOT agency for hazardous materials regulation.* MTB was delegated responsibility for issuing all hazardous materials transportation regulations except those governing bulk transport by water; these remained with the Coast Guard. However, the modal administrations continued to be responsible for safety regulations, including the development of hazardous materials regulations, applicable to each mode. Inspection and enforcement authority was divided between MTB and the modal administrations.

In 1976, MTB consolidated and amended the hazardous materials regulations based on changes originally proposed in the late 1960s, prior to passage of the HMTA.[20] FAA and part of the Coast Guard regulations, contained in Titles 14 and 46 of CFR, were incorporated into 49 CFR which already contained the highway and rail regulations. Regulations for bulk transport by water remained in 46 CFR. In addition, MTB amended existing requirements for shipping papers, marking, labeling, and placarding, and added new hazard classes. The format of the regulations has essentially remained the same since 1976. Subsequent regulatory amendments, though numerous, have been narrowly focused.

"Ibid., p. 37.

18* National Academy of Sciences, National Research Council, A *Study of Transportation of Hazardous Materials* (Washington, DC: National Academy Press, 1969); and U.S. Congress, Senate Committee on Commerce, *Transportation Safety Act of 1974*, Report No. 93-1192 accompanying S. 4057 (Washington, DC: U.S. Government Printing Office, Sept. 30, 1974).

19 Title I of Public Law 93-633, Jan. 3, 1975, 49 U.S.C. 1801. Title II addressed rail safety and Tide 111 made the National Transportation Safety Board an independent agency. The Explosives and Other Dangerous Articles Act was repealed by this statute.

*The Hazardous Materials Board was terminated and the responsibilities of the Office of Hazardous Materials were transferred to the newly formed Materials Transportation Bureau.

*"See footnote 13. Proposed rules were published on Jan. 24, 1974 (Docket HM-103, 39 F.R. 3164 and Docket HM-112, 39 F.R. 3022). Final rules were published on Apr. 15, 1976, 41 F.R. 15972.

The Current Regulatory Framework

Overview

While RSPA issues most of the hazardous materials regulations under the HMTA, DOT modal administrations, other Federal agencies, private domestic groups, and international organizations significantly influence the movement of hazardous materials in the United States.[21] Table 4-1 indicates the modes of transport addressed by the major regulatory and standard-setting bodies concerned with the transportation of hazardous materials.

The regulatory responsibilities of RSPA and the four modal administrations within DOT are indicated in figure 4-1.22 Regulations issued by RSPA cover activities of both shippers and carriers of hazardous materials for all four modes of transport (except for bulk shipments by barge or ship, which are governed by Coast Guard regulations) as well as container manufacturers. RSPA also carries out inspection and enforcement activities for multimodal shippers and container manufacturers. RSPA regulations, summarized in table 4-2, are located in 49 CFR. More than 30,000 hazardous materials are subject to these regulations. Although the HMTA authorized DOT to regulate both interstate and intrastate transportation of hazardous materials by all modes, the regulations have not been applied to most intrastate highway shipments.[23] Thus, unless State and local governments adopt 49 CFR and specifically apply it to intrastate highway transport, most local shipments of gasoline and other hazardous materials are not subject to Federal regulation.

Table 4-1.—Federal and International Regulatory Framework for Transportation of Hazardous Materials

Type of regulatory or standard-setting body	Highway	Rail	Air	Water
Department of Transportation Administration:				
Research and Special Programs Administration . .	X	X	X	X
Federal Highway Administration—Bureau of Motor Carrier Safety.	X			
Federal Railroad Administration [a].		X		
Federal Aviation Administration			X	
United States Coast Guard [b]. , ...				X
Other Federal agencies:				
Environmental Protection Agency	X	X	X	X
Nuclear Regulatory Commission	X	X	X	X
Occupational Safety and Health Administration	X	X	X	X
International organizations:				
United Nations—Committee of Experts on the Transport of Dangerous Goods	X	X	X	X
International Atomic Energy Agency	X	X	X	X
International Civil Aviation Organization.			X	
International Air Transport Association			X	
International Maritime Organization.				X

[a] The Tank Car Committee of the Association of American Railroads is authorized to approve new tank car designs.
[b] The National Cargo Bureau, Inc., is authorized by the Coast Guard to assist with the administration of international regulations for cargo loading and storage.
SOURCE: Office of Technology Assessment.

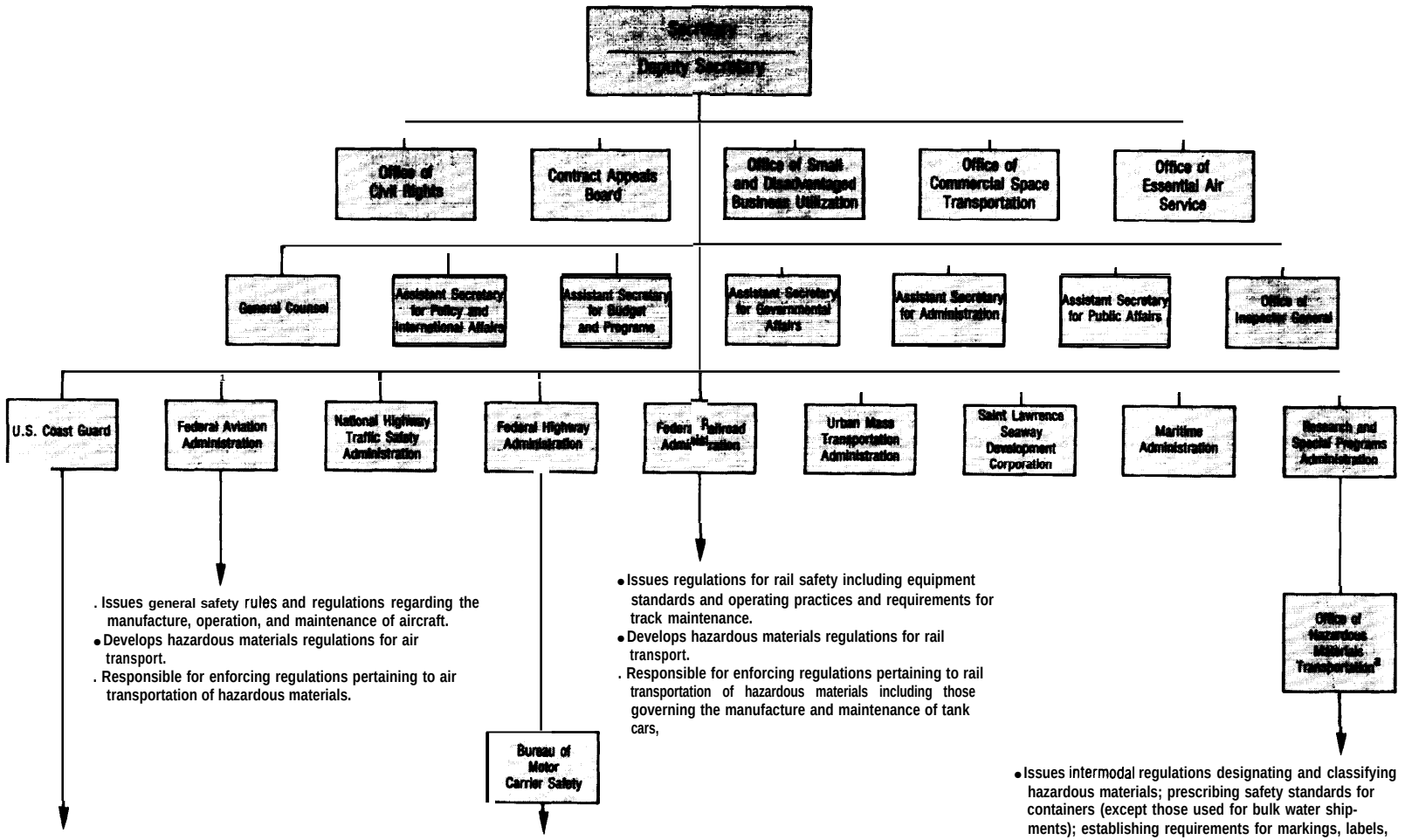
Data collection is another activity undertaken by RSPA, other DOT administrations, and other Federal agencies. Chapter 2 describes these activities in more detail, focusing on the limitations of existing efforts to obtain commodity flow and accident information, It is significant from a regulatory perspective that although the HMTA allows DOT to establish a registration program, current registration requirements are limited to certain groups of shippers, carriers, and container manufacturers

[21] In 1985, the Research and Special Programs Administration (RSPA) was reorganized. The Materials Transportation Bureau was abolished and its responsibilities were transferred to the Office of Pipeline Safety and the Office of Hazardous Materials Transportation within RSPA. RSPA has both rulemaking and enforcement functions pertaining to the transportation of hazardous materials. See 50 F.R. 45728, Nov. 1, 1985.

[22] 49 CFR 1.46, 1.47, 1.48, 1.49, and 1.53 contain delegations of authority for the U.S. Coast Guard, the Federal Aviation Administration, the Federal Highway Administration, the Federal Railroad Administration, and the Research and Special Programs Administration, respectively.

[23] Intrastate shipments of hazardous wastes and substances (designated by the U.S. Environmental Protection Agency) and flammable cryogenic liquids in portable tanks and cargo tanks are covered by Federal regulations. See 49 CFR 171.1.

Figure 4-1 .—U.S. Department of Transportation



. Issues general safety rules and regulations regarding the manufacture, operation, and maintenance of aircraft.
• Develops hazardous materials regulations for air transport.
. Responsible for enforcing regulations pertaining to air transportation of hazardous materials.

• Issues regulations for rail safety including equipment standards and operating practices and requirements for track maintenance.
• Develops hazardous materials regulations for rail transport.
. Responsible for enforcing regulations pertaining to rail transportation of hazardous materials including those governing the manufacture and maintenance of tank cars,

• Issues regulations for the design, construction, equipment, and maintenance of commercial vessels including bulk containers used to transport hazardous materials,
. Develops hazardous materials regulations for nonbulk marine transport.
. Responsible for enforcing regulations pertaining to water transportation of hazardous materials.
. Operates the National Response Center and responds to spills of hazardous materials.

. Issues and enforces general motor carrier safety regulations covering motor carriers, drivers, and vehicles.
• Develops hazardous materials regulations for highway transport.
. Administers the Motor Carrier Safety Assistance Program.
. Responsible for enforcing regulations pertaining to highway transportation of hazardous materials, including requirements for tank truck manufacture and maintenance.

• Issues intermodal regulations designating and classifying hazardous materials; prescribing safety standards for containers (except those used for bulk water shipments); establishing requirements for markings, labels, and placards; and specifying handling and other in-transit requirements including routing.
• Issues specific packaging exemptions.
. Responsible for inspection and enforcement of container manufacturers and multimodal shippers,
. Serves as Department of Transportation liaison to other Federal regulatory agencies.
• Administers the State Hazardous Materials Development Enforcement Program.

[a]Formerly the Materials Transportation Bureau

SOURCE Off Ice of Technology Assessment

and reconditioners.[24] A more comprehensive registration program would provide DOT with basic data on the industry it regulates.

The modal administrations are also responsible for developing and enforcing hazardous materials regulations applicable to each mode. In addition, they have jurisdiction over general safety regulations for operations, vehicles, and vessels under other Federal statutes.[25] Despite monthly intermodal meetings, there is little coordination among the DOT agencies.

Two other Federal agencies, the U.S. Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), establish transportation-related requirements for hazardous substances and wastes and radioactive materials. The Occupational Safety and Health Administration (OSHA) is responsible for the safety of workers employed by shippers and carriers of hazardous materials. While the regulatory role of ICC has been diminished, carriers are required to publish rates and obtain operating certificates. The Department of Defense (DOD) and the Department of Energy (DOE), as major shippers and carriers of hazardous materials, have also established some additional transportation requirements for their own shipments. In addition, packages containing hazardous materials sent by mail must comply with DOT and U.S. Postal Service regulations; chapter 5 describes training available for Postal Service employees.

[24]The following are examples of registration requirements that have been established by the U.S. Department of Transportation (DOT): shippers and carriers of flammable cryogenic liquids must comply with registration and driver training requirements (see 49 CFR 173.11, 177.816, and 177.826); reconditioners of steel drums (DOT specifications 17C, 17E, and 17H) must obtain registration numbers from DOT and *mark drums* qualified for reuse with such numbers (see 49 CFR 173.28(m)(3)(ii)); manufacturers of DOT specification containers must register a symbol with DOT if their full names are not provided on containers (see "marking sections" for each specification in 49 CFR 178); independent inspection agencies who wish to perform cylinder inspections and verifications must obtain DOT approval (see 49 CFR 300(a)); and shippers of highway route controlled quantities of radioactive materials, such as spent fuel, must file specified information with DOT within 90 days after a package is accepted by a carrier (see 49 CFR 173.22(d)).

[25]For example, Bureau of Motor Carrier Safety activities are authorized by the Motor Carrier Safety Act of 1980 (Public Law 96-296), the Surface Transportation Act of 1982 (Public Law 97-424), and the Motor Carrier Assistance Act of 1984 (Public Law 98-554). Federal Railroad Administration activities are authorized by the Federal Railroad Safety Act of 1970, as amended (45 U.S.C. 431 et seq.). Federal Aviation Administration activities are authorized by the Federal Aviation Act of 1958 (72 Stat. 744).

Table 4-2.—Summary of U.S. Department of Transportation Hazardous Materials Regulations in Title 49 of the Code of Federal Regulations

Part 106 prescribes general rulemaking procedures for adopting Office of Hazardous Materials Transportation regulations.[a]

Part 107 contains procedures for the submission and review of packaging exemption applications, inconsistency rulings, and nonpreemption determinations. Enforcement authorities are also described.

Part 171 is a general introduction to the hazardous materials regulations. Special requirements for hazardous wastes are included, as well as definitions of terms and a list of technical documents incorporated by reference into the regulations. Reporting requirements for hazardous materials accidents are also specified.

Part 172 contains the Hazardous Materials Table. The table lists the hazardous materials and hazard classes subject to regulation; appropriate requirements for labels, packaging, and air and water shipments are referenced. In addition, Part 172 includes detailed regulations for shipping papers, markings, labels, and placards.

Part 173 indicates the types of packaging that maybe used by shippers of hazardous materials. General shipment and packaging regulations are followed by more specific requirements for certain hazard classes. Hazard class definitions are also contained in Part 173.

Part 174 prescribes regulations for rail transport. General operating, handling, and loading requirements are specified, as well as detailed requirements for certain hazard classes.

Part 175 applies to passenger and cargo aircraft shipments of hazardous materials. The regulations include quantity limitations, loading and handling requirements, and special requirements for certain hazard classes.

Part 176 addresses nonbulk transportation of hazardous materials by waterborne vessels. Requirements for accepting freight, handling, loading, and stowage are prescribed. Coast Guard regulations for bulk shipments of hazardous materials are contained in Title 46 of the *Code of Federal Regulations.*

Part 177 contains regulations for the highway mode; they apply to common, contract, and private carriers. In addition to regulations for handling, loading, and stowage, routing rules for high-level radioactive materials and other in-transit requirements are specified.

Part 178 presents detailed specifications for the fabrication and testing of packaging described in Part 173.

Part 179 prescribes detailed specifications for rail tank cars. Procedures for obtaining Association of American Railroads approval of new tank car designs or changes to existing ones are provided.

[a]The Off Ice of Hazardous Materials Transportation was formerly the Materials Transportation Bureau.

SOURCE: Office of Technology Assessment.

RSPA serves as the DOT liaison with other Federal agencies for hazardous materials. Memoranda of Understanding have been signed with EPA, NRC, and DOE delegating responsibilities under specific laws. One Federal coordinating group does exist, the National Response Team (NRT), but it

is concerned primarily with emergency response activities. Aside from these agreements and NRT, however, there are no formal mechanisms for interagency coordination of regulatory matters. While the division of responsibilities among multiple Federal agencies means that modal safety concerns and questions relating to radioactive or hazardous waste materials are addressed by those with appropriate expertise, it also means that when issues arise that require the attention of more than one agency, a method of ensuring effective coordination does not exist. Interagency regulatory issues generally take years to resolve, and the range of options considered by one agency to address a problem is often limited because actions involving others are not studied. Chapters 2, 3, and 5 illustrate some interagency coordination problems that exist.

Private domestic organizations continue to play an influential role in the development and implementation of regulations governing the transportation of hazardous materials. Such reliance on industry for technical input is inevitable in light of RSPA's small staff and budget restrictions. For example, staff levels have decreased from 143 positions in 1979 to 111 in 1985.[26] These decreases have occurred despite increasing regulatory demands on RSPA staff and rising public concerns about safety.

Other organizations, like AAR, develop standards and testing requirements, conduct inspections, and provide their members with information on existing and proposed regulations.[27] Moreover, a number of international regulatory bodies have established recommendations and standards affecting all modes of transport. At an accelerating pace, international regulations governing the transportation of hazardous materials are being used instead of DOT regulations. This is particularly true for the air and water modes where international requirements that must be followed for overseas shipments are recognized by DOT for domestic use.

State and local governments also regulate matters that can be classified as accident prevention and protection of public safety, such as routing, permits, or licenses. Requirements set by States and localities focus primarily on highway and rail transport and often vary from those established by the Federal Government and other jurisdictions. Interjurisdictional issues are addressed later in this chapter.

The following sections describe existing hazardous materials regulations relevant to all four modes (intermodal) and those applicable only to the highway, rail, air, or water mode. Each section also discusses the private domestic and international organizations active in the regulatory process. The responsibilities of other Federal agencies are presented in a separate section at the end of the chapter. Enforcement activities and training are discussed in chapter 5.

Intermodal

Regulations applicable to all modes of transport consist of two basic types of requirements set by RSPA: use of authorized packaging to ensure effective containment during transport; and clear communication of the hazards of the cargo through shipping papers, markings, labels, and vehicle placards. Shippers begin the regulatory process by identifying the hazards of their cargo.

Classification of Hazardous Materials.–Hazardous materials subject to RSPA regulations are listed in the Hazardous Materials Table in Part 172.101 of 49 CFR. A sample page of the table is shown in table 4-3. The Hazardous Materials Table indicates the hazard class to which each material belongs and references the packaging, labeling, and special requirements applicable to rail, air, and water transportation that must be met by shippers and carriers. The hazard classes designated by RSPA are defined in table 4-4.

In those instances where a material is not listed in the Hazardous Materials Table, the shipper must evaluate it against the criteria for all of the hazard classes. However, the regulations contain no explicit

[26] Staff levels are for both hazardous materials transportation and pipeline safety offices. There have not been any significant trends in the U.S. Department of Transportation's budget. Funding appropriated by Congress in 1985 was $6.114 million. Data provided by the Research and Special Programs Administration, Apr. 15, 1986.

[27] Various organizations publish general standards for hazardous materials that are applied to the transportation field. These groups include the American Society of Mechanical Engineers, the American Society for Testing and Materials, the Compressed Gas Association, the Institute of Makers of Explosives, the National Association of Corrosion Engineers, and the National Fire Protection Association. 49 CFR 171,7 indicates the organizations and standards incorporated into the hazardous materials regulations by the U.S. Department of Transportation.

Table 4.3.—Sample Page From the Hazardous Materials Table

(1)	(2)	(3)	(3A)	(4)	(5)		(6)		(7)		
					Packaging		Maximum net quantity in one package		Water shipments		
+/E/A/W	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	(a) Exceptions	(b) Specific	(a) Passenger carrying aircraft or railcar	(b) Cargo aircraft only	(a) Cargo vessel	(b) Passenger vessel	(c) Other requirements
	Acetylcyclohexanesulfonyl peroxide, more than 82%, wetted with less than 12% water	Forbidden									
	Acetyl cyclohexanesulphonyl peroxide, not more than 82% wetted with not less than 12% water See Organic peroxide, solid, n.o.s		UN2081								
	Acetyl cyclohexanesulphonyl peroxide, not more than 32% in solution See Organic peroxide, liquid or solution, n.o.s		UN2083								
	Acetylene	Flammable gas	UN1001	Flammable gas	None	173.309	Forbidden	300 pounds			Shade from radiant heat
	Acetylene (liquid)	Forbidden									
	Acetylene salter nitrate	Forbidden									
A	Acetylene tetrabromide	ORM-A	UN2504	None	173.505	179.510	1 gallons	55 gallons			
	Acetyliodide	Corrosive material	UN1898	Corrosive	173.244	173.247	1 quart	5 gallons			Keep dry Glass carboys not permitted on passenger vessels
	Acetylperoxide, not more than 25% in solution See Acetyl peroxide solution, not over 25% peroxide		UN2081								
	Acetyl peroxide solid, or more than 25% in solution	Forbidden									
	Acetyl peroxide solution, not over 25% peroxide	Organic peroxide	UN2081	Organic peroxide	173.153	179.222	Forbidden	1 quart	2		
	Acidbutyl phosphate	Corrosive material	UN1718	Corrosive	179.244	173.245	1 quart	5 gallons	2	2	Glass carboys in hampers not permitted under deck
	Acid carboy, empty See Carboy, empty										
	Acid, liquid, n.o.s	Corrosive material	NA1760	Corrosive	179.244	173.245	1 quart	5 pints			Keep cool
+E	Acrolein, inhibited (RQ-1/454)	Flammable liquid	UN1092	Flammable liquid and Poison	None	172.122	Forbidden	1 quart	2		Keep cool Stow away from living quarters
	Acrylic acid	Corrosive material	UN2218	Corrosive	179.244	173.245	1 quart	5 pints			
[	Acrylonitrile (RQ-100/45.41)	Flammable liquid	UN1093	Flammable liquid and Poison	None	179.119	Forbidden	1 quart	2		Keep cool
	Actuating cartridge, explosive (@ 0.2 W/W)	Class C explosive		Explosive C	179.114		0 pounds	50 pounds	2	2	Keep cool and dry
	Adhesive	Combustible liquid	UN1133	None	173.118a	None	No limit	No limit	2	2	
	Adhesive	Flammable liquid	UN1133	Flammable liquid	173.118	173.152	1 quart	10 gallons	2		
E	Adipic acid (RQ-5000/2270)	ORM-E	NA9077	None		173.510	No limit	100 limit	2	2	
	Aerosol product See Compressed gas, n.o.s.										
	Air, compressed	Nonflammable gas	UN1002	Nonflammable gas	179.305	179.302	150 pounds	300 pounds	2	2	
	Air conditioning machine See Refrigerating machine										
	Aircraft rocket engine (Commercial)	Flammable solid	NA2792	Flammable solid	None	173.225	Forbidden	150 pounds	1,3		
	Aircraft rocket engine igniter (Commercial,	Flammable solid	UN2792	Flammable solid	None	173.238	Forbidden	5 pounds	1,3		
	Airplane flare See Fireworks, special										
	Alcoholic beverage	Flammable liquid	UN1170	Flammable liquid	179.118	173.125	See 178.11	10 gallons	1,2		
	Alcoholic beverage	Combustible liquid	UN1170	None	173.118a	None	No limit	No limit	1,2	2	
	Alcohol, n.o.s	Flammable liquid	UN1987	Flammable liquid	179.118	179.125	1 quart	10 gallons	1,2		
	Alcohol, n.o.s	Combustible liquid	UN1987	None	179.118a		No limit	No limit	1,2	1,2	
I	Aldrin (RQ 1/0.454)	Poison B	NA2761	Poison	179.864	173.876	50 pounds	1 Kto pounds	1,2	1,2	
E/	Aldrin, cast solid (RQ-1/0.454)	ORM-A	NA2761	None	179.505	173.610	No limit	No limit	1,2	1,2	
I	Aldrin mixture, dry (with more than 65% aldrin) (RQ-1/0.454)	Poison B	NA2761	Poison	179.204	179.876	50 pounds	100 pounds	1,2	1,2	
E/	Aldrin mixture, dry, with 65% or less aldrin (RQ-1/0.454)	ORM-A	NA2761	None	173.505	173.510	No limit	No limit	1,2	1,2	
I	Aldrin mixture, liquid (with more than 60% aldrin) (RQ-1/0.454)	Poison B	NA2761	Poison	173.345	178.861	1 quart	55 gallons	1,2	1,2	Outflub point less than 141 deg F, segregation same as for flammable liquids
E/	Aldrin mixture, liquid, with 60% or less aldrin (RQ-1/0.454)	ORM-A	NA2761	None	173.505	173.510	No limit	No limit	1,2	1,2	
	Alkaline (corrosive) liquid, n.o.s	Corrosive material	NA1719	Corrosive	173.244	173.240	1 quart	5 gallons	1,2	1,2	
	Alkanesulfonic acid	Corrosive material	UN2584	Corrosive	179.244	179.245	5 pints	1 gallon	1,2	1	
	Alkyl aluminum halides. See Pyrophoric liquid, n.o.s										
	Allethrin	ORM-A	NA2902	None	173.505	179.510	No limit	No limit			
	Allyl alcohol (RQ-100/45.4)	Flammable liquid	UN1098	Flammable liquid and Poison	None	179.119	1 quart	10 gallons	1,2	1	
	Allyl bromide	Flammable liquid	UN1099	Flammable liquid	179.118	179.119	Forbidden	10 gallons	1,2	1	
E	Allyl chloride (RQ-1000/454)	Flammable liquid	UN1100	Flammable liquid	None	179.119	Forbidden	10 gallons	1,3	5	
	Allyl chlorocarbonate	Flammable liquid	UN1722	Flammable liquid	None	179.288	Forbidden	5 pints	1	5	Keep dry. Separate longitudinally by an intervening complete hold or compartment from explosives. Segregation same as for corrosive materials
	Allyl chloroformate See Allyl chlorocarbonate										
	Allyl trichlorosilane	Corrosive material	UN1724		None	173.280	Forbidden	10 gallons	1	1	Keep dry
	Aluminum alkyl See Pyrophoric liquid, n.o.s										

