HAZARDOUS MATERIALS REGULATION IN VIRGINIA

by

Gary M. Bowman
Research Scientist Assistant

A report prepared by the Virginia Transportation Research Council under the sponsorship of the Transportation Safety Administration of the Department of Motor Vehicles

Virginia Transportation Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia Department of Transportation and the University of Virginia)
Charlottesville, Virginia

February 1987
VHTRC 87-R8

SAFETY RESEARCH ADVISORY COMMITTEE

W. E. DOUGLAS, Chairman, Director, Planning & Programs Development, Department of Motor Vehicles

V. M. BURGESS, Transportation Safety Administrator, Department of Motor Vehicles

J. T. HANNA, Deputy Commissioner, Department of Motor Vehicles

C. P. HEITZLER, JR., Program Manager, Department of Information Technology

T. A. JENNINGS, Safety/Technology Transfer Coordinator, FHWA

B. G. JOHNSON, Supervisor, Driver Education, Department of Education

F. W. JOHNSTONE, Chief of Police, Albemarle County Police Department

C. W. LYNN, Reseach Scientist, VTRC

R. M. MCDONALD, Project Director, Transportation Safety Training Center, Virginia Commonwealth University

J. T. PHIPPS, Director, Roanoke Valley Alcohol Safety Action Project

C. M. ROBINSON, Field Supervisor, Department of State Police

ANDREW SISSON, Director, Substance & Abuse Services, Blacksburg, Virginia

F. F. SMALL, Highway Engineering Program Supervisor, VDOT

J. A. SPENCER, Assistant Attorney General, Office of the Attorney General

C. W. THACKER, Director, Office of Substance Abuse Services, Department of Mental Health and Mental Retardation

E. W. TIMMONS, Director of Public Affairs, Tidewater AAA of Virginia, Norfolk, Virginia

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

The preparation of this report was possible only through the cooperation and aid of a number of individuals and organizations.

Special help was given by Edith Page and Fran Rudoff of the Office of Technology Assessment, who prepared the report, Transportation of Hazardous Materials. Their report is the document upon which most of this report was either based or from which portions were extracted. Alan Roberts, Dr. Sherwood Chu, and Elaine Economides of the U.S. D.O.T. Office of Hazardous Materials Transportation were also very helpful in providing background data on hazardous materials flow and incidents throughout the nation.

The only information available on the significance of hazardous materials in Virginia is the study prepared by Dennis Price of V.P.I. & S.U, Multi-Modal Hazardous Material Transportation in Virginia. Much of the analysis of hazardous material commodity flows and the prediction of accidents has been extracted from Price's study.

Chapter One

THE SIGNIFICANCE OF HAZARDOUS MATERIALS IN VIRGINIA

A. The Need for Hazardous Materials Information

The agencies of the government of Virginia that are responsible for hazardous materials need data about the manufacturers, shippers, carriers, commodity flow, and accidents to help them develop regulations, plan for accident prevention and emergency response, and target enforcement efforts.

Over the last fifteen years, the public has become increasingly aware of the special environmental and public health damage that hazardous materials transportation accidents can cause. With this awareness has come an understanding by state and local officials that, while they have responsibility for public safety in their jurisdictions, they do not fully understand the local risk from the transportation of hazardous materials. Moreover, there is a pervasive feeling that federal regulations and programs do not take into account special local circumstances and, in any case, may not provide an appropriate level of safety. These jurisdictions require data about hazardous materials transportation in their areas to help them establish regulatory, enforcement, and emergency response programs that meet their needs.

Hazardous material data collection is not easy. In Virginia, no state agency maintains a comprehensive data base on fixed facilities that handle hazardous materials, the routes on which hazardous materials travel, or accidents in which hazardous materials are involved. A variety of federal hazardous material data bases exist, but the data in the federal bases are too aggregated to be very useful in Virginia.

The widely accepted method of gathering and examining data on hazardous materials flow is described by William Rowe in Risk Assessment Processes for Hazardous Material Transportation, a Transportation Research Board study issued in 1983. Risk assessment involves estimating the frequencies and consequences of undesirable events, then evaluating the associated risk in quantitative terms. The process of risk assessment serves to organize thinking about risks, and permits the judgements of interdisciplinary teams of experts to be integrated in a systematic way. It also helps identify risks that might not be thought of otherwise and it motivates improvements in data collection by pointing out data base deficiencies. The results of risk assessment provide knowledge essential to informed decision making.

Public concern is greatest about risks that are involuntary, uncontrolled, unfamiliar, immediate, man-made, and catastrophic. Hazardous materials transportation possesses many, and sometimes all, of those

attributes. Risk assessment can help to address two fundamental questions, one quantitative and objective and one qualitative and subjective: What is the level of risk? and What level of risk is acceptable to the parties concerned? The first question is relatively readily addressed with adequate data and proper methodology, whereas the second question involves numerous judgements and often a great deal of discussion and negotiation, especially when large numbers of people and several governmental jurisdictions are involved. Professional risk assessment places heavy emphasis on quantitative results. Where policy issues are involved, however, and involuntary risks exist, such as those associated with the transportation of hazardous materials, qualitative judgements are important too.