SOURCE: 49 *CFR* 172.101

Table 4-4.—Department of Transportation Hazard Classes

Hazard class	Definition	Examples
Flammable liquid	Any liquid having a flash point below 100° F as determined by tests listed in 49 CFR 173.115(d). Exceptions are listed in 49 CFR 173.1 15(a).	Ethyl alcohol, gasoline, acetone, benzene, dimethyl sulfide.
Combustible liquid	Any liquid having a flash point at or above 100° and below 200° F as determined by tests listed in 49 CFR 173.115(d). Exceptions are listed in 49 CFR 173.115(b).	Ink, methyl amyl ketone, fuel oil
Flammable solid	Any solid material, other than an explosive, liable to cause fires through friction or retained heat from manufacturing or processing, or which can be ignited readily creating a serious transportation hazard because it burns vigorously and persistently (49 CFR 173.150).	Nitrocellulose (film), phosphorus, charcoal
Oxidizer	A substance such as chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter (49 CFR 173.151).	Potassium bromate, hydrogen peroxide solution, chromic acid
Organic peroxide	An organic compound containing the bivalent -O-O- structure and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals. Exceptions are listed in 49 CFR 173.151(a).	Urea peroxide, benzoyl peroxide
Corrosive	Liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact. Liquids that severely corrode steel are included (49 CFR 173.240(a)).	Bromine, soda lime, hydrochloric acid, sodium hydroxide solution
Flammable gas	A compressed gas, as defined in 49 CFR 173.300(a), that meets certain flammability requirements (49 CFR 173.300(b)).	Butadiene, engine starting fluid, hydrogen, liquefied petroleum gas
Nonflammable gas	A compressed gas other than a flammable gas,	Chlorine, xenon, neon, anhydrous ammonia
Irritating material	A liquid or solid substance which on contact with fire or when exposed to air gives off dangerous or intensely irritating fumes. Poison A materials excluded (49 CFR 173.381).	Tear gas, monochloroacetone
Poison A	Extremely dangerous poison gases or liquids belong to this class. Very small amounts of these **gases** or vapors of these liquids, mixed with air, are dangerous to life (49 CFR 173,326).	Hydrocyanic acid, bromoacetone, nitric oxide, phosgene
Poison B	Substances, liquids, or solids (including pastes and semi-solids), other than Poison A or irritating materials, that are known to be toxic to humans. In the absence of adequate data on human toxicity, materials are presumed to be toxic to humans if they are toxic to laboratory animals exposed under specified conditions (49 CFR 173.343).	Phenol, nitroaniline, parathion, cyanide, mercury-based pesticides, disinfectants
Etiologic agents	A viable micro-organism, or its toxin, which causes or may cause human disease. These materials are limited to agents listed by the Department of Health and Human Services (49 CFR 173.386, 42 CFR 72.3).	Vibrio cholerae, clostridium botulinum, polio virus, salmonella, all serotypes
Radioactive material	A material that spontaneously emits ionizing radiation having a specific activity greater than 0.002 microcuries per gram **(μCi/g).** Further classifications are made within this category according to levels of radioactivity (49 CFR 173, subpart l).	Thorium nitrate, uranium hexafluoride
Explosive	Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, unless such compound, mixture, or device is otherwise classified (49 CFR 173.50). Explosives are divided into three subclasses:	
	Class A explosives are detonating explosives (49 CFR 173,53);	Jet thrust unit, explosive booster
	Class B explosives generally function by rapid combustion rather than detonation (49 CFR 173.88); and	Torpedo, propellant explosive
	Class C explosives are manufactured **articles,** such as small arms ammunition, that contain restricted quantities of Class A and/or Class B explosives, and certain types of fireworks (49 CFR 173.100).	Toy caps, trick matches, signal flare, fireworks
Blasting agent	A material designed for blasting, but so insensitive that there is very little probability of ignition during transport (49 CFR 173.1 14(a)).	Blasting cap

Table 4-4.—Department of Transportation Hazard Classes—Continued

Hazard class	Definition	Examples
ORM (Other Regulated Materials)	Any material that does not meet the definition of the other hazard classes, ORMs are divided into five substances:	
	ORM-A is a material which has an anesthetic, irritating, noxious, toxic, or other similar property and can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation (49 CFR 173.500(a)(l)).	Trichloroethylene, carbon tetrachloride, ethylene dibromide, chloroform
	ORM-B is a material capable of causing significant damage to a transport vehicle or vessel if leaked. This class includes materials that may be corrosive to aluminum (49 CFR 173.500(a)(2)).	Calcium oxide, ferric chloride, potassium fluoride
	ORM-C is a material which has other inherent characteristics not described as an ORM-A or ORM-B, but which make it unsuitable for shipment unless properly identified and prepared for transportation. Each ORM-C material is specifically named in the Hazardous Materials Table in 49 CFR 172.101 (49 CFR 173.500(a)(3)).	Castor beans, cotton, inflatable life rafts
	ORM-D is a material such as a consumer commodity which, although otherwise subject to regulation, presents a limited hazard during transportation due to its form, quantity, and packaging (49 CFR 173.500(a)(4)).	Consumer commodity not otherwise specified, such as nail polish; small arms ammunition
	ORM-E is a material that is not included in any other hazard class, but is subject to the requirements of this subchapter. Materials in this class include hazardous wastes and hazardous substances (49 CFR 173.500(a)(5)).	Kepone, lead iodide, heptachlor, polychlorinated biphenyls

SOURCE: 49 *CFR* 172,101 and 173.

guidance for shippers on how to classify a hazardous material. The criteria set by DOT for these hazard classes vary; some are based entirely on a quantifiable test, such as flash point determinations for flammable liquids, while others require shippers to exercise their judgment, as for the flammable solid definition. If a material falls into more than one hazard class, a shipper must follow a specified hierarchy of hazards based on the quality of packaging associated with each hazard class.[28]

Many of the hazard classes currently in use were initially established by ICC decades before the HMTA was passed. These early regulations focused on materials likely to cause immediate injury to carrier personnel and the public if they were unexpectedly released during transport.[29] DOT did not expand the list of hazard classes covered by the regulations until the early 1970s.

Corrosive solids were added to the list of hazard classes in 1974, and when DOT consolidated the hazardous materials regulations in 1976, a new classification, "Other Regulated Materials" (ORM), was created. The ORM hazard class consisted of four subclasses, ORM-A, B, C, and D, and was introduced by DOT to include materials that were encompassed by the hazard classifications used by FAA and the Coast Guard prior to consolidation of the regulations.[30]

In 1980, DOT added a fifth ORM class, ORM-E, to include hazardous substances and wastes regulated by EPA that did not fit into one of the existing DOT hazard classes. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a statute primarily concerned with responses to releases of hazardous substances into the environment, required DOT to expand its list of hazardous materials to include hazardous substances and wastes designated under other environ-

[28] 49 CFR 173.2.

[29] The Explosive and Other Dangerous Articles Act made explicit reference to explosives and other dangerous articles such as radioactive materials, etiologic agents, flammable liquids and solids, oxidizing materials, corrosive liquids, compressed gases, and poisonous substances. See 18 U.S.C. 834(e).

[30] ORM-A materials are those with the potential to impair the respiratory and visual functions of aircraft crew members in the event of a spill. ORM-B materials are those corrosive to aluminum, another concern in air transport, ORM-C consists of materials that were regulated by the U.S. Coast Guard as "Hazardous Articles" including those with the potential to heat spontaneously if kept in a closed, damp environment for an extended period of time. Finally, ORM-D materials are consumer commodities, such as charcoal or nail polish, which present limited hazards during transport because of their form, quantity, or packaging. See 41 F.R. 15972, Apr. 15, 1976.

mental laws.[31] While DOT has listed these substances in the CFR, transportation regulations for shippers and carriers are presently applicable only to hazardous wastes under the Resource Conservation and Recovery Act and hazardous substances under the Federal Water Pollution Control Act, not the entire list of substances defined under CERCLA.[32]

Underlying DOT's current classification system are several assumptions—that most accidents involve fire, that only acute health effects need to be considered, and that only people close to the scene of an accident will be affected. The National Transportation Safety Board and others have asserted that these considerations are insufficient and that DOT's classification system does not adequately indicate degrees of hazard and does not take into account all of the potential dangers posed by a hazardous materials accident.[33] For example, releases that do not involve fires may be just as dangerous as those that do and can affect people miles from the scene. Furthermore, long-term health effects and the potential for environmental damage, such as groundwater contamination, as well as the difficulty in cleaning up released materials, should also be considered in the identification and classification of hazardous materials. Chapter 3 discusses the classification issue in the context of packaging requirements for hazardous materials.

Hazard Communication.—The regulations require shippers and carriers to communicate the hazards of their cargo by providing shipping papers, markings, labels, and placards. These requirements are important because they are intended to furnish essential information about the cargo to emergency response personnel if accidents occur.

Shipping Papers.–Most shipments of hazardous materials must be accompanied by shipping papers that describe the hazardous material and contain a certification by the shipper that the material is offered for transport in accordance with applicable DOT regulations.[34] For most shipments, DOT does not specify the use of a particular document and the information can be provided on a bill of lading, waybill, or similar document. Figure 4-2 is a sample shipping document. The exceptions are hazardous waste shipments, which must be accompanied by a specific document called the Hazardous Waste Manifest. A manifest lists EPA identification numbers of the shipper, carrier, and the designated treatment, storage, or disposal facility, in addition to the standard information required by DOT.[35]

Instructions for describing hazardous materials are provided in the regulations. These descriptions include the quantity of the material, its shipping name (taken from the Hazardous Materials Table in 49 CFR 172) and hazard class, and the United Nations/North America (UN/NA) hazard identifi-

[31] These statutes include the Federal Water Pollution Control Act, the Resource Conservation and Recovery Act, the Clean Air Act, and the Toxic Substances Control Act. See Section 306 (b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601).

[32] The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that releases of designated hazardous substances in quantities equal to or exceeding certain amounts, called Reportable Quantities (RQs), be reported to the National Response Center (See 49 U.S.C. 9656(a)). Prior to the passage of CERCLA, the U.S. Environmental Protection Agency (EPA) established RQs for designated hazardous substances under the Federal Water Pollution Control Act (FWPCA); RQs were set at 1, 10, 100, 1,000, and 5,000 pounds. CERCLA, enacted in 1980, assigned a statutory RQ of 1 pound to all designated hazardous substances (except those set under the FWPCA) but authorized EPA to adjust the RQs as appropriate. In April 1985, EPA promulgated RQs for 340 substances and proposed adjustments for 105 of the remaining 358 CERCLA designated substances. DOT decided not to regulate CERCLA substances (except RCRA hazardous wastes and FWPCA substances) until EPA adjusts the RQs. See Advance Notice of Proposed Rulemaking, Docket HM-145E, 48 F.R. 3596, Aug. 8, 1983. Several industry organizations petitioned the U.S. Department of Transportation (DOT) in 1981 to require all shippers of CERCLA designated substances in excess of 1 pound to prepare shipping papers. The petitioners believed that carriers needed to be notified that they were transporting hazardous substances as they were subject to liability requirements under CERCLA. The petition was denied by DOT. See 46 F.R. 58086, Nov. 30, 1981.

[33] U.S. Congress, Office of Technology Assessment, "Transcript of Proceedings-OTA Workshop on State and Local Activities," unpublished typescript, May 30, 1985; Charles Batten, National Transportation Safety Board, personal communication, April 1986; and Transportation Research Board, National Academy of Sciences, *Transportation of Hazardous Materials: Toward a National Strategy: Special Report 197* (Washington DC: National Academy Press, 1983).

[34] Certain shipments of ORM-A, B, C, and D materials do not have to be accompanied by shipping papers. See 49 CFR 172.200. These exceptions do not apply if the material is a hazardous substance or a hazardous waste.

[35] The U.S. Department of Transportation regulations specify that a U.S. Environmental Protection Agency manifest may be used in place of a shipping paper. See 49 CFR 172.205. For additional information on hazardous waste requirements, see app. A.

Figure 4-2.—Sample Shipping Document

H **Straight Bill of Lading – Short Form—Original— Not Negotiable**

AT: TANK CAR OR TRUCK NO

F.O.B., SHIPPED 1 FRI →

[redacted] Mail or street address of consignee — For purpose of notification only

CUST PO NO	CUST / ADOR CODf	REQUESTED SHIP DATE	DATE SHIPPED	ORDER DOCUMENT NO.

CONSIGNED TO / DESTINATION

FOR PREPAID SHIPMENTS
SHOW DOCUMENT NO ON FREIGHT BILL
Mail Prepaid Freight Bills With o Copy of the Bill of Lading To

CARRIER No

DATE PRINTED

R JTE:

NO. PKGS.	TYPE OF CONTAINER	H.M.	☒	† DESCRIPTION (00 NOT ABBREVIATE)	WNT (U.S. TO COR.)	CLASS OR RATE	✓

EMERGENCY PHONE NUMBERS: CHEMTREC → (Day or Night)

(800) 424-9300
WASH., D.C. 483-7616
OUTSIDE U.S.A. (202) 483-7616

INSTRUCTIONS:

LEGEND
1. DOT PROPER SHIPPING NAME
2. GENERIC/TECHNICAL NAME
3. DOT HAZARD CLASS
• UN/NA NUMBER
4. DOT HAZARD LABELS
5. DOT HAZARD PLACARD
6. FREIGHT CLASSIFICATION COOS
7. FREIGHT CLASSIFICATION DESCRIPTION
0. *RELEASE* VALUE
9. DOT EXEMPTION NO,

Subject to Section 7 of conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of C -)

If charges are to be prepaid, write 01 stamp here "To be Prepaid."

Received $ _____ to apply in prepayment of the charges on the property described hereon

Agent or Cashier

Per _____
(The signature here acknowledges only the amount prepaid.)

Charges Advanced:
$ _____

"Shipper's imprint in lieu of stamp; not a part of bill of lading approved by the Department of Transportation."

• DESCRIPTION(S) AND WEIGHTS(S) INDICATED ON THIS BILL OF LADING ARE CORRECT; SUBJECT TO VERIFICATION BY THE WEIGHING AND INSPECTION BUREAU HAVING JURISDICTION
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's ACCORDING TO AGREEMENT"
NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property
The agreed or declared value of the property is hereby specifically stated by the shipper to be not • xcoeding [SEE ABOVE IN DESCRIPTION)

per

†THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS AR.! PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION

†The fibre boxes barrels drums, carboys, cans, paper bags, pails or tubes used for this shipment color, to the specifications set forth in box and drummaker's certificate thereon, and all other requirements of the [redacted] tariff which governs the transportation of this shipment

DRIVER'S SIGNATURE HEREON INDICATES RECEIPT OF REQUIRED PLACARDS

SHIPPER, PER: _____
PERMANENT SHIPPER ADDRESS

CARRIER AGENT, PER: _____

DATE: _____

PERMANENT POST OFFICE ADDRESS OF SHIPPER:

CUSTOMER

1

cation number assigned to it.[36] UN/NA identification numbers, which also must be marked on packages and bulk containers, correspond to emergency response information provided in a guidebook that is published and distributed nationally by DOT.[37] The DOT Guidebook contains information on potential health, fire, or explosion hazards and basic emergency action instructions. Isolation and evacuation information is also provided for a limited number of highly hazardous substances. DOT has requested $544,000 for fiscal year 1987 to revise the *Guidebook* and print 750,000 copies.[38]

In those instances where a specific technical name of a hazardous material is not listed in the Hazardous Materials Table, a proper shipping name must be selected from general description and n.o.s. (not otherwise specified) entries corresponding to the hazard class of the material.[39] In addition, special description requirements apply to certain types of materials, such as toxic inhalants, radioactive materials, hazardous substances, empty packaging, and each mode of transport.[40]

Markings.-DOT has established marking requirements for packages, freight containers, and transport vehicles. Shippers are required to mark all packages with a capacity of 110 gallons or less with the proper shipping name of the hazardous material, including its UN/NA identification number.[41] This is done so that the contents of a package can be identified if it is separated from its shipping papers. Requirements for intermodal portable tanks, highway cargo tanks, and rail tank cars specify that the UN/NA identification number be displayed on a placard or an orange rectangular panel.[42] Additional requirements are specified for liquids, packages containing ORM materials, and hazardous substances. For example, packages containing liquid hazardous materials must be marked "THIS SIDE UP" or "THIS END UP."[43] EPA also requires special markings for packages of hazardous wastes identifying the shipper and indicating that Federal law prohibits improper disposal of wastes.[44] Another type of marking requirement applies to container manufacturers and other persons who test, repair, or recondition containers; DOT specification numbers, serial numbers, and test inspection dates must be marked on containers as certification that specification requirements have been met.[45]

Labels.–Labels are symbolic representations of the hazards associated with a particular material. Figure 4-3 contains some examples of DOT labels. They are required on most packages and must be printed on or affixed near the marked shipping name.[46] The Hazardous Materials Table indicates which materials require labels. Shipments of limited quantities of certain hazardous materials may not require labeling; these exceptions are referenced in the Hazardous Materials Table (in column 5(a) under packaging exceptions). Additionally, some hazardous materials are exempt from labeling requirements. Exemptions are listed in 49 CFR 172.400 and include materials classed as ORM-A, B, C, D, or E (if other hazardous materials that must be labeled are not contained in the same package).

[36] United Nations/North America (UN/NA) numbers consist of the prefix "UN" or "NA" followed by a four digit number. UN/NA numbers were adopted by the U.S. Department of Transportation in 1980 to facilitate international transportation of hazardous materials. The UN numbers are based on an international system developed by the United Nations Committee of Experts on the Transport of Dangerous Goods. The NA numbers identify materials not recognized for international shipment by the U.N. Committee except for transport between the United States and Canada. The change was intended to minimize the burden on shippers, avoid differing shipping paper descriptions and package markings for domestic and international shipments, and improve the capability of emergency response personnel to quickly identify hazardous materials. See 45 F.R. 34571, May 22, 1980.

[37] U.S. Department of Transportation, 1984 *Emergency Response Guidebook,* P 5800.3 (Washington, DC: 1984). Additional information on emergency response training is provided in ch. 5.

[38] Paul Rothberg, Hazardous *Materials Transportation: Laws, Regulations, and Policy,* Issue Brief IB76026 (Washington, DC: Congressional Research Service, Science Policy Research Division, Mar. 11, 1985), p. 5.

[39] 49 CFR 172.101 (c)(13).

[40] 49 CFR 172.203. The U.S. Department of Transportation recently amended the regulations for describing a packaging that contains the residue of a hazardous material. Placarding requirements for rail tank cars were also changed from "Empty" to "Residue." See 50 F.R. 39005, Sept. 26, 1985. Regulations for shipping descriptions, marking, labeling, placarding, and packaging of toxic inhalants, such as methyl isocyanate, were issued on Oct. 8, 1985. See 50 F.R. 41092.

[41] 49 CFR 172.301.

[42] 49 CFR 172.326, .328, and .330. Specific instructions regarding the display of identification number markings are provided in the regulations. It should be noted that identification numbers may not by displayed on a poison gas, radioactive, or explosives placard. See 49 CFR 172.332-.338.

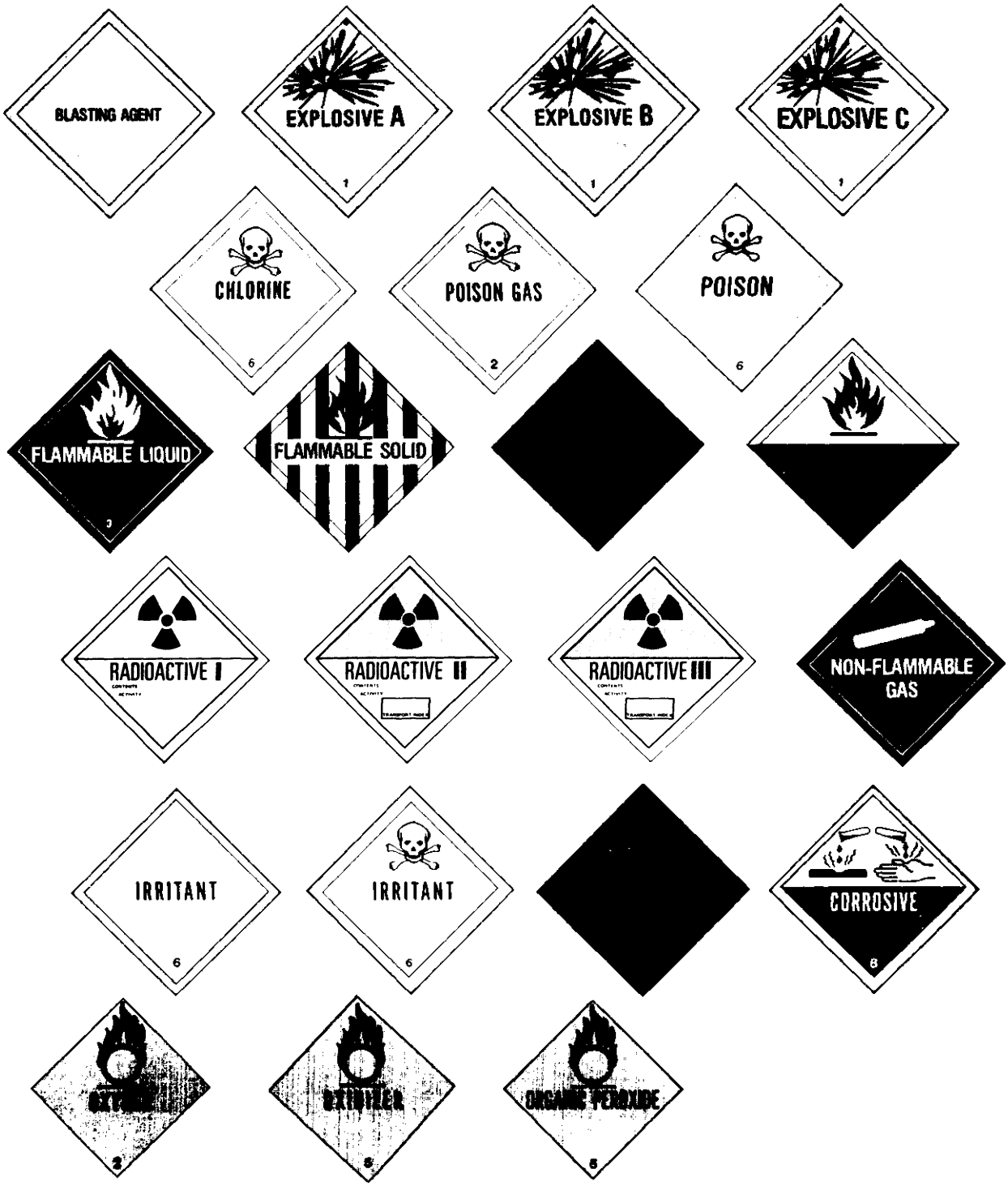
[43] 49 CFR 172.312, .316, and .324.

[44] 40 CFR 262.32. The U.S. Environmental protection Agency's requirements for hazardous waste shipments are described in app. A.

[45] 49 CFR 173, 178, and 179.

[46] Requirements for the placement of labels can be found in 49 CFR 172.406. Label designs by hazard class are also specified in the regulations. See 49 CFR 407-450.

Figure 4-3.— Examples of Labels for Hazardous Materials Packages



SOURCE: 49 CFR 172, Subpart E

Photo credit: Office *of Technology Assessment based on 49 CFR 172.332*

1203 is the UN/NA identification number for gasoline.

Special labels, such as "MAGNETIZED MATERIALS" or "CARGO AIRCRAFT ONLY," are required under appropriate circumstances. In addition, packages containing materials that meet more than one hazard class definition may require multiple labels. For example, a material classed as a Poison B Liquid that also meets the definition of a Flammable Liquid must be labeled "POISON" and "FLAMMABLE LIQUID."[47]

Placards.–Placards are symbols that are placed on the ends and sides of motor vehicles, railcars, and freight containers indicating the hazards of the cargo. UN/NA identification numbers may be displayed on some placards, as noted above in the discussion of marking requirements. Placards are extremely important to emergency response personnel in the event of an accident because they are highly visible. Sample placards are shown in figure 4-4.

DOT has developed tables, presented in tables 4-5 and 4-6, that indicate the placards required for each hazard class. For mixed loads of some hazardous materials (those listed in table 4-6) shipped in freight containers, motor vehicles, or railcars, a "DANGEROUS" placard may be substituted for the placards required for each hazard class; however, if the weight of one material in a mixed load exceeds 5,000 pounds, a separate placard for it must also be affixed.[48] Placarding is the joint responsibility of shippers and carriers. Placard designs and rules for providing and affixing placards are specified by DOT.[49]

Placards are not required for all shipments of hazardous materials, such as etiologic agents; materials classed as ORM-A, B, C, D, or E; or limited quantities of hazardous materials.[50] Moreover, motor vehicles or freight containers transported by highway containing less than 1,000 pounds of certain types of hazardous materials (those listed in table 4-6) do not have to be placarded. This exclusion also applies to motor vehicles or freight containers carried by railcar (e.g., piggyback service).[51]

[47] 49 CFR 172.402, .403, .404, and .405.

[48] 49 CFR 172. 504(b).

[49] Rules for providing and affixing placards are contained in 49 CFR 172.506, .507, .508, .512, and .514. Special placarding provisions for railcars are listed in 49 CFR 172.510. Display and design specifications are specified in 49 CFR 172.516-.558.

[50] 49 CFR 172.500.

[51] 49 CFR 172.504(c).

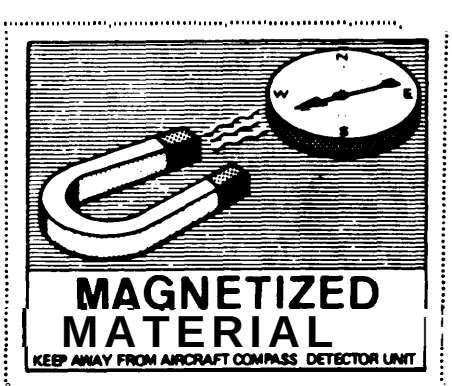


Photo *credit:* 49 *CFR* 172.446 *and* 172.446

Two examples of special labels required by the Department of Transportation.

Figure 4-4.—Examples of Hazardous Materials Placards

SOURCE: 49 CFR 172, Subpart F.

Packaging Requirements.–The historical summary at the beginning of this chapter underscores the fact that current packaging regulations, published in 49 CFR 173, 178, and 179, are a compilation of detailed specifications developed over a 70-year period. Part 173 indicates the types of packages authorized for each hazard class as well as regulations governing the reuse and reconditioning of packagings and qualification, maintenance, and use requirements for rail tank cars, highway cargo tanks, intermodal portable tanks, and cylinders. Small quantities of some hazardous materials maybe trans-

Table 4-5.—Department of Transportation Placarding Table 1

If the motor vehicle, rail car, or freight container contains a material classed (described) as—	The motor vehicle, rail car, or freight container must be placarded on each aide and each end—
Class A ~	EXPLOSIVES A.[1]
Class B ~	EXPLOSIVES B.[2]
Poison A	*POISON* GAS.[3]
Flammable solid (DANGEROUS WHEN WET label only)	FLAMMABLE SOLID W.[3]
Radioactive material	RADIOACTIVE.[4, 5]
Radioactive material:	
uranium hexafluoride, fissile (containing more than 1.0 pet u =9...	RADIOACTIVE [4] ANO CORROSIVE.[6]
Uranium hexafluoride, low specific activity (containing 1.0 pet of less U [235])	RADIOACTIVE [4, 5] AND CORROSIVE.[6]

'Sac § 172510(4.
[2]EXPLOSIVES B placard not required if the freight container, motor vehicle, or rail car contains class A explosives and is placarded EXPLOSIVES A se required.
[3]FLAMMABLE SOLID "W" placard is required only when the DANGEROUS WHEN WET label is specified in § 172.101 for a material classed as a Flammable solid.
[4]Applies only to any quantity of packages bearing the RADIOACTIVE YELLOW III label. (See § 172.402.)
[5]See § 173.403, for full-load shipments of radioactive materials meeting the definition of low specific activity when transported pursuant to § 173.425(b).
[6]CORROSIVE placard not required for shipments of less than 1000 pounds gross weight.

SOURCE: 49 *CFR* 172.504.

Table 4=6.-Department of Transportation Placarding Table 2

If the motor vehicle, rail car or freight container contains a material classed (described) –	The motor Vehicle, rail car, or freight container must be placarded on each aide and each end—
Class C ~	DANGEROUS.[1, 2]
Blasting aim	BLASTING AGENTS,*.[10]
Nonflammable gas	NONFLAMMABLE GAS.[7]
Nonflammable gas (chlorine)	CHLORINE.[7]
Nonflammable gae (fluorine)	POISON.
Nonflammable gas (oxygen, cryogenic Lou@	OXYGEN.
Flammable gas	FLAMMABLE GAS.[c]
Combustible liquid	COMBUSTIBLE.".[4]
Flammable liquid	FLAMMABLE.
Flammable w	FLAMMABLE SOLID.[8]
~	OXIDIZER.[9, 10]
Organic ~	ORGANIC PEROXIDE.
Poison B	PotsON.
Corrosive material	CORROSIVE.[7]
Irritating material	DANGEROUS.

[1]Applies only to a class C explosive required to be labeled with an EXPLOSIVE C label.
[2][Reserved]
'COMBUSTIBLE placard required onty when a material classed ss a combustible liquid is transported in a packaging having a rated capacity of more than 110 gallons, a cargo tank, or a tank car.
[4]A FLAMMABLE placard may be used on a cargo tank or portable tank during transportation by highway, rail or water, and on a compartmented tank car containing materials classed as Flammable liquid and Combustible However, no EMPTY placard may be displayed on-an-"empty" Combustible liquid tank car.
[8]Except when offered for transportation by water, a FLAMMABLE placard may be displayed in place SOLID placard except when a DANGEROUS WHEN WET label is specified for the material in sec. 172.101. (See table 1.[8]this section.)
[9]See § 173.245(b) of this subchapter for authorized exceptions.

SOURCE: 49 *CFR 172.504.*

ported in nonspecification packaging if specified performance tests and other requirements are met.[52] The Hazardous Materials Table references the appropriate section of Part 173 for each hazardous material and packaging exceptions for limited quantities of certain hazardous materials.

[52]These exceptions apply to small quantities of flammable liquids, flammable solids, oxidizers, organic peroxides, corrosive materials, Poison B, and ORM-A, B, C, and radioactive materials that also meet the definition of one or more of these hazard classes. See 49 CFR 173.4.

Parts 178 and 179 contain the specifications for each package type including test standards that must be followed by container manufacturers. Hundreds of packaging exemptions are still issued by RSPA staff each year, authorizing the use of packaging that differ from approved DOT specifications. For a more detailed discussion of packaging regulations, see chapter 3.

International Regulations.-Two major international standard-setting bodies publish recommended

requirements for intermodal shipments of hazardous materials: the United Nations (U. N.) and the International Atomic Energy Agency (IAEA). RSPA representatives participate in the development of these international codes and others that deal solely with air and water transportation (see discussion below). Comments are solicited from industry and the public on proposed international regulatory activities, even though a formal public participation mechanism, comparable to the Administrative Procedures Act for domestic regulations, does not exist.[53] Regulations for the transportation of hazardous materials adopted by these international agencies are applicable to U.S. shippers and carriers that trade abroad.

The main body of the United Nations dealing with hazardous materials transportation policy is the Economic and Social Council (ECOSOC), which reports to the U.N. General Assembly in New York. ECOSOC works through specialized commissions and committees. The primary groups concerned with hazardous materials are the Economic Com-mission for Europe and the Committee of Experts on the Transport of Dangerous Goods. The Committee of Experts is comprised of 10 members including the United States, Canada, several European Nations, and the U. S.S.R.[54]

The Committee of Experts has published a set of recommendations regarding classification and identification numbering systems for hazardous materials, labeling, and placarding requirements, and the use of objective performance standards for nonbulk packaging.[55] DOT has adopted some of the U.N. recommendations, such as the identification numbering systems for hazardous materials. Other recommendations, such as performance standards, have not yet been adopted by DOT, although an advance notice proposing their adoption has been published in the *Federal Register*.[56] Additional information on the U.N. performance standards is presented in chapter 3.

The Canadian Government has recently adopted new rules, the Transportation of Dangerous Goods (TDG) Regulations, based on the U.N. system.[57] Transport Canada, a multimodal national agency responsible for these requirements, issued rules in July 1985 covering classification, placarding, marking, labeling, and shipping papers. In October 1985, DOT issued a rule permitting shipments between Canada and the United States in conformance with Canada's TDG Regulations and certain additional DOT requirements. Packaging standards, except for specific types of hazardous materials (limited quantities and consumer commodities), have not yet been published by Transport Canada.[58]

The International Atomic Energy Agency first became involved with the transportation of radioactive materials in the late 1950s. The first set of recommendations—Regulations *for the Safe Transport of Radioactive Materials, Safety Series No. 6*– was published in 1961. The recommendations have been revised and updated over the years and serve as the basis for regulatory programs established by IAEA member nations. DOT has incorporated Safety Series No. 6 into its regulations by reference with certain modifications for application to radioactive materials being imported to or exported from the United States.[59] Other international organizations such as the International Maritime Organiza-

[53] The Administrative procedures Act (APA) prescribes rules for the adoption of regulations by Federal agencies. Agencies are required to publish proposed and final rulemakings in the *Federal Register* and provide an opportunity for public comment. Any international requirements proposed for incorporation into the U.S. Department of Transportation's hazardous materials regulations are subject to APA procedures. See 5 U. SC. 553.

[54] A working group under the Committee of Experts, the Group of Rapporteurs on the Transport of Dangerous Goods, is responsible for developing detailed positions on various issues for formal consideration by the full committee. Another subgroup is the Group of Experts on Explosives.

[55] United Nations, *Transport of Dangerous Goods—Recommendations of the Committee of Experts on the Transport of Dangerous Goods,* third revised edition (New York: 1984).

[56] 47 FR 16268, Apr. 15, 1982.

[57] Until the early 1970s, the U.S. Department of Transportation's hazardous materials regulations were adopted by the Canadian Transport Commission (CTC) and applied to rail transport in Canada (49 CFR 173.8 stated that hazardous materials shipped in accordance with CTC regulations were acceptable for transport in the United States). CTC did not establish national regulations for the highway mode. Thus, shippers and carriers involved with transborder shipments of hazardous materials were not concerned with conflicting regulatory requirements. As new regulations were adopted by the United States in the late 1970s, CTC did not amend its code accordingly.

[58] 50 FR 41516, Oct. 11, 1985.49 CFR 173.8 was replaced by a new section, 49 CFR 171. 12a, describing requirements for U.S.-Canadian shipments.

[59] 49 CFR 171.12(e), 173.416, and 173.417. Radioactive materials passing through the United States in the course of being shipped between places outside the United States are included.

tion and the International Civil Aviation Organization (discussed below) have incorporated IAEA requirements into their codes. IAEA recommendations include package design, testing, and inspection procedures; requirements for limiting human exposure to radiation; and controls for transport and storage while in transit.

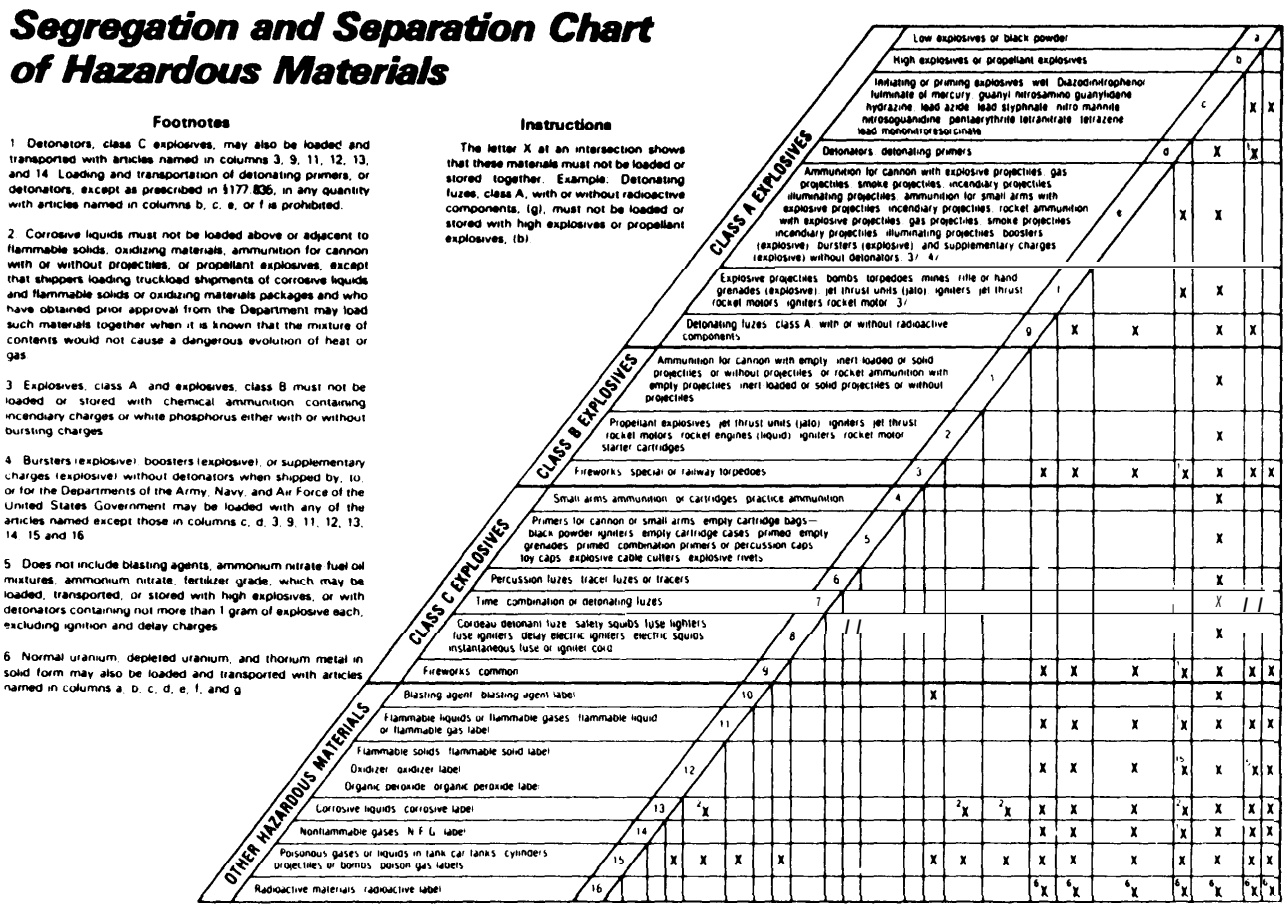
Highway

RSPA regulations for the highway mode apply to common, contract, and private carriers. Part 177 of 49 CFR specifies regulations for accepting freight, loading and unloading, stowage, routing, and handling. A special chart, shown in figure 4-5, is provided in the regulations indicating materials that must not be loaded or stored together (similar charts are provided for other transport modes). A general requirement applicable to all highway shipments is that they be transported without unnecessary delay, from loading to arrival at their destinations.[60] Recognizing the safety concerns associated with tunnels, the regulations allow State and municipal requirements restricting hazardous materials shipments (except radioactive materials) through vehicular tunnels used for mass transport.[61] Other in-transit regulations cover the actions that must be taken by carriers and shippers in the event of an

[60] 49 CFR 177.853(a).

[61] 49 CFR 177.810. When the U.S. Department of Transportation issued HM-164, this section was amended to exclude shipments of radioactive materials so that States would be able to: "evaluate the site-specific risks involved over various routes without being hampered by locally imposed constraints which may be counterproductive." See 46 F.R. 5308, Jan. 19, 1981.

Figure 4=5.–Department of Transportation Segregation and Separation Chart for the Highway Mode



SOURCE: 49 CFR 177.S48.

accident.[62] In addition, carriers of flammable cryogenic liquids in portable tanks or cargo tanks are required to register with RSPA and undergo training.[63]

While routing regulations are generally considered to be an appropriate local-level responsibility, RSPA has established a national highway routing rule for radioactive materials.[64] This rule, commonly referred to as DOT Docket HM-164, was promulgated because a large number of States and localities had proposed or enacted legislation banning or restricting the transport of radioactive materials through their jurisdictions. Following an extensive public comment period, DOT concluded that, "the public risks in transporting these materials by highway are too low to justify the unilateral imposition by local governments of bans and other severe restrictions."[65] However, DOT found that certain actions could further minimize the risks associated with such shipments. Thus, HM-164 requires carriers of all placarded shipments of radioactive materials, including radiopharmaceuticals and low-level wastes, to operate on routes that minimize radiological risk.[66] Carriers of high-level radioactive materials must operate over a "preferred" route that is selected to reduce transit time. Such a route consists of either an Interstate highway system (including the use of an Interstate bypass around a city when available) or an alternative State-designated route selected by a State routing agency in accordance with DOT guidelines.[67] Drivers of vehicles that transport high-level radioactive materials are also required to receive written training, and carriers must prepare a written route plan.

An appendix to HM-164 provides policy guidance for State and local authorities for establishing requirements that are consistent with Federal law and regulations. The implementation of HM-164 by RSPA, Federal routing guidelines, and existing State and local routing restrictions are discussed later in this chapter.

The Bureau of Motor Carrier Safety (BMCS) within the Federal Highway Administration is responsible for developing some hazardous materials regulations and enforcing RSPA regulations for the highway mode, including requirements for tank truck manufacture and maintenance. BMCS, under its general authority to set motor carrier safety standards, also regulates motor carrier operations, drivers, and vehicles used for transporting hazardous materials.

Motor carrier safety regulations, incorporated by reference into RSPA's hazardous materials regulations in 1978, are located in Parts 301 to 399 of 49 CFR. However, the driver qualification regulations are limited; for example, while drivers must take a written test, it is an open book exam and a passing grade is not required.[68] In addition, the motor carrier regulations do not provide for driver disqualification based on a driver's cumulative record of convictions, and the disqualifying driver offenses apply only when a driver operates a commercial vehicle and is on duty at the time of an offense.[69] Furthermore, Federal regulations cover mainly Interstate drivers, and State driver requirements vary considerably.* Improvements in driver qualification and training requirements have been proposed; these suggestions and State requirements are described later in this chapter.