In the technical detail of risk assessment models, the question of risk acceptability is complicated further by the fact that some of the concerned parties may have risk perceptions that differ from the actual risks. Risk equity, the appropriate distribution of risks among different members of society, is another complicating factor. Factors of perception, actual risk, and equity are important policy considerations in the initial stages of developing a hazardous material program in Virginia: the data already collected suggest that the problem of hazardous material incidents is so small that active governmental intervention in the area may not be warranted.

Public concerns about the risks of hazardous materials transportation are likely to persist and intensify, accentuating the need for risk or hazard assessment at the state level. This assessment generally should consist of two phases: (1) the development of an inventory of hazardous material activity and exposure in the region, and (2) the estimation and evaluation of risks based on that information. The recent Office of Technology Assessment (OTA) report, Transportation of Hazardous Materials, advises that the first stage can be performed very well at the state level. In fact, the OTA found that the data collection process is beneficial in itself, because of the communication that it fosters. It is the process of evaluating the risks and making decisions based on them that has been the source of difficulty in localities where disputes over routing have reached the courts.

Few jurisdictions have used sophisticated mathematical techniques of risk analysis to estimate the probability of an incident and its severity. Most communities have found it adequate to map the areas where the risk of a hazardous materials incident is highest or where there would be the greatest public danger or the most damage. Data for this type of study can be assembled either from a fixed facility inventory or a transportation study. Much useful information is also available from public records routinely kept for other purposes by state and local public

works, transportation, environment, and planning departments. Normally, a hazardous assessment requires the following kinds of information:

1. transportation network maps and descriptions
2. highways and streets used by hazardous materials carriers
3. tunnels, bridges, and rail crossings
4. railroad yards and truck terminals
5. highway, rail, air, and water accident data
6. locations of past hazardous materials incidents and materials involved
7. concentrations of hazardous materials manufacturing and storage sites
8. areas of high population density and environmental sensitivity
9. location of schools, hospitals, and other especially vulnerable sites
10. water supply and sewer facilities

Fortunately, in Virginia, two separate risk assessments, both meeting these criteria, have been conducted under the sponsorship of the Virginia Department of Transportation Safety. The data gathered during those previous studies are sufficient to support contemporary policy decisions about hazardous material transportation safety.

B. Hazardous Material Flow in Virginia

In February 1980, J. William Schmidt and Dennis Price of the Virginia Polytechnic Institute and State University Department of Industrial Engineering and Operations Research studied hazardous material commodity flow and accidents in Virginia, with the objective of predicting accident occurrence in the future.

The study was conducted in two phases. In phase I, the Hazardous Material Flow Study, estimates were obtained for each section of primary and interstate highway in Virginia where sufficient data were available. The data for the estimates were obtained through a truck survey conducted during July and August 1977. The estimates of hazardous cargo flow were expressed in terms of ton of hazardous material per day and the number of trucks carrying hazardous cargo per day.

The Department of Highways and Transportation provided data by route and section of primary interstate highway defining the number of truck accidents in 1977. The estimated number of accidents involving trucks carrying hazardous cargo per section of highway was determined as follows:

Ta = Number of truck accidents per section in 1977.
Tt = Annual truck traffic per section in 1977.
Th = Estimated number of trucks carrying hazardous materials per section in 1977.

Ah = Estimated number of truck accidents involving hazardous materials per section in 1977.

Ta and Tt were available through Department of Highways and Transportation Records. The estimated numbers of trucks carrying hazardous materials by section of primary and interstate highways were obtained in the highway flow survey. The probability that a truck will be involved in an accident on a given section of highway can be estimated as Ta/Tt. Assuming that the probability of a truck accident is independent of the nature of the cargo onboard, the number of accidents involving trucks carrying hazardous materials per year per section of highway can be estimated by

$$Ah = Th\ (Ta/Tt)$$

Taking the vehicle flow of hazardous material in 1977 as typical, an assumption that may not be appropriate in 1986, and considering the accident rate in that year, Virginia can expect approximately 240 accidents involving hazardous materials over a ten-year period. This is of course a static estimate since it is based upon 1977 data only and changes in the flow of hazardous commodities will change the estimate. Based upon the results of the 1977 Virginia Highway Hazardous Materials Flow Survey, 41% of the accidents can be expected to involve flammable liquids, 23% combustible liquids, and 11% corrosive substances.

The sections of highway in Virginia of highest potential for accidents involving hazardous materials are shown in the flow map in Figure 1-1.