Special regulations for the transportation of hazardous materials, contained in Part 397, prescribe requirements for compliance with Federal, State, and local laws; parking; attendance and surveillance of vehicles; and operating (e.g., requirements for fueling and examining tires). A general routing requirement instructs carriers to avoid routes that go through or near heavily populated areas, places where crowds are assembled, tunnels, narrow streets, or alleys, unless a practicable alternative route does not exist.[70] BMCS also requires written route plans

[62] 49 CFR 177, Subpart D.
[63] 49 CFR 177.816 and 177.826.
[64] 49 CFR 177.825. The routing rule, Docket HM-164, was published on Jan. 19, 1981, 46 F.R. 5316.
[65] 46 F.R. 5299, Jan. 19, 1981. See also 43 F.R. 36492, Aug. 17, 1978, and 45 F.R. 7140, Jan. 31, 1980.
[66] 49 CFR 177.825 (a).
[67] 49 CFR 177.825(b). This provision applies to highway route controlled quantities of radioactive materials as defined in 49 CFR 173.403(1).
[68] 49 CFR 391.35.
[69] See 49 CFR 391.15 and National Transportation Safety Board, *Safety Effectiveness Evaluation of Detection and Control of Unsafe Interstate Commercial Drivers* (Washington, DC: Feb. 15, 1980), pp. 15-18.
*Federal motor carrier regulations do apply to intrastate carriers of hazardous wastes, hazardous substances, and flammable cryogenics.
[70] 49 CFR 397.9(a). This requirement does not apply to radioactive materials covered by HM-164, 49 CFR 177.825.

for shipments of Class A or Class B explosives by motor vehicle that comply with the general routing rule.[71] However, when the motor carrier safety regulations were incorporated into the hazardous materials regulations, these routing rules were not incorporated. Another provision in the motor carrier regulations, requiring compliance with State and local regulations unless they are at variance with more stringent Federal regulations, was not incorporated.

In addition, BMCS has established minimum financial responsibility requirements for private and for-hire carriers of hazardous materials as required by the Motor Carrier Act of 1980. Minimum levels of coverage have been set at $1 million and $5 million, depending on the nature of the cargo. However, exemptions from these requirements have been established for intrastate nonbulk carriers of hazardous materials except high-level radioactive materials and motor vehicles with gross vehicle weight ratings of less than 10,000 pounds except for vehicles used to transport Class A or B explosives, poison gases, or high-level radioactive materials.[72]

Another BMCS activity is the administration of the Motor Carrier Safety Assistance Program (MCSAP), which provides assistance to States for enforcement of motor carrier regulations, including some of those governing hazardous materials transportation on public roads.[73] MCSAP is discussed later in this chapter.

In addition to the DOT regulations, the National Motor Freight Traffic Association, a division of the American Trucking Association, publishes the National Motor Freight Classification (NMFC) which prescribes packaging to be used to ship all goods by highway, including hazardous materials. Except in one instance, the NMFC rules are not referenced in the Federal regulations, but they do provide guidance for shippers handling materials that do not have to be transported in DOT specification containers. In addition, noncompliance with the NMFC requirements may limit the ability of a shipper to collect from a motor carrier in the event of damages arising during transport.

Rail

Hazardous materials regulations for rail transport appear in 49 CFR 174. The regulations contain general operating, handling, and loading and unloading requirements, as well as detailed requirements for various hazard classes. For example, specific requirements for segregating hazardous materials in a car and for the placement of cars containing certain types of material are included.[74] Carriers are also instructed to forward shipments of hazardous materials within 48 hours after acceptance at the originating point, or receipt at any yard, transfer station, or interchange point.[75] Special loading and bracing requirements for container-on-flatcar, trailer-on-flatcar, and portable tanks are provided, and procedures for unloading tank cars are also specified.[76]

The Federal Railroad Administration (FRA) enforces regulations pertaining to the transportation of hazardous materials by rail, including those governing the manufacture and maintenance of tank cars used to ship hazardous materials. Additionally, FRA has jurisdiction over all areas of rail safety such as track maintenance, equipment standards, and operating practices. Rail safety regulations are published in 49 CFR Parts 209 to 236.

As noted previously, AAR has been involved in developing hazardous materials regulations since the early 1900s. However, the organization currently plays a less prominent role in the regulatory process. Prior to the formation of DOT, counsel for ICC recommended withdrawal of the broad delegation of authority that had been granted to the Bureau of Explosives, a legal opinion reiterated by DOT when it took over ICC's functions in 1967. In the late 1970s, DOT assumed responsibility for approving regulatory exemptions, a task performed by the Bureau of Explosives for decades.[77] In 1985, the

[71] 49 CFR 397.9(b), The carrier must furnish a copy of the plan to the driver. Drivers may prepare written plans when trips begin at locations other than the carrier's terminal.

[72] 49 CFR 387.

[73] The Motor Carrier Safety Assistance Program was authorized by the Surface Transportation Act of 1982, Public Law 97-424.

[74] See 49 CFR 174.81 for cargo segregation requirements; a table, similar to the one for highway shipments (see figure 4-5) is provided. Regulations regarding the placement of cars can be found in 49 CFR 174.83-.93.

[75] 49 CFR 174.14.

[76] 49 CFR 174.61, 174.63, and *174.67*.

[77] U.S. Department of Transportation Docket No. HM-163.

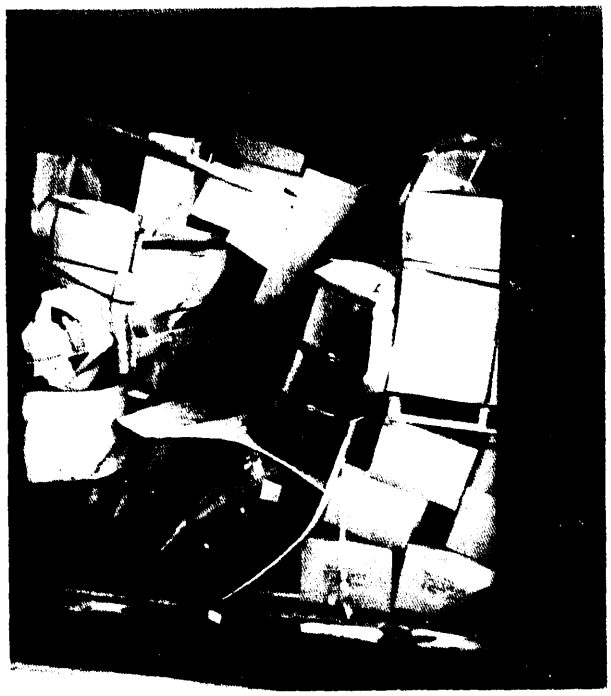


Photo credit: Research and Special Programs Administration, DOT

Inadequate blocking and bracing of containers for rail transportation can cause damage and spills.

Bureau of Explosives was renamed Hazardous Materials Systems; it continues to classify and review new explosives and other materials.

Other AAR groups publish equipment standards and specifications, and engineering offices certify construction and repair shops. The AAR Tank Car Committee is involved in all aspects of tank car construction, maintenance, and repair, including those used for hazardous and nonhazardous materials. The committee must approve new tank car designs before they are submitted to DOT. The DOT hazardous materials regulations specify procedures for securing AAR approval of tank cars or changes to existing specifications, and providing certificates of construction.[78]

Another organization involved with rail transport is the Uniform Classification Committee, which publishes the Uniform Freight Classification (UFC). The UFC serves a similar function to that of the NMFC for the highway mode.

[78]49 CFR 179.3, .4 and .5.

Air

RSPA regulations for the air mode are specified in 49 CFR 175. They cover special requirements for certain hazard classes as well as general loading, unloading, and handling requirements. The Hazardous Materials Table in 49 CFR 172 indicates the quantities per package of materials that may be transported on passenger and cargo aircraft as well as those materials, such as Class A explosives, forbidden from being offered or accepted for transport.[79] The regulations also require that pilots be informed of any hazardous materials carried in an aircraft. 80

Responsibility for the enforcement of hazardous materials regulations for the air mode lies with FAA. Inspections of hazardous materials packages on domestic and foreign carriers are conducted at U.S. airports and in airport cargo-handling areas. FAA also issues and enforces general safety rules and regulations, such as manufacture, operation, and maintenance requirements for aircraft.

The Air Transport Association represents the concerns of domestic airlines. Its Restricted Articles Board was responsible for publishing "CAB Restricted Articles Tariff No. 6-D" in 1965. Tariff 6-D originally contained a restatement of the DOT hazardous materials regulations for air shipments as well as additional requirements established by air carriers. In 1977, Tariff 6-D was replaced by Circular 6-D in response to a CAB order prohibiting the publication of portions of the CFR in tariffs; Tariff 6-D was rewritten to include only more restrictive carrier regulations.[81] Federal regulations were effectively replaced by Circular 6-D, because it was more readable and useful as a daily tool and could be updated more easily to accommodate regulatory amendments.

[79]Quantity limitations aboard aircraft are specified in 49 CFR 175.75. No person may carry more than 50 pounds net weight of hazardous materials (and in addition thereto, 150 pounds net weight of nonflammable compressed gas) on a passenger-carrying aircraft in an accessible cargo compartment or freight container, an accessible cargo container, or an accessible cargo compartment in a cargo-only aircraft. Hearings were held by the U.S. Department of Transportation during 1985 in response to a petition for rulemaking submitted by Japan Airlines to remove current weight limitations of 50 pounds allowed on passenger aircraft. See 50 F.R. 6013, Feb. 13, 1985.

[80]49 CFR 175.33.

[81]Civil Aeronautics Board Order 77-2-59.

The role of the Restricted Articles Board has been diminished in recent years due to deregulation of domestic air carriers and the increasing influence of international organizations such as the International Air Transport Association (IATA). IATA publishes restricted articles regulations for international use similar to those in Circular 6-D. Increasing numbers of domestic carriers are relying exclusively on the IATA regulations instead of Circular 6-D, as carriers prefer to follow only one set of instructions,[82] The Restricted Articles Board continues to work with carriers in restricting the types of hazardous materials accepted for transport beyond the limitations set by DOT.

In 1982, the International Civil Aviation Organization (ICAO), an affiliate of the United Nations, adopted Technical Instructions (TI) based on the U.N. recommendations for air transportation of dangerous goods. All air shipments from the United States and all U.S. flag carriers must adhere to the TI, as the United States is a signatory to the convention under which they were adopted. In addition, DOT has authorized the use of the TI for domestic air transportation and for any highway transportation related to the air distribution of a material.[83] IATA has revised its regulations so that they are based primarily on the ICAO requirements.

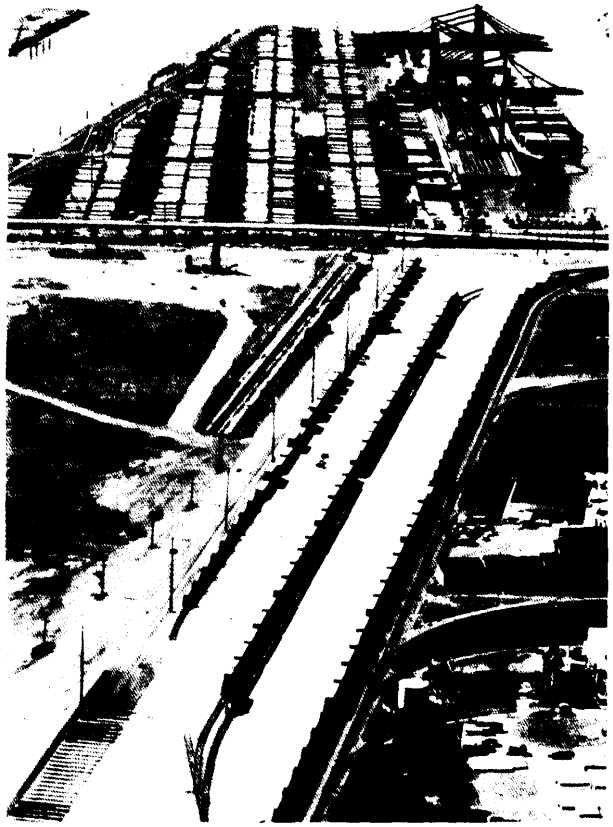


Photo credit: Sea/and, provided by Railway Age

Hazardous materials travel by all modes of transportation.

Water

RSPA regulations for the water mode apply only to nonbulk shipments.[84] Promulgated in 49 CFR 176, the regulations address requirements for accepting freight, loading and unloading, stowage, and handling. Carriers or agents are also required to prepare a dangerous cargo manifest, which must be kept in a designated holder on or near the vessel's bridge.[85]

The Coast Guard regulates bulk transport by water. Requirements for the design, construction, equipment, maintenance, and inspection of commercial vessels, including those used for bulk hazardous material shipments are contained in 46 CFR Parts D, I, N, and 'O. Additional requirements for certain ships and barges that carry bulk oil shipments are prescribed in 33 CFR 157. Coast Guard requirements for dangerous cargo require vessels to notify the appropriate captain of the port in advance of arrivals and departures.[86]

82 Frank Black, Air Transport Association of America, written communication, Feb. 12, 1986.

83 49 CFR 171.11.

84 Vessels subject to regulation are specified in 49 CFR 176.5. For example, public vessels not engaged in commercial service and vessels of 500 gross tons or smaller, engaged in fisheries are not covered.

85 The manifest includes information about the vessel and the cargo and is prepared based on information from shipping papers. 49 CFR 176.30.

86 33 CFR 211 and 213. Dangerous cargo includes Class A explosives, oxidizing materials or blasting agents, large quantity radioactive materials or certain fissile radioactive materials, and bulk shipments of a specified list of materials (see 33 CFR 160.203 and 46 CFR 153 (table 1)). General prenotification requirements have also been established for all vessels on voyages of 24 hours or more destined for the United States and for vessels bound for ports on the Great Lakes (33 CFR 160.207 and 160.209).

Coast Guard inspection and enforcement activities are carried out in port areas and on domestic and foreign ships and barges operating in the navigable waters of the United States. The National Cargo Bureau, inc., has been authorized by the Coast Guard to assist with the administration of the hazardous materials regulations applicable to the safe loading of vessels. Surveyors employed by the Bureau inspect vessels to determine their suitability for loading and stowing hazardous materials, recommend stowage requirements, and issue certificates of loading.'[87]

The Safety of Life at Sea convention of 1960 outlined requirements for ship construction and safety that set the stage for the development of an international maritime code pertaining to the movement of hazardous materials. The International Maritime Organization (IMO), formerly called the Intergovernmental Maritime Consultative Organization, worked with the U.N. Committee of Experts to establish requirements addressing classification, identification, documentation, labeling, marking, and packaging." These requirements, referred to as the International Maritime Dangerous Goods (IMDG) Code, may be followed, with certain limitations, by shippers and carriers who import to or export from the United States.[89] In addition, RSPA has authorized the use of IMDG requirements for packaging, marking, labeling, classification, description, certification, and placarding for most domestic shipments by vessel, as well as for transportation by motor vehicle used in connection with the discharge or loading of a vessel if the vehicle does not operate on a public street or highway.'"[90] To facilitate the use of the IMDG Code, RSPA has incorporated an optional Hazardous Materials Table into 49 CFR based on IMO classifications and requirements.[91]

Related Federal Agencies and Programs

While DOT has primary jurisdiction over the transportation of hazardous materials, three other Federal agencies have overlapping regulatory responsibilities—EPA, NRC, and OSHA. In addition, ICC grants motor carriers authorization to operate and requires carriers subject to its jurisdiction to publish rates. DOE and DOD as shippers of hazardous materials have also established transportation programs and requirements. Another agency, NTSB, is concerned with investigations of transportation accidents.

Environmental Protection Agency

EPA manages several programs that affect the transportation of certain hazardous materials. The Resource Conservation and Recovery Act (RCRA) requires EPA to establish requirements for transporters of hazardous wastes; EPA has adopted DOT's regulations for hazard communication, packaging, and reporting discharges and has enacted additional notification, marking, manifest, and cleanup requirements. However, the characteristics used by EPA to identify a waste are different from DOT's hazard classes. Thus, shippers and carriers of hazardous wastes must understand and comply with both classification systems. A Memorandum of Understanding between EPA and DOT refers to investigation, enforcement, and information-sharing responsibilities under RCRA.[92] Appendix A contains additional information on EPA and DOT regulations for the transportation of hazardous wastes.

In 1981, a guidance manual for shippers and carriers of hazardous wastes was prepared by EPA and DOT to explain the interface between the regula-

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[87] 49 CFR 176.18. The National Cargo Bureau is a nonprofit organization established in 1952 to perform vessel inspections. The directorship of the bureau is composed of government and industry representatives. See U.S. General Accounting Office, *Management Improvement Could Enhance Enforcement of Coast Guard Marine Safety Programs*, GAO/RCED-85-59 (Washington, DC: Aug. 15, 1985).

[88] "The Intergovernmental Maritime Organization (IMO) created by a convention adopted by the United Nations Maritime Conference in Geneva in 1948, was the first regulatory body to adopt the U.N. standards. More than 100 countries are members of IMO.

[89] 49 CFR 171.12.

[90] 49 CFR 171.12 and 176.11. International Maritime Dangerous Goods (IMDG) regulations may not be applied to transport of certain explosives, radioactive materials, or materials that are hazardous under U.S. Department of Transportation regulations but are not covered by the IMDG Code.

[91] 49 CFR 172.102. The U.S. Department of Transportation noted that this optional table is included in the interest of providing consistency with the International Maritime Dangerous Goods Code and alerting persons about the international requirements.

[92] 45 F.R. 51645, Aug. 4, 1980.

Photo credit: Waste Age Magazine

Personnel wearing appropriate equipment sample hazardous wastes in drums before transferring the wastes to a tank truck.

tions of the two agencies.[93] Since then, amendments to RCRA have been passed extending the scope of the law to include more than 100,000 small generators of hazardous wastes. Given the complexity of DOT and EPA regulations, the potential for confusion and inappropriate use of containers for transport is immense. However, the 1981 guidance document has not been updated, and information distributed by EPA to small generators in 1985 did not cover DOT's transportation regulations.

The Toxic Substances Control Act (TSCA) provides EPA with broad authority to regulate chemical substances and mixtures whose manufacture, processing, distribution in commerce, use, or disposal may present an unreasonable risk of injury to health or the environment.[94] One regulatory option available to EPA is to require that such substances or mixtures be accompanied by clear and adequate warnings and instructions when they are distributed, used, or disposed.[95] However, EPA regulatory action under TSCA has been limited; regulations for polychlorinated biphenyls require special markings on containers, equipment, articles, and transport vehicles.[96]

In addition to the designation of hazardous substances, CERCLA (or Superfund) and the Clean Water Act authorize EPA and the Coast Guard to provide technical information and advice to emergency response personnel and to respond to severe transportation accidents (see chapter 5). Data on accidents involving hazardous substances and wastes are also collected by EPA (see chapter 2).

[93] U.S. Environmental Protection Agency, *Hazardous Waste Transportation Interface--Guidance Manual*, prepared for the U.S. Department of Transportation, PB82-182361 (Springfield, VA: National Technical Information Service, November 1981).

[94] 15 U.S. C. 2601

[95] 15 U.S.C. 2605(a)(3).

[96] 40 CFR 761, Subpart C.

Nuclear Regulatory Commission

NRC regulates the receipt, possession, use, and transfer of byproduct, source, and special nuclear materials.[97] A Memorandum of Understanding between DOT and NRC identifies the responsibilities of each agency.[98] NRC sets standards for the design and performance of packages used to transport high-level radioactive materials and conducts inspections of its licensees. Other NRC regulations require advance notification to States of certain shipments and provide for physical security measures. DOT has regulatory authority over the design and performance of packages used to ship low-level radioactive materials and transportation operations for high-level materials including highway routing. Chapter 3 contains a detailed examination of the requirements for containers for transporting radioactive materials.

Occupational Health and Safety Administration

OSHA of the U.S. Department of Labor is responsible for safety and health in the workplace. However, the Occupational Safety and Health Act prohibits OSHA from acting where another Federal agency has already exercised its regulatory authority." A Memorandum of Understanding between DOT and OSHA delineates those areas in which DOT has exercised its authority. Transportation presents two major regulatory areas of concern—vehicle operator safety and the protection of workers handling packages containing hazardous materials at shipping or transfer facilities. DOT has established requirements for vehicle operators, so OSHA has not taken any regulatory action. OSHA has generally accepted DOT's packaging rules, although there have been instances where packages meeting DOT transport requirements could not be handled in the workplace.[100]

OSHA also requires chemical manufacturers and importers to develop or obtain Material Safety Data Sheets (MSDSs) for hazardous substances and to label containers that are used in or leave the workplace in a manner that does not conflict with DOT regulations.[101] Although the contents of MSDSs vary, they can provide basic information about hazardous materials present in a State or locality; however, they rarely provide any transportation-related information.

Interstate Commerce Commission

The regulatory role of ICC has been limited since the establishment of DOT. ICC requires carriers of hazardous materials to publish rates.[102] In addition, ICC is required to investigate whether safe and adequate service, equipment, and facilities are provided by carriers subject to ICC jurisdiction.[103] Common and contract motor carriers of hazardous materials must obtain ICC operating authority, although safety ratings for certifications are provided by BMCS. The safety rating is based on a number of factors including violations over the past 5 years, discovered by BMCS during safety management audits, and driver equipment compliance reviews; the carrier's improvement or lack thereof during the same time period; and the carrier's accident record. While BMCS currently has information stored in a computerized database on more than 200,000 interstate carriers and 25,000 hazardous materials shippers, less than 15 percent of the entries contain sufficient information for providing initial safety ratings.

Department of Energy

Under the provisions of the Nuclear Waste Policy Act (NWPA) of 1982, DOE acquired responsibility for high-level nuclear waste movement, storage, and disposal. DOE will be responsible for

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[97] The Nuclear Regulatory Commission authority is derived from the Atomic Energy Act of 1954, 42 U.S.C. 2011.

[98] 44 F.R. 38690, July 2, 1979.

[99] 29 U.S.C. 653 (b)(l).

[100] See the Occupational Safety and Health Administration (OSHA) regulations for container and portable tank storage (29 CFR 1910. lo). The OSHA regulations require use of U.S. Department of Transportation (DOT) approved metal containers and portable tanks for flammable or combustible liquids; these requirements were based on National Fire Protection Association (NFPA) standards. However, DOT permits the use of fiber and plastic containers for certain flammable materials. NFPA has amended their standards to conform to DOT regulations, but OSHA has not yet changed its regulation. However, industry has been advised that any approved DOT container is acceptable.

[101] 29 CFR 19101200 The Occupational Safety and Health Administration (OSHA) standard also requires employers in the manufacturing sector to develop written hazard communication programs to inform and train workers about hazardous substances. OSHA is considering the expansion of this standard to include employees in other Industrial sectors.

[102] 49 U.S.C. 10702 and 10761.

[103] 49 U.S.C. **11101.**

moving the waste from utility reactor sites to a geologic repository, targeted for completion in 1998, or a monitored retrievable storage facility if one is approved by Congress. DOE is authorized by DOT to approve packaging and certain operational aspects of its own research, defense, and contractor shipments, provided that DOE complies with NRC standards and employs procedures equivalent to those of NRC in the container certification process.[104] In the past, DOE has often chosen to use procedures equivalent to but not identical to NRC regulations for its shipments; however, DOE has indicated that all NWPA shipments will be conducted in accordance with NRC and DOT regulations.[105] Chapter 3 provides more information on the NWPA shipments.

Department of Defense

DOD transports many hazardous materials. When government contractors or other commercial parties transport DOD materials, DOT and NRC regulations apply. Shipments undertaken by DOD itself, however, are subject to their own requirements, which are similar to those developed by DOT and NRC.[106] DOD requirements and operations were not reviewed for this study.

National Transportation Safety Board

NTSB was created in 1966 as an arm of the Department of Transportation. A 1975 legislative action made NTSB an independent agency that reports directly to Congress. NTSB has a hazardous materials branch that investigates accidents for all modes and determines the probable cause. In addition, NTSB has conducted studies on topics such as hazardous materials regulatory compliance, risk analysis, railroad yard safety, and hazard classification. Although NTSB is not a regulatory agency, its recommendations have influenced DOT programs.

[104] 49 CFR 173.7.

[105] Memorandum of Understanding between the Research and Special Programs Administration of the U.S. Department of Transportation and the Office of Civilian Radioactive Waste Management of the U.S. Department of Energy for the Transportation of Radioactive Materials Under the Nuclear Waste Policy Act, September 1985.

[106] U.S. Department of Defense regulations are recognized by the Research and Special Programs Administration. See 49 CFR 173.7 and 177.806.

STATE AND LOCAL REGULATION

Evolution of State Programs

The entry of State governments into the field of hazardous materials transportation safety began in earnest in the early 1970s. A series of episodes involving radioactive materials prompted States to call for more vigorous efforts to monitor and control the shipment of hazardous materials. Since it was apparent that the resources committed by the Federal Government to police shipments of radioactive material—much less other, more common, forms of hazardous materials—were limited, the States began to seek ways to develop inspection and enforcement capabilities. The task was formidable since States then had virtually no organizational structure, legal authority, or personnel with specialized competence in the area of hazardous materials control.

In 1973, DOT and NRC's predecessor, the Atomic Energy Commission, undertook a program in cooperation with nine States to collect data on the amount and type of radioactive material originating in and passing through selected locations. This effort, known as the State Surveillance of Radioactive Materials Transportation (SSRMT) program, was directed at determining the magnitude of the problem posed by radioactive materials and the degree of regulatory noncompliance by shippers and carriers. The SSRMT study identified needed improvements in data collection, recordkeeping, and enforcement and pointed to the need to strengthen State-level prevention and enforcement mechanisms for all types of hazardous materials. SSRMT findings thus helped form the basis for a more substantial Federal program to aid in the development of State hazardous materials safety programs.

State Hazardous Materials Enforcement Development Program

Shortly after the SSRMT study was completed, responsibility for administering Federal-State cooperative programs was transferred to RSPA. Under RSPA, the programs were broadened to include all classes of hazardous materials, and emphasis shifted from data collection to regulatory enforcement, especially development of State organizations that could assume a greater share of inspection and enforcement functions.[107]

In 1981, RSPA initiated the State Hazardous Materials Enforcement Development (SHMED) program, designed to assist States in the enforcement of hazardous materials safety standards and regulations, primarily those pertaining to highway transportation. SHMED had two objectives: 1) decreasing the number of hazardous materials transportation accidents by strengthening State enforcement capabilities, and 2) promoting uniformity in State hazardous materials safety regulations and enforcement procedures. The SHMED program offered participating States contracts to conduct a three-phase program. The first phase, funded at a maximum of $20,000 per State, concentrated on data gathering, passage of enabling legislation, and adoption of Federal regulations. The second phase had a funding limit of $40,000 and required States to develop and implement an inspection program. In the third phase, with funding of up to $60,000, States had to establish enforcement procedures. In all, 25 States have participated in SHMED (see figure 4-6).

Compared to most Federal-State programs, SHMED is small. The 1984 budget was $1.1 million, and overall expenditures through 1986, when the program expires, will amount to just over $3 million. Nonetheless, it has had a significant influence in shaping State enforcement programs and in defining what constitutes an effective program. While some States, such as New Jersey, have established enforcement programs without SHMED support, the majority of existing State programs have had SHMED funding. Indeed, New Jersey enforcement officers participated in Maryland SHMED training programs.

[107] Stephen N. Salomon, *State Surveillance of Radioactive Materials Transportation: Final Report, NUREG-1015* (Washington, DC: U.S. Nuclear Regulatory Commission, Office of State Programs, 1984).

Motor Carrier Safety Assistance Program

When the SHMED program ends this year, Federal support of State multimodal hazardous materials enforcement capabilities will diminish, and there will be no programs specifically targeted to hazardous materials transportation by rail, water, and air. However, Federal funds for State inspection and regulatory enforcement on the highways will be available through MCSAP, authorized under the Surface Transportation Assistance Act of 1982. '08

The MCSAP grant program, administered by BMCS, is designed to improve State capabilities to enforce motor carrier safety regulations and to enable States to increase safety inspections of intrastate and interstate commercial vehicles in terminals and along roadsides. The development of an accurate database on compliance with safety regulations is a secondary goal of MCSAP, and funds may be used for data collection, storage, and analysis. The act specifically indicates that MCSAP may apply to enforcement of rules pertaining to vehicles used to transport hazardous commodities. Figure 4-7 shows the States participating in MCSAP.

Under MCSAP, States may apply for two types of grants. Development grants, available for a maximum of 3 years, provide funding for States needing to establish or substantially modify an enforcement program. Implementation grants provide finding for States ready to initiate or enhance established enforcement programs. To qualify for an implementation grant, a State must:

- agree to adopt and enforce the Federal Motor Carrier Safety Regulations (49 CFR 390-399) including highway-related portions of the Federal Hazardous Materials Regulations (49 CFR 171-173 and 177-178) or compatible State rules, regulations, standards, and orders applicable to motor carrier safety;
- submit an enforcement and safety program plan and designate a lead agency for administering the plan;
- agree to devote adequate resources to administration of the program and enforcement of rules, regulations, standards, and orders; and

[108] Public Law 97-424. Motor Carrier Safety Assistance Program grant regulations are spelled out in 49 CFR 350.

Figure 4-6.—States Participating in the State Hazardous Materials Enforcement Development Program

Key:
States participating in the State Hazardous Materials Enforcement Development (SHMED) program.
States not participating in the State Hazardous Materials Enforcement Development (SHMED) program.

SOURCE: Office of Technology Assessment.

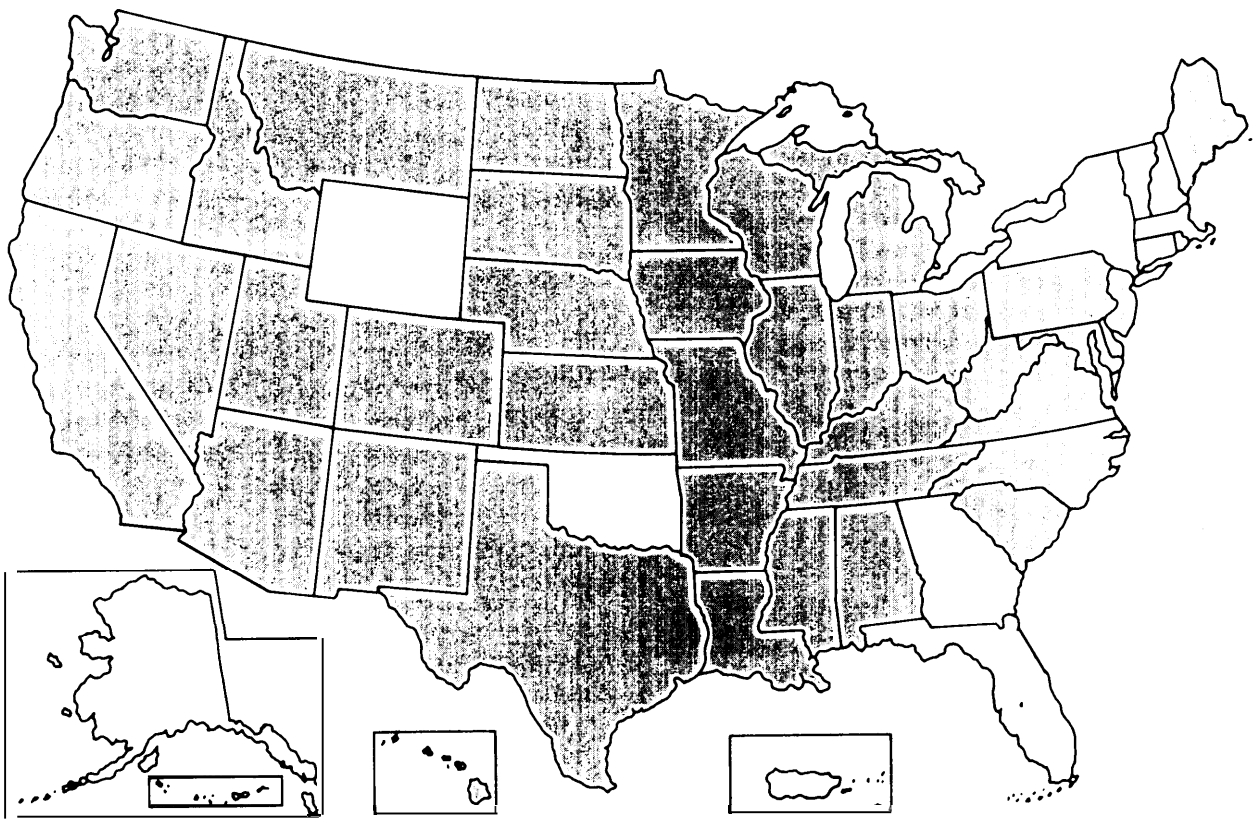
have established statutory authority to regulate private and for-hire motor carriers and provide for right of entry into vehicles and facilities.

MCSAP is financed through the Highway Trust Fund under a 5-year authorization: $10 million was authorized for fiscal year 1984, and $10 million was to be added each year up to a maximum of $50 million by fiscal year 1988. The Federal grants were to be matched by States on an 80:20 basis. To date, actual appropriations have been significantly lower. The projected total amount of development and implementation grants under MCSAP is estimated to be $13 million for 1985; approximately $17.4 million is authorized for 1986.[109] However, the Secretary of Transportation has requested that the $50 million maximum funding level for MCSAP be authorized in fiscal year 1987.

State officials committed to expanding hazardous materials enforcement have expressed concern that MCSAP gives priority to general motor carrier safety programs and that hazardous materials enforcement activities—especially those for nonhighway modes—

[109] Gary Curtis, Chief, Operations Division, Bureau of Motor Carrier Safety, personal communication, Feb. 13, 1986.

Figure 4=7.—States Participating in the Motor Carrier Safety Assistance Program



Key:
States participating in **the Motor Carrier Safety Assistance Program (M CSAP).**

States not participating in the Motor Carrier Safety Assistance Program (MCSAP).

SOURCE: Office of Technology Assessment.

are being slighted. Since MCSAP funds are restricted to highway safety purposes, the broader question arises of how States are to develop or improve inspection, regulation, and enforcement for other modes of transportation, because no similar Federal programs exist for water, rail, or air. Particular concern has been expressed by States with high concentrations of nonhighway hazardous materials shipments. In an effort to continue the work begun under the SHMED program, RSPA and BMCS recently sponsored four regional conferences, referred to as the Cooperative Hazardous Materials Enforcement Development Program, to help States promote uniform enforcement practices.

Commercial Vehicle Safety Alliance

In an initiative independent of the Federal Government, 26 States and the Canadian Provinces of Alberta and British Columbia have become members of the Commercial Vehicle Safety Alliance (CVSA), formed in 1980. Created under the leadership of California, Idaho, Oregon, and Washington, CVSA seeks to foster interstate cooperation in establishing uniform safety inspection standards for trucks. Under the terms of the alliance, members agree to use common inspection standards and out-of-service criteria and to honor the inspections of other jurisdictions. In this way, CVSA hopes to

secure greater acceptance of motor carrier inspection programs by the trucking industry and to reduce delays caused by duplicative inspections of interstate truck shipments.

CVSA inspection standards and procedures have been developed in cooperation with BMCS and RSPA. The inspection process concentrates on the critical items (brakes, steering, tires, wheels, couplers, and suspension) most frequently identified as causes of truck accidents. In addition, the driver's qualifications and log book are checked. CVSA has recently added hazardous materials inspection standards and out-of-service criteria to its procedures. On passing inspection in a CVSA jurisdiction, the vehicle receives a decal valid for 3 months allowing it to travel through member States without further inspection unless a visible or audible defect is detected. Reciprocity, uniformity, and consistency are the key concepts of the alliance.

A CVSA associate membership program has recently been formed through which industry members serve in an advisory and nonvoting capacity to contribute their views, experience, and concerns. Since many of the States participating in CVSA are involved in SHMED and MCSAP as well, State agencies and personnel are developing a nationwide program of State-level hazardous materials transportation inspection and enforcement capability. The three organizations now hold joint national and regional meetings. CVSA sees its role as providing a link between Federal and State agencies responsible for motor carrier and hazardous materials inspection and enforcement.

Current State and Local Activities

A condition of State participation in MCSAP is passage of legislation adopting Federal motor carrier safety regulations and those portions of Federal hazardous materials regulations pertaining to highway shipments. MCSAP also requires States to conduct inspections of both intrastate and interstate motor carriers. As of August 1985, all but two States had adopted 49 CFR wholly or in part; however, legal processes allowing extension of 49 CFR to intrastate motor carriage have only just begun in many States.

Despite this strong encouragement for uniform regulations and enforcement policies, great regulatory variation remains from State to State. Familiarity with numerous State laws is thus a necessity for interstate carriers, and development of nationally standardized training is difficult. Some States exempt specific commodities, such as agricultural fertilizers; others exclude private carriers from regulation. In Illinois, hazardous materials regulations apply only to quantities that require placarding by Federal law, while in South Dakota, shipments of flammable and combustible liquids are exempt. [110] According to a 1985 survey of 47 States, 46 States indicated that they regulate common and contract carriers, while only 43 said that private carriers are regulated. [111] Moreover, the extent to which intrastate shipments of hazardous materials are regulated also varies. For example, some jurisdictions have established more stringent container requirements for intrastate transport, while in others, second- or third-hand cargo tanks that no longer meet Federal standards may be used. [112]

Restrictive State and local legislation is frequently passed in an attempt to regulate the transportation of hazardous materials perceived as posing a high risk to public safety. Many of these laws establish requirements in areas not presently covered by Federal regulations; others are enacted because State and local governments believe that existing Federal requirements are inadequate. A recent DOE report identified 513 State and local laws that affect the transportation of radioactive and other hazardous materials. [113] Moreover, faced with increasing re-

[110] U.S. Department of Transportation, Materials Transportation Bureau, "State Hazardous Materials Enforcement Development (SHMED) Program Workshop Proceedings," unpublished typescript, 1983, pp. 121 and 183.

[111] S. Department of Transportation, Research and Special programs Administration, "State Hazardous Materials Enforcement and Development (SHMED) Hazardous Materials Survey," unpublished typescript, Sept. 30, 1985.

[112] New York City regulations require the use of steel cargo tanks for shipments of flammable materials; Federal regulations permit the use of steel or aluminum. New York City Fire Department Directive 7-74, Mar. 23, 1984, and revisions. Ch. 3 contains additional information on cargo tanks.

[113] N.P. Knox, et al., *Transportation of Radioactive and Hazardous Materials: A Summary of State and Local Legislative Requirements for the Period Ending December 31, 1984*, ORNL/TM-9563 (Oak Ridge, TN: U.S. Department of Energy, September 1985). The types of requirements identified by the survey include transport approvals, conditional bans on transportation, documentation, escorts, Federal/State compliance, legal and financial requirements, notification, permits, placarding, transport prohibitions, routing restrictions, and vehicle specifications. Most State and local laws apply to highway and rail shipments; however, several address ports and one deals with air transport.

sponsibilities for the enforcement of hazardous materials regulations and emergency response activities and a general trend of decreasing Federal financial support, some State and local governments have turned to permit, licensing, and registration fees to help cover the costs of their programs. Unlike States, local governments do not receive Federal grants for enforcement programs and must rely on alternate sources of funding.

Bridge, tunnel, and turnpike authorities also establish regulations governing shipments of hazardous materials. The potential catastrophic consequences of an accident inside a tunnel or on a bridge underscore the need for safety precautions and emergency response planning. A recent survey conducted by the International Bridge, Tunnel, and Turnpike Association found that the three primary concerns of their U.S. members are: having appropriate incident response systems, obtaining information on movements of hazardous materials, and adequate indemnification including loss of revenue coverage. [114] Requirements imposed by transportation facilities often include prenotification, escorts, and prohibitions against shipments of certain materials such as flammable gases.

Licensing, Registration, and Permits

Licensing, registration, and permit requirements enable State and local governments to monitor and obtain information from shippers and carriers operating within their jurisdictions. The three terms—permit, license, and registration—are used to describe a variety of programs in different jurisdictions. However, a general distinction can be made between registration programs designed to identify shippers and carriers and permitting or licensing programs, usually intended to obtain assurances of fitness and more detailed information about company operations. Fees from such programs are often used to cover only the administrative costs of processing application forms; however, they are also used to generate funds for emergency response and enforcement activities.

State and local requirements vary; some focus on specific types of hazardous materials, while others are broader in scope. Information requested from shippers and carriers may include the types of materials they handle, origins and destinations of shipments, routes followed, miles covered in a given year, proof of insurance coverage, vehicle inspection dates, and drivers employed. There are also differences in the period of time covered by a permit and the fees levied. For example, 34 States require transport companies carrying hazardous wastes to register and pay a fee on a per vehicle or per company basis. [115] Fees imposed range from a low of $3 up to $500 and may be good for one trip only or for as long as a year. Some States also require special driver training or certification, vehicle registration and inspection, and proof of liability insurance. Table 4-7 summarizes State hazardous waste permit requirements.

Local jurisdictions may also require separate permits for carriers operating within their boundaries. Denver requires carriers of hazardous materials (except radioactive materials, and diesel and gasoline fuel in quantities under 111 gallons) to obtain annual permits by mail. Fees are assessed based on the number of trucks in a carrier's fleet; they range from $50 per year for a fleet of 1 or 2 trucks to $600 per year for 500 or more trucks. A description of the material to be transported (based on historical information), proof of liability insurance as required by Federal regulations (49 CFR 397.9), and acknowledgment of the routes designated by the city for hazardous materials shipments must be submitted. Funds generated are used to support the city's hazardous materials transportation enforcement activities and administration of the permit program. '16

Data obtained through permit, licensing, or registration requirements may be used to target enforcement activities, plan emergency response programs, or develop regulations. For example, emergency response personnel would use data on the types of materials they are likely to encounter to develop

[114] International Bridge, Tunnel, and Turnpike Association, "Hazardous Materials Transportation Survey Results," unpublished typescript, June 8, 1984.

[115] U.S. Congress, Office of Technology Assessment, *Transportation of Hazardous Materials: State and Local Activities, OTA-SET-301* (Washington, DC: U.S. Government Printing Office, March 1986).

[116] Article VI of Chapter 22, Denver Municipal Code; and Tony Massaro, Office of Environmental Affairs, City and County of Denver, personal communication, Feb. 11, 1986.

Table 4-7.—States with Proposed or Existing Hazardous Waste Transportation Registration and Fee Requirements*

State	Company registration	Company fee	Year covered	Vehicle registration	Vehicle fee	Vehicle inspection	Driver training certification/ registration
Alabama	Yes	$250	3 yrs				
Arizona	Yes						
Arkansas	Yes	$100/$50[a]	5 yrs				
California	Yes	$200	1 yr	Yes	$50 each[b]	Yes	Yes
Colorado	No						
Connecticut	Yes	$500[c]	1 yr	Yes		Yes	Yes
Delaware	Yes	$50	1 yr				
Florida	No						
Georgia	No[d]						
Idaho	Yes[e]	$20					
Illinois	Yes	$100	1 yr	Yes			
Indiana	Yes[f]	$100	1 yr	Yes	$10	Yes	
Iowa	No						
Kansas	Yes	$250	1 yr				
Kentucky	Yes	$25	1 yr	Yes			
Louisiana	No						
Maine	Yes	$100[g]	1 yr	Yes	Yes[g]		
Maryland	Yes		1 yr	Yes	$50/trailer		Yes[h]
Massachusetts	Yes	$100	1 yr	Yes	$200 each	Yes	Yes
Michigan	Yes[f]	$500	1 yr		$200 each		
Minnesota	No						
Mississippi	No						
Missouri	Yes		1 yr	Yes	$20/100[i]		
Montana	Yes	$25	1 yr		$5 each		
Nebraska	No						
Nevada	Yes[j]						
New Hampshire	Yes	$100	1 yr	Yes			Yes
New Jersey	Yes		1 yr	Yes	$5[k]		Yes
New Mexico	No						
New York	Yes[f]		1 yr	Yes	$5[l]		

*This table only covers State registration requirements and fees for hazardous waste transporters; requirements for radioactive materials and hazardous materials transport are not included.
[a]The Arkansas Department of Pollution registration fee is $100, while the Arkansas Transportation Commission fee is $50.
[b]A vehicle fee of $50, vehicle registration, and inspection is required for trailers (tractors are exempt), freight containers, and rail containers involved in hazardous waste transport. Intermodal tanks (>110 gallons) must also be inspected; the fee is $25.
[c]Transporters in Connecticut pay an initial registration fee of $500; the annual renewal fee is $350. Spill contractors transporting in Connecticut pay an initial registration fee of $600 and an annual renewal fee of $450.
[d]However, Georgia requires registration of for-hire carriers of LNG, PCBs, and radioactive wastes. A company fee of $100 or purchase of a $25 trip permit, good for one trip or 5 days, is required. Vehicle registration is also required.
[e]Requirement becomes effective on July 1, 1986.
[f]Applies to transporters of liquid industrial wastes.
[g]Registration fee covers one company location, one truck, and one driver; additional locations, trucks, or drivers are $50 each.
[h]Drivers are charged a fee of $20 and must receive State approved training.
[i]The vehicle fee varies from $20 to $100, depending on the number of vehicles and their weight.
[j]Applies to waste PCBs only.
[k]$50 per vehicle for the first 20 vehicles, $5 per vehicle for additional vehicles.
[l]Registration for a single vehicle is $500 plus a $25 processing fee; additional vehicles are registered for $200 with a processing fee of $5. Companies may not be required to pay more than $300 for processing and they have the option of paying an annual company registration fee of $5,000 instead of individual vehicle payments.

Table 4-7.—States with Proposed or Existing Hazardous Waste Transportation Registration and Fee Requirements, 1986—Continued

State	Company registration	Company fee	Year covered	Vehicle registration	Vehicle fee	Vehicle inspection	Driver training certification/ registration
North Carolina	Yes	$25	one time			Yes	
North Dakota	Yes						
Ohio	Yes	$25		Yes	$3 each		
Oklahoma	Yes		1 yr		$15 each		
Oregon	Yes	$125[m]	1 yr	Yes		Yes	
Pennsylvania	Yes	$125/200[n]	1 yr/2 yr				
Rhode Island	Yes		1 yr	Yes	$25 each	Yes	Yes
South Carolina	Yes						Yes
South Dakota	No						
Tennessee	Yes	$300[o]	1 yr				
Texas	Yes	$25	one time				
Utah	No						
Vermont	Yes		1 yr	Yes	$10/unit[p]		
Virginia	Yes	$80/120[q]	10 yrs				
Washington	No						
West Virginia	No						
Wisconsin	Yes[r]	$400	2 yrs				Yes
Wyoming	No						
District of Columbia	No						

[m]The $150 fee must be paid to obtain operating authority to haul hazardous wastes; this is not considered a registration fee.
[n]The Public Utilities Commission annual registration fee is $125 and the Department of Environmental Resources biannual fee is $200.
[o]Renewal fee is $200.
[p]Each vehicle unit is assessed a fee of $10; tractors and trailers are considered separate units.
[q]In-State companies pay $80, while out-of-State companies pay $120.
[r]Permit requirements apply to transporters of hazardous wastes, as well as solid wastes and PCBs.

SOURCE: American Trucking Association survey provided by Charles Mayer, ri-State Motor Transit Co., updated by U.S. Congress, Office of Technology Assessment, May 1986.

appropriate training programs. Driver or carrier information is important to enforcement officials for identifying individuals or firms with poor performance records. Regulatory agencies interested in providing industry with information on new or amended regulations must know the location of shippers and carriers of hazardous materials. An example of a strong State program, described in box 4A, is California's licensing and computerized statewide database and information system.

Proliferation of State and local licensing, registration, and permit requirements, usually applicable to trucks, can pose hardships for carriers. Aside from the impact of a requirement within the regulating State, transporters are concerned about the cumulative economic impact of these requirements and particularly about permits or licenses that must be obtained per vehicle or per trip. The latter can increase transit time. One carrier noted that, in order to ensure that his driver was completely prepared to transport a load of hazardous wastes from Georgia to Wisconsin, he had to telephone every State along the route, sometimes calling as many as four or five agencies within a State, before he was fully apprised of all the requirements.[117] Many trucking company officials believe that adoption of special requirements by different States impedes interstate commerce and is inconsistent with the HMTA, and have taken legal action. These court cases are described later in this chapter.

Notification

Notification requirements have been established by numerous local governments; transportation facilities, such as bridge and tunnel authorities; and States. A study conducted by Battelle Memorial Institute for DOT identified 136 notification laws pertaining to hazardous materials transportation.[118]

[117] Reported at the U.S. Congress, Office of Technology Assessment, Workshop on State and Local Activities, May 30, 1985.

[118] Battelle Columbus Laboratories, *Assessment of State and Local Notification Requirements for Transportation of Radioactive and Other Hazardous Materials* (Columbus, OH: Jan. 11, 1985).

Box 4A.—California's Licensing Program

California requires private and for-hire transporters of hazardous materials to pay a fee and obtain a license.* Each company must pay a $100 fee for the first year (there is a $75 renewal fee for subsequent years) and provide information on the number of trucks and trailers, commodities carried, and three emergency response contacts for work and nonwork hours to the California Highway Patrol.** Licenses may be obtained by mail. As of February 1986, approximately 6,400 companies were licensed by California.[1] Monies collected are used to administer the program and support terminal hazardous materials inspections. Data on registrants allows the State to provide appropriate regulatory information to carriers such as routing restrictions for transporters of explosives, and has enabled the State to set up a computerized hazardous materials information system.

The California information system, scheduled to be operational in mid-1986, consists of a profile of all carriers that currently carry hazardous materials or are likely to become involved in hazardous materials transportation in the State. In addition to licensing information, the profile includes data on inspection records, citations, and spills. Monthly reports will list all carriers with a hazardous materials license due to expire in 90 days. The reports will be sent to the carrier and to the California Highway Patrol along with a copy of each carrier's current profile. The database will also include a record of all highway hazardous materials incidents reported throughout the State. Monthly incident summaries will be issued by highway patrol subarea. The California system will have access to the information systems of the Bureau of Motor Carrier Safety and the Research and Special Programs Administration.[2]

*[illegible]

**Emergency response contacts [illegible]

[1] Steve Brown, California Highway Patrol, [illegible], personal communication, Feb. [illegible], 1986.

[2] California Highway Patrol, "SHMED Program System Objectives and Scope," unpublished typescript, 1985, p. 3.

The vast majority of these apply to trucks; a few apply to rail. Notification requirements, as defined by the study, include notification prior to shipments, periodic summaries, and reports on individual shipments filed after a trip. Prenotification is required by 23 State and 77 local regulations; 14 call for periodic reporting and 22 concern individual trip reports. Transportation facilities almost universally require some type of prenotification to arrange for escorts and notify emergency response agencies; these requirements focus on radioactive materials in addition to other hazardous materials, such as explosives and flammable materials. States and municipalities have tended to regulate spent fuel or high-level radioactive wastes, although some also include other radioactive materials. Table 4-8 lists State and local notification laws and the types of hazardous materials covered.

The Battelle study found that State and local governments typically give two reasons for enacting notification requirements: to provide data for planning (including better routing and safety regulations), and to improve emergency response. However, lack of enforcement of notification regulations means that there is little reason for shippers and carriers to comply, and several local agencies were found to be unaware of the notification laws they were supposed to enforce. Some community officials reported that they have never received a notification, even though it is required by local ordinance. The Battelle study observed that, while there are instances of conscientious enforcement and data collection, many local agencies charged with enforcing regulations on prenotification give the task relatively low priority. Often when information is collected, it is simply filed and not used for planning purposes.

Transporters are concerned that proliferation of State and local notification regulations creates scheduling difficulties and increases paperwork and staff needed to monitor requirements.

Hazardous Materials Driver's Licenses

A recent insurance industry publication indicates that one out every three tractor-trailers can be expected to crash in a year.[119] While BMCS required ments for motor carrier drivers include written and road tests and a physical examination, the written test is used as an instructional tool only and a passing grade is not required. *20 Although many States have established classified commercial licenses, drivers in 19 States are allowed to operate large trucks with a general commercial license, and driving a pick-up truck is very different from driving a large cargo tanker.[121] Moreover, it is common practice for many truck drivers, including those who handle hazardous materials, to possess driver's licenses from more than one State to avoid multiple violations in any given State. A 1980 investigation of drivers involved in large truck crashes by NTSB found that 44 drivers held 63 licenses, had 98 suspensions, were involved in 104 previous crashes, and had 456 traffic convictions.[122] In recognition of this situation, the American Trucking Association (ATA) has urged Congress and DOT to promote the implementation of a single license by all States so that truck drivers may hold licenses from their State of legal residence only. ATA has also recommended that applicants for a truck driver's license be given written examinations and road tests applicable to the type of vehicle that will be driven.[123]

Drivers transporting hazardous materials also should understand the special hazards associated with their cargo and the regulations governing such shipments. Data collected by DOT indicate that 62 percent of all accidents involving hazardous materials are the result of human errors.[124] This statistic underscores the importance of driver training as an accident prevention tool. Under HM-164, DOT requires drivers of vehicles carrying high-level radioactive waste to undergo training. Driver training re-

[119] Insurance Institute for Highway Safety, "Big Trucks and Highway Safety, " unpublished typescript, 1985, p. 1.

[120] 49 CFR 391.35(b).

[121] Insurance Institute for Highway Safety, op. cit., p. 3.

[122] National Transportation Safety Board, *Safety Effectiveness Evaluation of Detection and Control of Unsafe Interstate Commercial Drivers, PB1980-162969* (Washington, DC: Feb. 15, 1980), pp. 18-20.

[123] Thomas Donohue, president and Chief Executive officer, American Trucking Association, Statement Before the U.S. Senate, Committee on Commerce, Science and Transportation, Oct. 29, 1985. A new National Transportation Safety Board report also calls for a licensing system based on vehicle types. National Transportation Safety Board, "Training, Licensing, and Qualification Standards for Drivers of Heavy Trucks," NTSB/SS-86/02, unpublished typescript, spring 1986,

[124] Mark Abkowitz and George List, "Hazardous Materials Transportation: Commodity Flow and Information Systems," OTA contractor report, unpublished typescript, December 1985.

Table 4.8.–Commodities Covered by Notification Requirements, 1985

	Spent fuel and/or high-level waste	Other radioactive materials	Hazardous wastes	Other hazardous materials
state:				
Arkansas	.....	.....	X	***X***
California	X	.....	.....	.....
Colorado	.....	.....	***X***	.....
Connecticut	X	X	.....	.....
Florida	X	X	.....	.....
Georgia	X	X	X	X
Illinois	.....	.....	X	.....
Louisiana	.....	.....	X	.....
Maine	.....	X	***X***	.....
Massachusetts	***X***	.....	***X***	.....
Michigan	X	X	.....	.....
Mississippi	X	X	.....	.....
Nevada	X	X	.....	.....
New Hampshire	.....	.....	.....	X
New Jersey	***X***	***X***	.....	.....
New Mexico	X	X	.....	.....
North Carolina	X	.....	.....	.....
Ohio	X	X	.....	.....
Oregon	.....	.....	.....	X
Rhode Island	***X***	X	X	.....
South Carolina	X	X	.....	.....
Tennessee	***X***	.....	.....	.....
Vermont	***X***	X	.....	.....
Virginia	X	X	X	.....
Total	17	14	9	4
Local				
Chickaswa, AL	.....	.....	***X***	.....
Phoenix, AZ	.....	.....	X	X
Tempe, AZ.....	.....	.....	.....	***X***
Tucson, AZ	X	X	.....	.....
Morro Bay,CA	X	X	.....	.....
New London, CT	X	X	.....	.....
Garden City, GA..	B	***X***	.....	.....
Lawrence, KS	B	***X***	.....	.....
Covington, KY	X	X	X	***X***
Kenner LA	.....	.....	.....	***X***
Kent County, MD	X	.....	.....	.....
Prince George's County, MD	X	X	.....	.....
Newton, MA	X	.....	.....	.....
Ypsilanti, Ml	B	***X***	.....	.....
Missouli, MT	X	X	.....	.....
Binghamton, NY.	X	.....	.....	.....
Geneva, NY	X	X	.....	.....
Ithaca, NY	X	***X***	.....	.....
Jefferson County, NY	X	X	.....	***X***
New York, NY	X	X	.....	.....
Rockland County, NY	X	X	.....	.....
St Lawrence County, NY	X	***X***	.....	.....
Syracuse, NY	X	***X***	.....	.....
Tompkins County, NY	X	***X***	.....	.....
Vestal NY	X	X	.....	.....
Yates County, NY	X	... .	.....	.....
Facilities:				
Golden Gate Bridge, CA	X	X	.....	.....
Delaware Memorial Bridge, DE	X	X	***X***	X
Francis Scott Key Bridge, MD.	X	X	.....	X
Harry W. Nice Memorial Bridge, MD	X	X	.....	***X***
John F. Kennedy Memorial Highway, MD.	X	***X***	.....	X

Table 4-8.—Commodities Covered by Notification Requirements, 1985-Continued

	Spent fuel and/or high-level waste	Other radioactive materials	Hazardous wastes	Other hazardous materials
Susquehanna River Bridge, MD.	X	X	. . . . .	X
William Preston Lane, Jr. Memorial Bridge, MD	X	X	. . . . .	X
Massachusetts Turnpike Authority, MA. . .	X	X	. . . . .	. . . . .
Blue Water Bridge, MI.	B	B	. . . . .	X
Mackinac Bridge, MI	X	X	. . . . .	X
Garden State Parkway, NJ	X	X	. . . . .	. . . . .
Newark International Airport, NJ	X	X	. . . . .	X
New Jersey Turnpike, NJ , ...	X	X	. . . . .	X
Bayonne Bridge, NY	X	X	. . . . .	X
George Washington Bridge:				
Expressway, NY	B	X	. . . . .	. . . . .
Lower Level, NY.	B	X	. . . . .	. . . . .
Upper Level, NY	X	X	. . . . .	X
Geothals Bridge, NY	X	X	. . . . .	X
Holland Tunnel, NY	B	X	. . . . .	. . . . .
Kennedy International Airport, NY	X	X	. . . . .	X
La Guardia Airport, NY	X	X	. . . . .	X
Lincoln Tunnel, NY	B	X	. . . . .	. . . . .

NOTE: X= existing; B= bans on transportation.

SOURCE: Battelle Human Affairs Research Center.

quirements have also been established by DOT for carriers of flammable cryogenic liquids. One carrier specializing in radioactive materials transport indicated to OTA that drivers employed by his firm who haul hazardous materials have better safety records than other drivers.[125] Some carrier associations, insurance industry representatives, State motor vehicle administrators and enforcement personnel, and the National Hazardous Materials Transportation Advisory Committee have voiced strong support for a national hazardous materials driver's license requiring special training and testing. Driver training would emphasize how to handle hazardous materials and respond to accidents. In addition, some large shippers and a few carriers have established special training courses for their drivers; examples of these programs are described in chapter 3.

Several States have already established special certification requirements for drivers of vehicles used to transport hazardous wastes. (See table 4-7.) California recently passed legislation requiring special certification for drivers of vehicles hauling hazardous materials, including hazardous wastes.[126] Certification requirements include a medical examination and a written test on applicable Federal and State laws and regulations for the transportation of hazardous materials and safe driving practices. A certificate of training issued by an employer of a driver may be submitted in lieu of the written test. The California Highway Patrol and the Department of Motor Vehicles are presently developing training regulations for drivers.

In addition to driver training and licensing, there is also a need for improved access to information on driver and carrier performance on a nationwide basis. While existing Federal databases, described in chapter 2, record data on violations and accidents, they would be more useful if they were interfaced and made accessible to State enforcement personnel. The SAFETYNET Program, being developed by FHWA, and the National Driver's Registry, being developed by the National Highway Traffic Safety Administration, will help, but their full implementation is at least a decade away.

[125] Charles Mayer, Vice president, Nuclear and Hazardous Materials Division, Tri-State Motor Transit Co., in U.S. Congress, Office of Technology Assessment, "Transcript of Proceedings—Transportation of Hazardous Materials Advisory Panel Meeting," unpublished typescript, Jan. 31, 1986.

[126] California Senate Bill No. 895, ch. 667, Statutes of 1984. Amendments to the California law are presently under consideration.

Routing Requirements

Routing is an important tool for local governments for preventing or reducing the consequences of hazardous materials accidents, and increasing numbers of cities, counties, and townships are adopting ordinances requiring hazardous materials carriers to use designated routes. Carefully made routing decisions restrict hazardous materials shipments to the safest routes, often Interstate highways and beltways, providing a low cost prevention measure that local police can enforce without additional equipment or training. On the other hand, routing requirements may lengthen and complicate trips for truckers, and sometimes bring local governments into conflict with each other or with Federal regulations governing interstate commerce. The trucking industry has challenged some local routing ordinances, claiming that they interfere with interstate commerce (see discussion below).

Two Federal regulations pertaining to the routing of hazardous materials were described earlier in this chapter. The first is a general statement directing drivers of vehicles carrying nonradioactive hazardous materials to use routes avoiding heavily populated areas and tunnels, narrow streets, or alleys.'[27] The second regulation, referred to as DOT Docket HM-164, applies to shipments of radioactive materials. The first part of the regulation requires carriers of all radioactive materials to operate on routes that minimize radiological risk. The second part applies only to highway route controlled quantities of radioactive materials, such as spent nuclear fuel; it requires the use of Interstate highways and beltways or State-designated alternate routes.[128]

To assist States and communities with the designation of routes for both radioactive and nonradioactive shipments of hazardous materials, DOT published two guidance documents. Both publications underscore the importance of involving a broad spectrum of community and industry members and neighboring jurisdictions in the route selection process. This approach encourages States and localities to: tap the knowledge and resources of persons and organizations experienced in the transportation of hazardous materials, identify the scope and objectives of a routing assessment at the outset, and determine whether and how to weight subjective factors in the routing analysis. It also provides a forum for addressing related safety issues such as vehicle inspections and emergency response capabilities. A 1983 demonstration program in Portland, Oregon, which successfully tested the DOT guidelines for nonradioactive materials, concluded that participation by all affected parties early in the planning process increases the likelihood of consensus as to which routes are safest.[129] See chapter 2 for a description of data-collection activities related to routing assessments.

Nonradioactive Materials.—The nonradioactive materials guidelines include procedures for analyzing risks associated with the use of alternative routes within a jurisdiction.[130] The risk assessment is based on the probability of a hazardous materials accident and the consequences of such an accident measured in terms of the population and/or property located inside the potential accident impact zone.[131] Other

[127] 49 CFR 397.9(a). In 1977, the Bureau of Motor Carrier Safety Provided an interpretation of this provision stating:

> Section 397.9(a) is not meant to preclude the use of expressways or major thoroughfares to make deliveries within a populated area. In many instances, a more circuitous route may present greater hazards due to increased exposure. However, in those situations where a vehicle is passing through a populated or congested area, use of a beltway or other bypass could be considered the appropriate route, regardless of the additional economic burden.

42 F.R. 60088, Nov. 23, 1977.

[128] 49 CFR 177.825. Highway route controlled quantities are defined in 49 CFR 173.403(1).

[129] City of Portland, Oregon, office of Emergency Management, *Hazardous Materials Highway Routing Study* (Washington, DC: U.S. Department of Transportation, 1984), p. 48. The Portland experience is summarized in U.S. Congress, Office of Technology Assessment, *Transportation of Hazardous Materials: State and Local Activities,* op. cit., pp. 34-35.

[130] E.J. Barber and L.K. Hildebrand, Peat, Marwick, Mitchell, & Co., *Guidelines for Applying Criteria To Designate Routes for Transporting Hazardous Materials*, Implementation Package FHWA-IP-80-20 (Washington, DC: U.S. Department of Transportation, 1980).

[131] In 1985, the Ohio-Kentucky-Indiana (OKI) Regional Council of Governments discovered an error in the calculation of the population consequence factor. The U.S. Department of Transportation (DOT) acknowledged the error ("population density" for a route segment should have been used instead of "population"), noting that it does distort route analysis and that it only becomes apparent when route segment lengths are extremely disparate. S.C. Chu, DOT, Research and Special Programs Administration, letter to A.H. Hessling, Executive Director, OKI Council of Governments, May 3, 1985. Another recent application of the DOT guidelines in Dallas-Fort Worth recognized this error and took into account the length of each link or route segment in the estimation of the impact area. Dan Kessler, "Establishing Hazardous Materials Truck Routes for Shipments Through the Dallas-Fort Worth Area," in Transportation Research Board, "Proceedings From the Conference on Recent Advances in Hazardous Materials Transportation Research: An International Exchange," unpublished typescript, Nov. 10-13, 1985, pp. 443-464.

Photo credit: Office of Technology Assessment

Routing of hazardous materials has been a controversial issue in many localities.

factors, such as emergency response capabilities, and proximity to sensitive ecological areas or populations that may be unable to evacuate themselves, may be applied when a risk analysis does not indicate that one alternative is clearly superior to the others. The guidelines suggest that such factors be selected by consensus, reflecting community priorities.

A number of cities including Columbus, Denver, and Boston, have established hazardous materials routing restrictions based on the general routing provision of the Motor Carrier Safety Regulations.[132] The types of regulations enacted by these jurisdictions include: restricting the use of certain roads, prohibiting transportation and delivery during rush hours, and specifying operating requirements.

However, reaching a regional consensus on routing is frequently difficult, even when a broad community spectrum is consulted. Often, for example, after a community routing risk assessment has been completed, hazardous materials carriers are diverted from central city routes onto surrounding roadways—usually Interstate highways—that traverse less populated areas. Since many suburban communities do not have specialized hazardous materials response teams like their urban neighbors, they feel particularly vulnerable to increased hazardous materials traffic and resist agreeing to such routing requirements.

Since 1985, suburban townships in the Cincinnati region have opposed the city's efforts to divert through shipments from the Interstate highways passing through the city onto outlying highways. In contrast, Portland, Oregon, and neighboring jurisdictions succeeded in establishing a regional routing plan. The city enacted an ordinance banning hazardous materials shipments from a tunnel that had been used frequently by trucks carrying petroleum products from the city to other parts of the State because fire officials determined that the tunnel posed an unacceptably high risk. (Portland also banned shipments from two grade-level rail crossings.) To compensate for any additional risks posed by the rerouting decisions, the city of Portland and three adjoining counties revised their mutual aid agreements to ensure that the affected counties would have access to the city's specialized firefighting equipment.

Selecting routes within an urban jurisdiction may also be difficult. In Dallas-Fort Worth, a regional routing assessment based on the DOT guidelines found that the safest route through Dallas is the Interstate. However, a Dallas ordinance enacted in 1978 prohibits local hazardous materials vehicles from using the elevated or depressed portions of the Interstate, diverting shipments onto city arterials. City, State, and regional officials are currently working together to resolve this conflict; options under consideration include restricting the times when the Interstate and city arterials can be used for transporting hazardous materials and upgrading sections of the Interstate highway.[133]

Radioactive Materials.–The procedures established by DOT for State officials interested in designating alternate routes for radioactive shipments under HM-164 are somewhat different,[134] The objective of the route selection methodology presented in the guidance document for radioactive materials is to determine the route within a State to minimize the radiological impacts. Routing agencies in neighboring States are advised to work together, as selected routes in each State must match preferred routes in bordering States. The guidelines suggest the formation of interstate or regional coalitions for the selection of routes and note that States might also enter into agreements designating, as portions of preferred routes, ferry routes for the transport of motor vehicles on waters within their jurisdictions.

The methodology is based on the use of comparative risk index figures, not actual risk figures. The primary route selection factors identified by DOT are the levels of radiation exposure from normal transport, and the public health and economic (decontamination costs) risks associated with the accidental release of radioactive materials. Public

[132] See, e.g., Columbus Codes, 1959, Chapter 2551: Article VI of Chapter 22 of the Denver Municipal Code; and 46 F.R. 18921, Mar. 26, 1981, for a description of Boston's regulations. The Boston regulations have been challenged by the State and national trucking associations; the lawsuit is discussed later in this chapter.

[133] Dan Kessler, North Central Texas Council of Governments, Arlington, TX, personal communication, Mar, 11, 1986,

[134] U.S. Department of Transportation, Research and Special Programs Administration, *Guidelines for Selecting Preferred Highway Routes for High way Route Controlled Quantity Shipments of Radioactive Materials, DOT/RSPA/MTB-84/22* (Washington, DC: June 1984 (originally published in June 1981)).

health risks are determined by the frequency of severe transportation accidents and the number of people that could be affected by a release. A method for determining the population within a potential impact area is suggested. Secondary factors may be used if a clear-cut choice does not emerge from evaluation of the primary factors or if unusual conditions exist in the State that increase the importance of one or more of the secondary factors.[135] These factors include emergency response and evacuation capabilities, the location of special facilities, and traffic fatality and injury rates. Procedures for comparing secondary factors based on the use of arbitrary scaling systems are also provided.

The guidelines have been used independently by New York City and Connecticut to evaluate the safety of shipping spent nuclear fuel from Long Island on routes through the city and through Connecticut using a ferry to cross Long Island Sound. The New York City case, described in box 4B, provides an example of the difficulties that can be encountered when routing decisions are made without interjurisdictional consultation.

Other State and Local Regulatory Activities

A number of States and localities have passed two other types of laws concerning their ability to collect data and protect emergency responders from liability.

Right-To-Know Laws.—Many States and municipalities have passed legislation, commonly referred to as "right-to-know" laws, requiring the release of information on the hazards associated with chemicals produced or used in a given facility. (Chapter 2 discusses fixed facility inventories that have been conducted by communities.) These laws have been adopted because some manufacturers have been unwilling to comply with requests for information due to concerns about protecting trade secrets or other information considered to be proprietary.

The majority of State right-to-know laws address both community and employee access to information about workplace hazards. Table 4-9 lists the States that have passed such laws. The provisions

[135] Ibid, p. 7.

Table 4-9.-State RIght-to-Know Laws, 1985

State	Community provisions	Worker provisions
Alabama		X
Alaska		X
Arizona		
Arkansas		X
California		X
Colorado		
Connecticut	X	X
Delaware	X	X
Florida	X	X
Georgia		
Hawaii		
Idaho		
Illinois	X	X
Indiana		
Iowa	X	X
Kansas		
Kentucky		
Louisiana	X	X
Maine	X	X
Maryland	X	X
Massachusetts	X	X
Michigan		X
Minnesota		X
Mississippi		
Missouri	X	
Montana	X	X
Nebraska		
Nevada		
New Hampshire	X	X
New Jersey	X	X
New Mexico		
New York[a]		X
North Carolina	X	X
North Dakota	X	X
Ohio		
Oklahoma		
Oregon	X	X
Pennsylvania	X	X
Rhode Island	X	X
South Carolina		
South Dakota		
Tennessee	X	X
Texas	X	X
Utah		
Vermont	X	X
Virginia		
Washington	X	X
West Virginia	X	X
Wisconsin		X
Wyoming		

[a]Although New York has not passed community right-to-know regulations, in December 19S3, Governor Cuomo issued an executive order requiring the Depart. ment of Environmental Conservation to inventory all toxic chemicals used, stored, or disposed of in the State.

SOURCES: National Conference of State Legislatures, "State Hazardous Materials Policy: Issues Raised by the Bhopal Incident," State *Legislative* Report, vol. 10, No. 1, January 19S5; personal communication with Jan is Adkins (ad.), *Right-To-Know* News (Washington, DC: Thompson Publishing Group, Oct. 22, 1985); and Department of Occupational Safety, Health, and Social Security of AFL-CIO, list of State right-to-know laws.

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agency.[7] New York City subsequently filed an administrative appeal with DOT. The city's appeal contends that no basis exists for the finding that a demonstration of exceptional circumstances is a necessary precondition for a nonpreemption determination; that the city does not have recourse to a State routing agency because all alternate routes go through Connecticut, which has opposed the designation of alternate routes; that DOT erred in failing to consider the city's safety analysis; and that the ruling was inconsistent with prior statements made by DOT.[8] DOT has requested public comments on the city's appeal.

New York City has also indicated that it believes that existing statutory and regulatory procedures to resolve interjurisdictional conflicts are time-consuming and inadequate. The city urges that an amendment to the HMTA divesting DOT of its authority to issue nonpreemption determinations be considered by Congress.[9]

[7]50 F.R. 37308, Sept. 12, 1985.
[8]50 F.R. 47321 -22, Nov. 15, 1985.
[9]Harvey W. Shultz, Commissioner, City of New York, Department of Environmental Protection, personal communication by letter, Apr. 30, 1986. Members of the New York State Congressional Delegation have introduced bills in the 99th Congress that would restrict the transportation of high-level radioactive materials through densely populated metropolitan areas. See H.R. 1105, introduced by Representative Mario Biaggi on Feb. 19, 1985, and H.R. 2938 introduced by Representative Bill Green on July 9, 1985.

of these laws are not uniform, either in terms of the obligations placed on industry or in terms of the types of hazardous materials covered. States have also taken different approaches to exemptions according to business size or quantities of material involved and the extent to which firms may protect trade secrets. Increasing numbers of local governments are also enacting their own right-to-know statutes.

The requirements of right-to-know laws most relevant to hazardous materials planning and emergency response include providing public access to information on hazardous materials present in a locality or State, conducting inventories or surveys, establishing recordkeeping and exposure reporting systems, and complying with container labeling regulations for workplaces. As described earlier in this chapter, OSHA now requires chemical manufacturers and importers to prepare MSDSs for all hazardous materials produced or used. Some States and localities specifically require that copies of MSDSs be made available to a State agency or local fire chief as part of their community right-to--know programs.

Good Samaritan Laws.—Governmental entities and industry are concerned that they may be held responsible for emergency response activities that result in damages. Good Samaritan laws have been enacted by at least 38 States to relieve the burden of potential liability for persons who assist during a hazardous materials transportation accident.[136] While most of these laws exclude gross negligence or willful misconduct, many States have limited the scope of liability protection in other ways. These differences are significant as they may affect whether and how emergency assistance is provided in a given State.

Some laws specify that emergency response personnel who have received a certain level of training are not relieved from liability. Consequently, members of specially trained hazardous materials response teams may not be covered by certain Good Samaritan laws. In contrast, a number of statutes provide immunity to individuals possessing certain qualifications such as training or education. Furthermore, some laws require that unless assistance is requested by a State or local official, persons who provide emergency assistance may not be extended immunity from liability. Additional differences in these laws include the types of hazardous materials addressed (for instance, some are restricted to compressed gases) and whether compensation is provided to emergency responders.

[136]See National Conference of State Legislatures, *Hazardous Materials Transportation—A Legislator's Guide* (Washington, DC: February 1984), pp. 84-85 and app. F. Additional information was obtained from a report on State Good Samaritan Statutes, prepared by Lawrence W. Bierlein for the Chemical Manufacturers Association, Sept. 30, 1985.

Regulatory Consistency

States and localities, responding to what they find to be limitations of the Federal regulatory program, have enacted their own laws and regulations. Interstate shippers and carriers, reacting to what they feel are unreasonable burdens on interstate commerce, have asked Federal courts to preempt some of these State and local requirements. DOT's efforts to resolve interjurisdictional conflicts have been focused on case-by-case advisory rulings that determine whether State and local requirements are consistent with the HMTA and the hazardous materials transportation regulations.

Preemption Under the HMTA

While Congress granted DOT a broad mandate to regulate the transportation of hazardous materials, a regulatory role for State and local governments is preserved by Section 112 of the HMTA, in deference to their inherent powers to enact legislation to protect the health, safety, and general welfare of the public. However, the legislative history of Section 112, although limited, indicates that Congress intended to "preclude a multiplicity of State and local regulations and the potential for varying as well as conflicting regulations in the area of hazardous materials transportation. ''*37 Thus, while Section 112(a) preempts State or local requirements that are inconsistent with the HMTA requirements or regulations issued under it, Section 112(I3) provides that an otherwise inconsistent State and local requirement may not be preempted if DOT determines that it affords an equal or greater level of protection to the public than Federal requirements and does not unreasonably burden commerce. [138] The latter provision was included because Congress also realized that certain exceptional circumstances might warrant more stringent State or local regulation.

Although the HMTA explicitly authorizes DOT to issue preemption waivers under Section 112(b), a similar delegation of authority is not made for deciding inconsistency questions under Section 112(a). To provide a forum for resolving interjurisdictional conflicts under the HMTA, DOT established procedures in 1976 allowing States, localities, affected parties, and DOT itself to initiate an administrative ruling process to determine whether State or local requirements are inconsistent. [139] This administrative process is advisory only and does not preclude judicial review of a State or local requirement. Independent of the DOT procedures, a Federal court may be asked to decide whether a State or local requirement is inconsistent and therefore preempted under the HMTA or is invalid under the Commerce Clause of the U.S. Constitution.

The standards applied by DOT in determining if a State or local requirement is inconsistent are the same as those used by the courts in preemption cases:

- whether compliance with both the State or local requirement and the HMTA is possible (the dual compliance or direct conflict test), and
- the extent to which the State or local requirement is an obstacle to the accomplishment and execution of the act and regulations issued under it (the obstacle test).[140]

The latter test is applicable irrespective of whether a direct conflict exists. The steps that must be followed to obtain an inconsistency ruling are specified in figure 4-8.

DOT has indicated that there are "strong policy reasons" for an administrative review; the process provides an opportunity to conduct a broader inquiry than one typically undertaken by a court, and it allows for diverse comments because notices are published in the Federal Register.[141] A finding of inconsistency under the DOT review process can also serve as the basis for an application for a waiver of preemption.

A waiver of preemption can be granted for an inconsistent State or local requirement under the HMTA if DOT finds that it affords an equal or greater level of protection to the public than Fed-

[137] U.S. *senate,* Report No. 93-1192, 93d Cong., 2d sess., 1974, pp. 37-38.

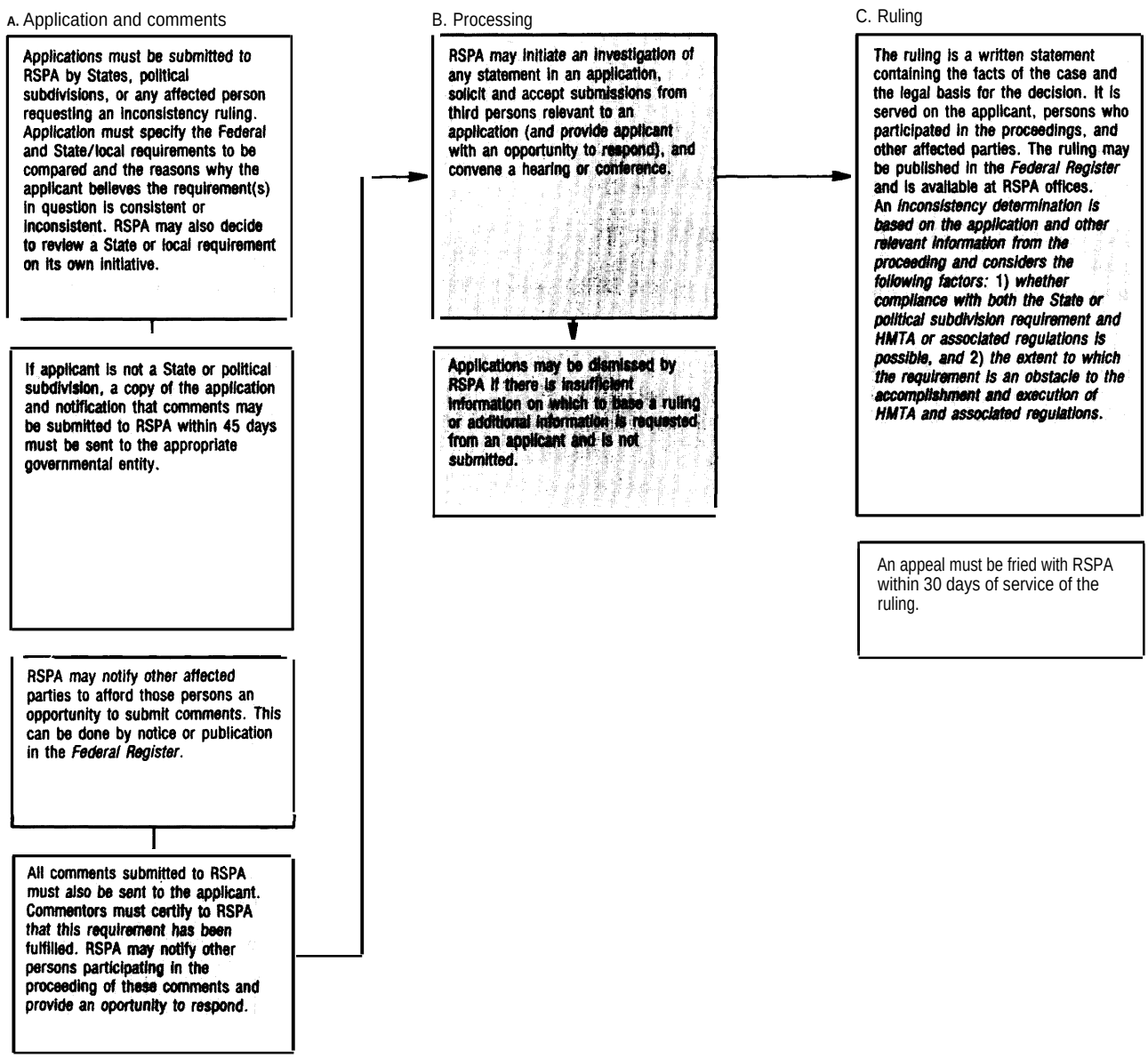
[138] 49 U.S.C. 1811.

[139] 49 CFR 107.203 to 107.211. The regulations were originally published on Sept. 9, 1976, 41 F.R. 38167. It should be noted that the U.S. Department of Transportation's administrative process does not address Commerce Clause considerations; these are reviewed by the courts.

[140] 49 CFR 107.209(c).

[141] U.S. Departments of Justice and of Transportation, Brief for the Department of Transportation as Amicus Curiae, New *Hampshire Motor Transport Association v. Flynn,* U.S. Court of Appeals for the First Circuit, No. 84-1226, November 1984, pp. 6-7.

Figure 4=8.-Procedures for Inconsistency Rulings



NOTE RSPA = Research and Special Programs Administration; HMTA = Hazardous Materials Transportation Act

SOURCE Office of **Technology** Assessment staff based on 49 *Code of Federal Regulations* 107203 to 107211

eral requirements and does not unreasonably burden commerce. The factors considered by DOT in assessing whether interstate commerce is unduly burdened are:

- the extent to which increased costs and impairment of efficiency result from the State or local requirement;
- whether the State or local requirement has a rational basis;
- whether the State or local requirement achieves its stated goals; and
- whether there is a need for uniformity with regard to the subject concerned, and if so, whether the State or local requirement com-

petes or conflicts with those of other States or local entities.[142]

These criteria have been drawn from Supreme Court decisions regarding the validity of various State transportation safety requirements.[143] The procedures that have been developed for granting a waiver of preemption are presented in figure 4-9. Applications for waivers of preemption are considered by DOT only if the State or locality acknowledges that the requirement in question is inconsistent, DOT rules that it is inconsistent, or a court decides that the requirement is inconsistent with the HMTA.[144]

In lieu of requesting a waiver of preemption, State and local entities have the option of petitioning DOT to establish, amend, or repeal a Federal regulation. The steps involved in undertaking such an action are also set forth in 49 CFR.[145]

DOT Policy Guidance for State and Local Requirements

When DOT issued routing regulations for radioactive materials, Docket HM-164, an appendix was also published containing DOT policy and advice to State and local governments regarding their authority over motor carriers in relation to HM-164. State and local rules addressed by the appendix include those that effectively redirect or otherwise significantly restrict or delay highway movements of hazardous materials, and that apply because of the hazardous nature of the cargo. Permits, fees, and similar requirements are included if they have such effects. The definition excludes State or local emergency actions and traffic controls that are not based on the nature of the cargo, such as truck routes based on vehicles' weight or size.[146]

DOT explicitly notes that a State routing rule is inconsistent if it prohibits transportation by highway between two points without providing an alternate route or if it does not meet three criteria:

- it must be established by a State routing agency,
- it must be based on a comparative risk assessment at least as sensitive as the one outlined in DOT guidelines, and
- it must be based on solicitation and substantive consideration of views from affected States and local jurisdictions.

Local governments may regulate shipments of radioactive materials only if the routes they choose are consistent with those designated by Federal and State authorities. New York City, concerned about the safety of through shipments of spent nuclear fuel, has opposed the regulatory restrictions placed on municipalities by HM-164. This case is described in box 4B.

In addition, the appendix provides guidance on related State and local rules. It states that a requirement is inconsistent with HM-164 if it:

- conflicts with the physical security requirements of NRC or DOT requirements;
- requires additional or special personnel, equipment, or escorts;
- requires additional or different shipping papers, placards, or other warning devices;
- requires filing advance route plans containing information that is specific to individual shipments;
- requires prenotification;
- requires accident or incident reporting other than that needed for emergency assistance; or
- unnecessarily delays transport.

DOT Inconsistency Rulings

As of May 1986, 16 inconsistency rulings have been issued by DOT. The inconsistency rulings are lengthy legal analyses that address requirements established by States, local jurisdictions, and individual bridge and highway authorities. (Appendix B contains a description of each case and a summary of the inconsistency ruling decisions for the major types of requirements examined.) The scope of the requirements reviewed in these decisions ranges from regulations governing a particular aspect of hazardous materials transportation, such as shipping papers, to comprehensive regulatory programs. Most

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142 49 CFR 1w.111(b).

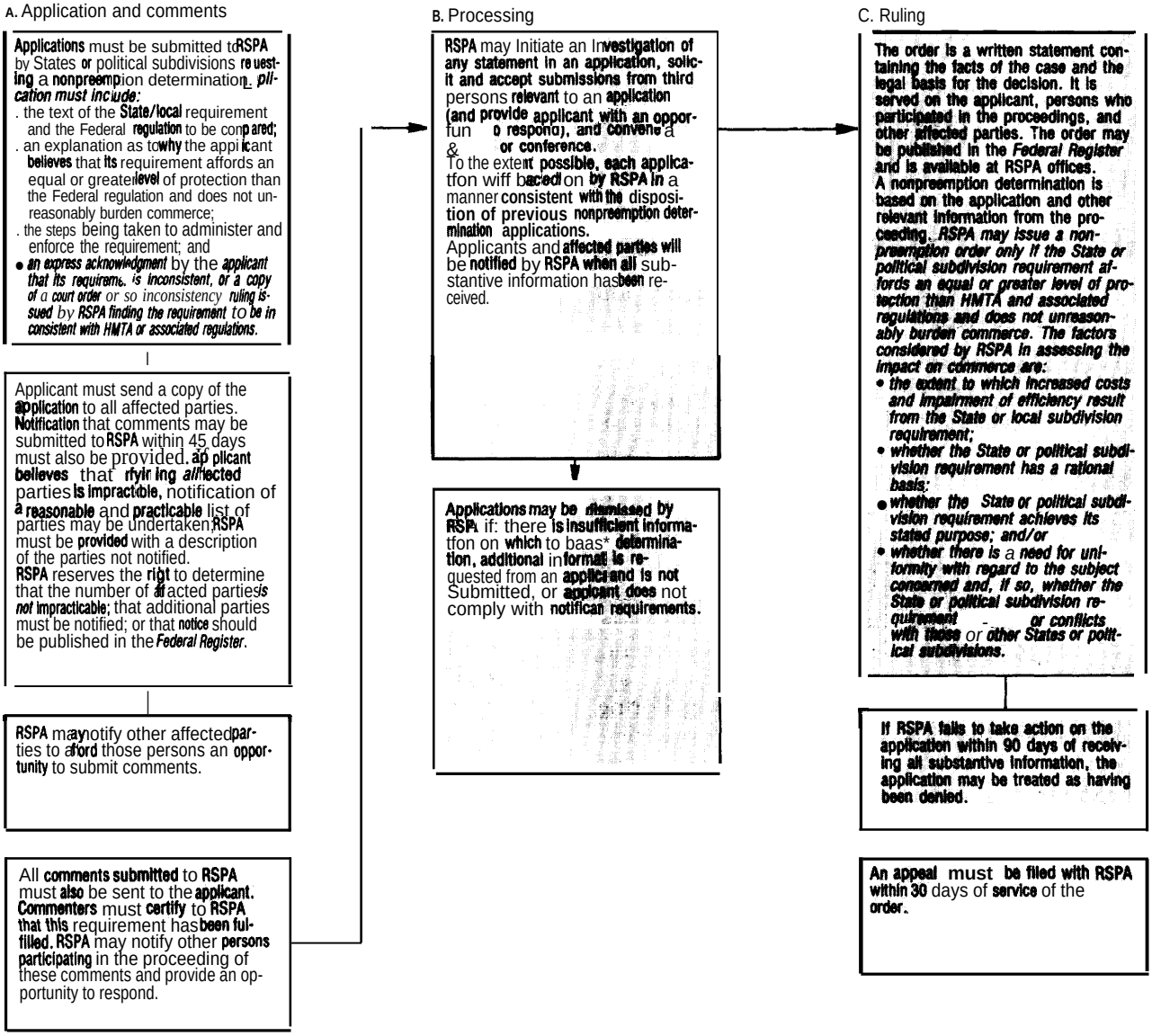
143 41 F.R. 38168, Sept. 9, 1976.

144 49 CFR 107.219(c).

145 49 CFR 106.31. Petitions to establish, amend, or repeal a regulation must: 1) set forth the text or substance of the regulation or amendment proposed, 2) explain the interest of the petitioner in the action requested, and 3) contain any information and arguments available to the petitioner to support the action sought.

146 Note that the appendix to HM-164 is not a regulation and was intended to guide State and local governments contemplating rulemaking action as to the likelihood of such actions being deemed inconsistent. 49 F.R. 46634, Nov. 27, 1984.

Figure 4=9.-Procedures for Nonpreemption Determinations



NOTE RSPA = Research and Special Programs Administration; HMTA = Hazardous Materials Transportation Act
SOURCE Office of Technology Assessment staff based on 49 Code of federal Regulations 107215 to 107225

of the requirements examined by DOT applied exclusively to highway transport; however, in three cases (Michigan; Vermont; and Covington, Kentucky) rail and water modes were also affected.

The decisions reached by DOT in each case were based on the application of the dual compliance and obstacle tests. The dual compliance test is a straightforward determination of whether compliance with both the State or local requirement and the applicable Federal requirement can be achieved. The obstacle test is somewhat more complex and involves an examination of the:

> , , . full purposes and objectives of Congress in enacting the HMTA and the manner and extent to which those purposes and objectives have been carried out through MTB's regulatory program.[147]

[147] 44 F.R. 75568, Dec. 20, 1979

The purposes and objectives that have been identified by DOT include protecting the Nation adequately against the risks to life and property inherent in the transportation of hazardous materials, and precluding a multiplicity of State and local regulations and the potential for varying and conflicting regulations. 148 Critics of DOT argue that safety and uniformity should not be given equal weight in the decision process. It is their belief that Congress was primarily concerned with safety; therefore, State and local requirements that vary from Federal ones but provide a greater degree of protection should be allowed.[149]

Generally, consistent non-Federal requirements are those DOT considers appropriate areas for State and local regulation and for which comparable Federal requirements have not been promulgated. Consistent requirements pertain to traffic control and safety hazards peculiar to a local area and include immediate notification of local officials when accidents occur, the use of headlights and vehicle separation distances, vehicle inspections, the imposition of penalties associated with valid local regulations, and certain types of communication equipment. When routing regulations increase safety and are enacted in consultation with affected neighboring jurisdictions, they are considered to be consistent requirements. In addition, DOT has indicated in these rulings that permit requirements as such are not inconsistent; it is the impact of such a requirement, such as causing shipment delays, that determines its validity. However, all of the permit requirements examined by DOT to date have been found to be inconsistent. *50

Other inconsistent State and local requirements pertain to areas already subject to Federal regulation or result in traffic diversions and increased transit times. These requirements encompass packaging regulations; hazard communication systems, including hazard classification; shipping papers, marking, labeling, and placarding requirements; insurance requirements; prenotification; written accident reports; permits as a precondition to transport; and the use of additional escorts or equipment. In one case, a $1,000 fee, assessed per shipment of certain radioactive materials, was also determined to be inconsistent.[151] Furthermore, transportation bans or other routing restrictions enacted without evaluation of the safety impacts and consultation with affected communities were also found to be inconsistent.

The Role of the Courts

Aside from New York's legal challenge of HM-164, other Federal court decisions have been issued on the validity of specific State and local laws and regulations. 152 Most of the lawsuits have been filed by national or State trucking associations. In four cases, the lawsuits pertain to non-Federal requirements that are also the subjects of DOT inconsistency rulings.[153] While a DOT inconsistency ruling does not preclude judicial review, the courts have given weight to the rulings in their decisions. '54 Preemption provisions of other Federal laws are also considered by the courts as appropriate; for example, the Atomic Energy Act is relevant to cases involving shipments of radioactive materials. A brief

[148] 47 F.R. 1231, Jan. 11, 1982.

[149] See "Defendants Memorandum of Law in Opposition to Plaintiffs Motion for Summary Judgment," *National Paint and Coatings Association Inc. v. City of New York,* Apr. 11, 1985, submitted to the U.S. District Court for the Eastern District of New York.

[150] These decisions, inconsistency rulings 2, 8, and 10 to 16, are described in app. B. In inconsistency ruling 3, while DOT found that a Boston regulation requiring transporters to carry permits in a vehicle cab was consistent, a ruling on the validity of the permitting system itself was not issued.

[151] The U.S. Department of Transportation (DOT) asserted that this requirement, established by Vermont, was inconsistent because it was discriminatory, diverted shipments, and replicated Federal emergency response efforts. Monies collected were to be used for a monitoring (response) team. See inconsistency ruling 15,49 F.R. 46660, Nov. 27, 1984. As this report went to press, DOT issued inconsistency ruling 17 concerning an Illinois law that assesses a $1,000 fee for spent nuclear fuel shipments. DOT found the Illinois fee to be consistent with the HMTA. 51 F.R. 20926, June 9, 1986.

[152] *City of New York* v. *Ritter Transportation Inc., 515* F. Supp. 663 (1981); *National Tank Truck Carriers, Inc. v. City of New York, 677* F. 2d 559 (1983); New *Hampshire Motor Transport Association v. Flynn, 751* F. 2d 43 (1984); and *American Trucking Association, Inc. v. Larson, 683* F. 2d 787 (1982). It should be noted that the *Larson* case upheld a Pennsylvania statute requiring periodic inspections of all motor carrier vehicles, whether or not they are used to transport hazardous materials and are registered in the State.
held a Pennsylvania statute requiring periodic inspections of all motor carrier vehicles, whether or not they are used to transport hazardous materials and are registered in the State.

[153] These cases include inconsistency rulings 1,2,3, and 5. App. B, which contains of a summary of inconsistency rulings, also describes related lawsuits,

[154] See for example, New *Hampshire Motor Transport Association v. Flynn, 751* F. 2d 43 (1984) and *National Tank Truck Carriers, Inc. v. Burke. 535* F. Supp. 509 (1982).

overview of relevant constitutional provisions is presented in box 4C.

Federal court decisions issued to date have generally been in agreement with DOT's inconsistency rulings. For example, the courts have struck down State and local requirements for written accident reports, vehicle equipment, vehicle markings and placards, container testing, and statewide curfews, while upholding requirements for local inspections, immediate accident reporting, operational requirements such as the use of headlights, and local curfews.

The courts have reviewed the validity of permit and license requirements established by New Hampshire, New York City, and Rhode Island. A 1983 New Hampshire law imposing license and fee requirements on vehicles transporting hazardous materials was upheld by the U.S. Court of Appeals for the First Circuit; these requirements provided transporters with the option of obtaining an annual or single-trip license.[155] A New York City regulation

[155] *New Hampshire Motor Transport Association v. Flynn, 751* F. 2d 43 (1984). This opinion reversed the decision of the lower court.

Box 4C.—Constitutional Considerations

State and local entities traditionally exercise their police powers to protect public health, safety, and general welfare. On the other hand, the Federal Government is endowed with broad regulatory powers by the Supremacy and Commerce Clauses of the U.S. Constitution. The courts have established basic guidelines to be used in deciding whether State or local requirements are preempted by Federal law or are invalid because they unduly burden interstate commerce. These guidelines or tests are applicable to &es involving the transportation of hazardous materials.

The ability of the Federal Government to preempt State laws is derived from the Supremacy Clause, under which State laws that conflict with Federal statutes are nullified.[1] Existing case law on the subject of Federal preemption identifies four major factors considered by the courts in reviewing the validity of State or local regulatory actions: whether there is an explicit congressional statement in the applicable Federal statute; whether preemption can be implied (based on the legislative history, the extent to which there is Federal occupation of the subject area, and whether there is a need for national uniformity); whether compliance with both Federal and State law is possible; and whether the State law serves as an obstacle to accomplishing the purposes and objectives of Congress.[2]

In those instances where Congress has not preempted non-Federal action, State laws can still be invalidated if they are found to violate the Commerce Clause; this constitutional provision authorizes Congress to "regulate Commerce with foreign Nations, and among the several States, and with Indian Tribes."[3] While this statement does not explicitly limit State interference with interstate commerce, the "negative implication" of the Commerce Clause has been interpreted to mean that in the absence of congressional action, States may not erect barriers to the free flow of interstate commerce.[4]

There are two tests used by the courts in evaluating alleged violations of the Commerce Clause. First, a State or local requirement must be nondiscriminatory in order for it to be valid. An example of a discriminatory requirement is one that prohibits out-of-State shipments. Second, the courts must determine if interstate commerce is unduly burdened by balancing the impact of a non-Federal requirement on interstate commerce against the benefits it provides.

[1] The Supremacy Clause asserts that: "This Constitution and the Laws of the United States which shall be made in Pursuance thereof, and all treaties made, or which shall be made under the authority of the United States, shall be the supreme law of the land; and the Judges in every State shall be bound thereby, anything in the *Constitution* of Laws of any State to the contrary nor withstanding." U.S. Constitution, article VI, clause 2.

[2] For additional information on Federal preemption see, L.M. Trosten and M.R. Ancarrow, "Federal-State" Local Relationships in Transporting Radioactive Materials: Rules of the Nuclear Road," *Kentucky Law Journal*, vol. 68, No.2, 1979-80, p. 251; and Christopher Baum, "Banning the Transportation of Nuclear Waste: A Permissible Exercise of the States' Police Power?" *Fordham* Law Review, vol. 52, March 19S4, p. 663.

[3] U.S. Constitution, article I, sec. 8, clause 3.

[4] Laurence Tribe, *American Constitutional Law* (Mineola, NY: The Foundation Press, Inc., 1978), p. 320.

[5] Trosten and Ancarrow, op. cit.; Baum, op. cit.

requiring tank truck carriers of hazardous gases to obtain permits was also upheld.[156] The New York City permits were obtainable by telephone. On the other hand, Rhode Island permit regulations for transporters of liquefied natural gas or liquefied petroleum gas were found to be inconsistent by the U.S. District Court and the Court of Appeals.[157] In this case, the court found that the regulations, which required transporters to obtain a permit not less than 4 hours before or more than 2 weeks prior to each shipment, caused unnecessary delays and were inconsistent with the HMTA. DOT also concluded that the Rhode Island permit requirements were inconsistent.

Local routing restrictions have been addressed in two lawsuits. The New York City permit regulations for transporters of hazardous gases also required transporters who did not have pick-ups or deliveries in the city to use an established alternate route around it. Shipments into the city had to conform to specified routes and times established by the local authorities. The court found that the city regulations promoted safety and did not cause unnecessary delays, and that the route around the city was a "practicable alternative." In Boston, restrictions on the use of city streets were challenged both in Federal court and through DOT's inconsistency ruling process. After a lengthy review process, DOT decided that it could not reach a conclusion, because even though the routing restrictions appeared to enhance public safety, consultation with affected jurisdictions had been limited.[158] A final decision by the court has not yet been reached.

State restrictions imposed on the transportation of radioactive materials have also been the subjects of lawsuits. Laws prohibiting interstate shipments of radioactive wastes but allowing intrastate transportation were found to be unconstitutional. In one case, Illinois attempted to prevent shipments of spent nuclear fuel into the State for storage at a General Electric facility in Morris, Illinois. Another case involved a Washington State statute prohibiting shipments of low-level radioactive wastes destined for a disposal site in Richmond, Washington, from entering the State.[159]

[156] Both the District Court and the U.S. Court of Appeals for the Second Circuit upheld the New York City requirement. See *City of New York v. Ritter Transportation Inc., 515* F. Supp. 663 (1981); and *National Tank Truck Carriers, Inc. v. City of New York, 677* F. 2d 270 (1982).

[157] *National* Tank Truck Carriers, *Inc.* v. *Burke, 535* F. Supp. 509 (1982) and *National Tank Truck Carriers, Inc. v. Burke, 698* F, 2d 559 (1983).

[158] 47 F.R. 18457, Apr. 29, 1982. It should be noted that the U.S. Department of Transportation also cited a concern about the validity of the data used for Boston's risk determination, but concluded that further refinement of the data would not have had a substantial effect on the outcome.

[159] *People* *f State *of Illinois* v. General *Electric Co.*, 683 F. 2d 206 (1982); and *Washington Stare Building and Construction Trades, AFL-CIO v. Spellman, 684* F. 2d 627 (1982).

CONCLUSIONS AND POLICY OPTIONS

A driving force behind enactment of the Hazardous Materials Act of 1975 was the improvement of regulatory and enforcement activities and the consolidation of authority within the Department of Transportation. During the past 10 years, responsibility for issuing most hazardous materials transportation regulations, except for bulk marine shipments, has been shifted to one entity, RSPA. However, the modal administrations continue to be responsible for safety regulations, including the development of some hazardous materials regulations applicable to each mode. Inspection and enforcement authority is shared by RSPA and the modal administrations. Other Federal agencies also have jurisdiction over certain types of hazardous materials and worker safety.

Moreover, the roles played by States and localities and by international organizations in the regulation of hazardous materials transportation have grown considerably since the HMTA was passed. The act provided the Secretary of Transportation with broad authority to promulgate a wide range of requirements. However, DOT has made several decisions about how to exercise its authority that have limited the application of its regulations, motivating State and local governments to act where they saw a need.

First, DOT has chosen not to apply the hazardous materials regulations to most intrastate highway transport. Thus, for example, hazardous materials released from a truck owned by a company operating wholly intrastate, need not be reported to DOT (see chapter 2) and second- or third-hand cargo tankers that no longer meet Federal requirements may be used in some States (see chapter 3). On the other hand, some jurisdictions have established container regulations that are more stringent than Federal requirements. While States accepting Federal funds to support their enforcement programs are required to apply the hazardous materials regulations to both intrastate and interstate carriers, this does not ensure that the reporting requirements and container regulations will be applied.

Second, DOT has not exercised its authority to establish a registration program for shippers and carriers. This has meant that it does not have vital data about the extent of the group it regulates and that information useful to State and local officials is not available.

The legislative history of the HMTA indicates that Congress intended to preclude a multiplicity of State and local regulations and the potential for varying and conflicting regulations. Most State and local governments understand and agree with the need for uniform regulations, especially in areas related to containers and hazard communication. However, they believe that the steps they have taken are necessary to provide adequate safety in light of the risks posed by the transportation of hazardous materials. State programs, like their Federal counterparts, are now characterized by a multiplicity and diversity of activities and areas of jurisdiction. While Federal grant programs have provided valuable assistance to States and have encouraged adoption and uniform enforcement of Federal regulations, great variation among State laws and regulations persists.

Local governments usually do not directly benefit from Federal grant programs to the States, Consequently, they must rely on alternate sources of funding, such as licensing or permitting fees. Some jurisdictions have set fee levels to cover the administrative costs associated with registration, permit, or licensing programs, while others use fees to support inspection and enforcement or emergency response activities.

As most State and local requirements apply to highway shipments, the trucking industry has been affected most heavily. Interstate shippers and carriers argue that compliance with differing laws and regulations is confusing, time-consuming, and expensive. The costs include payment of registration, permit, and licensing fees which range from several dollars up to $1,000 per shipment, as well as operational expenses, such as driver costs, and expenses incurred by special staff to track changing requirements. Carriers have also found that certain types of requirements can cause delays in transit. Moreover, shipments may be diverted around jurisdictions that have imposed special requirements, shifting the risks to other States and communities.

There have been no comprehensive efforts to resolve existing interjurisdictional differences. Resolving questions of inconsistency between Federal, State, and local regulations, a task traditionally left to the courts, has been the focus of an advisory administrative review process established by DOT in 1976. In 16 inconsistency rulings, DOT has indicated that it believes State and local activity is limited to traffic control and narrow regulations that eliminate or reduce safety hazards peculiar to a local area. In addition, even when there is a unique local safety problem, consideration of the impacts of a requirement on other jurisdictions must be taken into account. DOT has also indicated that it is necessary to look at the impacts of State or local permit requirements, such as shipment delays, to determine their validity. Several cases reviewed by DOT have also been the subjects of lawsuits. Although case-by-case reviews by DOT and the courts, a time-consuming and costly effort, provide criteria for assessing the validity of certain types of laws and regulations, OTA believes that they will not prevent continued adoption of differing State and local requirements.

Registration, licensing, permitting, and notification requirements are important to States and localities because they provide valuable data and revenue. However, industry objects to both the fees that are assessed and the delays and diversions of shipments. Policy decisions must address both the financial and informational needs of State and local governments and ease the burden faced by interstate shippers and carriers. Thus, Congress might require development of national guidelines for State

and local information-collection programs in three areas: 1) to determine the number and location of hazardous materials shippers and carriers (registration or inventory), 2) to obtain assurances of fitness from shippers and carriers (licensing or permitting), and 3) to obtain information on the types of hazardous materials passing through or being produced in a community or region (notification). A consensus approach involving Federal, State, local, and industry representatives could be used to formulate the guidelines. A standard form for requesting information could be created, sire. ilar to the uniform hazardous waste manifest developed jointly by DOT and EPA. If detailed commodity flow data are needed, requirements that focus on information already available, such as Material Safety Data Sheets, should be emphasized. Special consideration should also be given to the information needs of bridge and tunnel authorities; this might include prenotification of certain high hazard shipments. In those States where the guidelines are adopted, localities may be required to obtain the information they need from their State agencies. In addition, reciprocity (including information sharing) between States in a given region could be encouraged. Assuming that alternative sources of financial support are provided for enforcement and emergency response (see discussion below), States and localities could be prohibited from assessing fees or required to limit fees to amounts sufficient to cover program administration costs. To assist interstate carriers and shippers, an annual compendium of State and local requirements and contacts, jointly developed by industry, DOT, and the States, could be published. Several public and private organizations have already compiled some of this information.

Carrier associations, insurance industry representatives, and State motor vehicle administrators and enforcement personnel have voiced strong support for a national truck driver's license requiring special training. Congress could author. ize the development of such a license with special certification requirements for all hazardous materials, including gasoline. Driver certification could be linked to specific types of vehicles. Prerequisites for a license should include training and a clean record. Uniform license requirements and training standards could be developed by DOT, but States would be responsible for issuing licenses and administering the training program. State license fees could be set to cover program costs. California has already developed such a program. Another model is a program created by the European Common Market countries, which requires a hazardous materials driver's license but allows each country to pass its own implementing legislation.

In addition to the problem of differing licensing, registration, and permit requirements, the broader issue of varying State hazardous materials laws and regulations should also be addressed. Complete information about the scope of existing State laws and regulations pertaining to the transportation of hazardous materials is not presently available. While many States have adopted 49 CFR, some have excluded certain types or quantities of hazardous materials. Others have excluded private motor carriers and intrastate highway shipments are not regulated consistently, An assessment of State hazardous materials laws and regulations to determine whether they are more or less stringent than Federal regulations could be required. BMCS has already begun, at congressional request, a 5-year review of State motor carrier laws to determine those that are more or less stringent than Federal requirements in the areas of driver qualifications and training, hours of service, and equipment maintenance. [160] As part of the process, State laws will be reviewed by a panel convened by the Secretary of Transportation. [161] State laws that are less stringent than their Federal counterparts will be preempted; a law that is more stringent will not be preempted unless there is no safety benefit associated with it, the law is not compatible with Federal regulations, or enforcement of it causes an undue burden on interstate commerce. Another study of State motor carrier laws related to finances is being conducted by the National Governors' Association for the Federal Highway Administration. Congress could extend these ongoing efforts to encompass State hazardous materials regulations or initiate a separate review.

[160] This review is authorized by the Motor Carrier Safety Act of 1984, Public Law 98-554, 98 Stat. 2829,2835-2838. State guidelines for compiling, analyzing, and submitting their laws; regulations; and other information were published by the Bureau of Motor Carrier Safety on Jan. 10, 1985 (50 F.R. 1243).

[161] Section 209 of the Motor Carrier Safety Act of 1984, 98 Stat. 2838.2839.

In addition, Congress could consider requiring the expansion of those parts of 49 CFR administered solely **by** RSPA, such **as the** container regulations, **to cover all** intrastate highway transportation. Intrastate shippers and carriers of hazardous wastes and substances and flammable cryogenics are already subject to Federal regulation. Such a requirement would make RSPA regulations consistent with MCSAP requirements. If this approach is adopted, the preemption criteria noted above for existing laws and regulations should also apply to new requirements. Thus, intrastate regulations that increase safety and do not unduly burden interstate commerce would be allowed. **Congress might also wish to require DOT to reduce emphasis on detailed inconsistency rulings, which occur after a regulation is in place, and to provide technical and policy assistance to States or communities during the regulation-setting process.**

State and local hazardous materials enforcement activities, particularly for the highway mode, have become increasingly important during the past decade. While SHMED and MCSAP have provided States with grant monies to develop and implement enforcement programs, SHMED is ending this year and MCSAP funds must be used to support all motor carrier enforcement activities, not just hazardous materials. Moreover, financial support for emergency response training of local fire and police department personnel (described in chapter 5) is also a major concern of State and local governments. One funding mechanism that State and local governments have tapped is licensing, registration, and permit fees. States and municipalities are unlikely to discontinue such fees unless alternative funding sources are provided, Thus, **Congress could consider providing additional funds to States and localities for enforcement and emergency response programs.** Funding for the SHMED program could be extended and made available to all States with a requirement that State hazardous materials enforcement teams be developed. Special provisions could also be made to ensure that major metropolitan areas that undertake inspections be allocated a portion of the grant monies. A dedicated Federal fund to support emergency response activities could also be established.

Routing is an extremely important accident prevention tool available to State and local governments. Developing routing schemes that enhance overall regional safety is a difficult process, although the Portland, Oregon, experience demonstrates that it is possible. **The existing BMCS routing regulation for nonradioactive hazardous materials could be amended to provide more explicit guidance to communities. States designating alternate routes under HM-164 are already required to follow DOT guidelines for routing shipments of radioactive materials; this requirement, which includes a risk assessment and interjurisdictional consultation, could be extended to all hazardous materials. The development of criteria for routing shipments of radioactive and other hazardous materials by rail and water might also be considered. DOT technical assistance to States or communities for applying the risk assessment criteria and working through the route selection process could be extremely useful.** For example, the availability of computer software packages capable of comparing the risks associated with alternative routes, might be increased. One example is a computerized risk assessment model developed by Oak Ridge National Laboratory for DOD (see chapter 2). In addition, a compendium of routes designated by State and local governments might be published for motor carriers.

Finally, Congress could take steps to promote improved coordination within DOT, between Federal agencies, and between the Federal Government and State and local governments. **A standing coordinating committee could be established with representatives from each DOT modal administration; RSPA; other Federal agencies such as EPA, NRC, DOE, and FEMA; State and local governments; and industry.** This committee might be established within the framework of the National Response Team. It could be required to meet regularly with an agenda that includes:

- defining missions and roles of Federal agencies in the transportation of hazardous materials,
- coordinating Federal training programs,
- developing national guidelines as described above,
- setting a regulatory agenda for intra-agency and interagency issues, and
- coordinating common activities such as data collection and enforcement.

Subgroups could be formed to address areas of particular concern. More specifically, DOT and EPA could be directed to develop a joint program to educate small businesses that generate and transport hazardous wastes about DOT transportation requirements and the compatibility of wastes and containers. NRC, DOE, and DOT could be encouraged to develop a joint program to involve States, local governments, and Indian tribes in the decisionmaking process for Nuclear Waste Policy Act shipments and procedures.