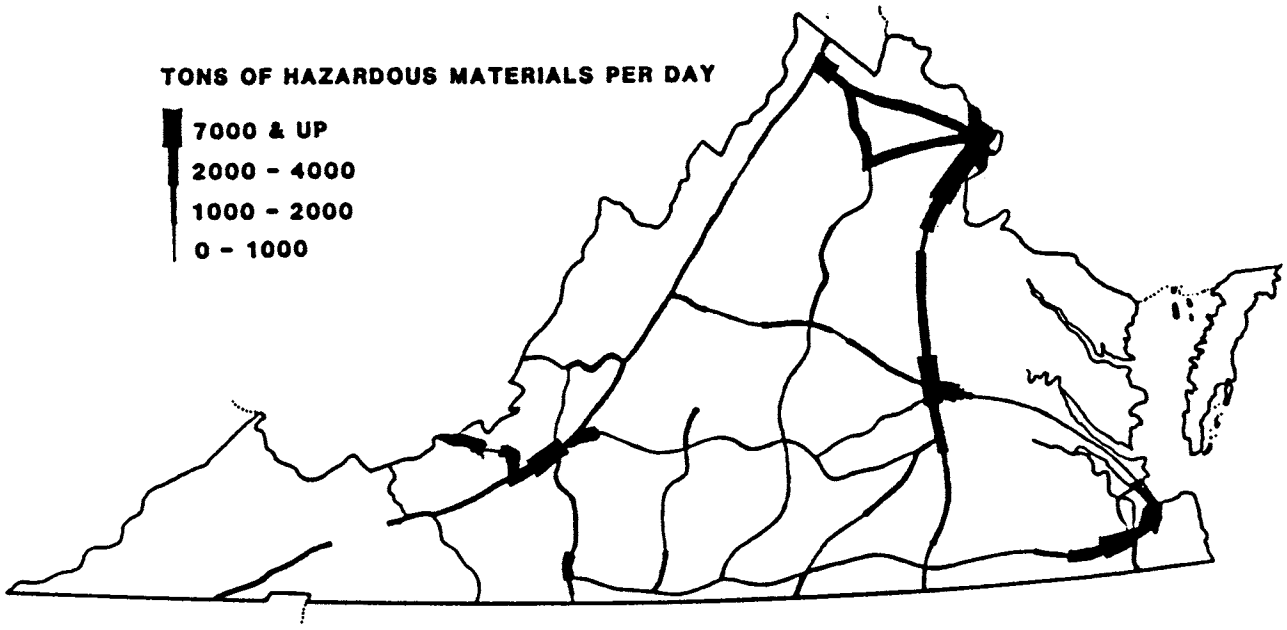


Figure 1-1: Quantity of Flow of Hazardous Materials, 1977

The sections listed in Figure 1-2 are the areas with the greatest potential for incident. Three areas are particularly noteworthy: the Roanoke metropolitan area, the Arlington metropolitan area, and Route 50 between Aldie and Millwood.

Route	From	To	Accidents/ 10 Years
29/211	Rt. 66 East of Gainesville	Rt. 66 West of Centerville	4.3
221/460	Blue Ridge Parkway	Rt. 695 Montvale	4.2
460	Rt. 730 Maybrook	Pearisburg	4.2
50	Rt. 15 Aldie	Middleburg	3.7
495	Rt. 95	Rt. 236	3.4
220	Rt. 419 South of Roanoke	Boones Mill	2.9
50	Middleburg	Rt. 17 Paris	2.8
17/50	Rt. 723 East of Millwood	Rt. 50 Paris	2.6
81	Rt. 11-460 East of Christiansburg	Rt. 603	2.5
58	Rt. 119 Delila	Rt. 729 Glenwood	2.4
95	Rt. 207 Carmel Church	Rt. 1 Massaponax	2.4
95	Rt. 10	Falling Creek	2.3
52	Hillsville	N.C. Line	2.2
50	Rt. 66	Rt. 28 Dulles Airport	2.1
29	Charlottesville	Rt. 33 Ruckersville	2.0
52	Rt. 69 Poplar Camp	Hillsville	2.0

Figure 1-2: Heaviest Travelled Routes

Considering highways in total rather than by section it is reasonable to conjecture that the number of hazardous materials accidents would depend upon the length of the highway and the volume of traffic over the highway. This conjecture was borne out by the Schmidt and Price study. The most heavily travelled highways are the routes with the most hazardous material incidents; Interstates 64, 81, 95, and 495 are among the ten Virginia highways with the greatest potential for hazardous material incidents. Nearly 75% of the hazardous material accidents occurring on the primary and interstate highway system can be expected on the ten most heavily travelled highways in the state.

Where sufficient data were available, Schmidt and Price computed the expected number of hazardous materials accidents over a ten-year period for each section of primary and interstate highway in Virginia. The study provided estimates of the number of such accidents by locality and the route and section within each locality with the greatest potential for hazardous material accidents. Although accurate hazardous material accident history data are not available for Virginia, the highway forecasts made by Schmidt and Price appear to have been fairly accurate, as will be discussed in the next section of this chapter.

Using essentially the same methodology as that followed in their truck study, Schmidt and Price also studied hazardous commodity flow by rail in the state. The rail study revealed that the heaviest flow of hazardous cargo by rail is from the West Virginia/Virginia border near Narrows to Radford to Roanoke and from the North Carolina/Virginia border near South Hill to Richmond to Washington, as illustrated in Figure 1-3. Most of the rail segments along these routes are near U.S.

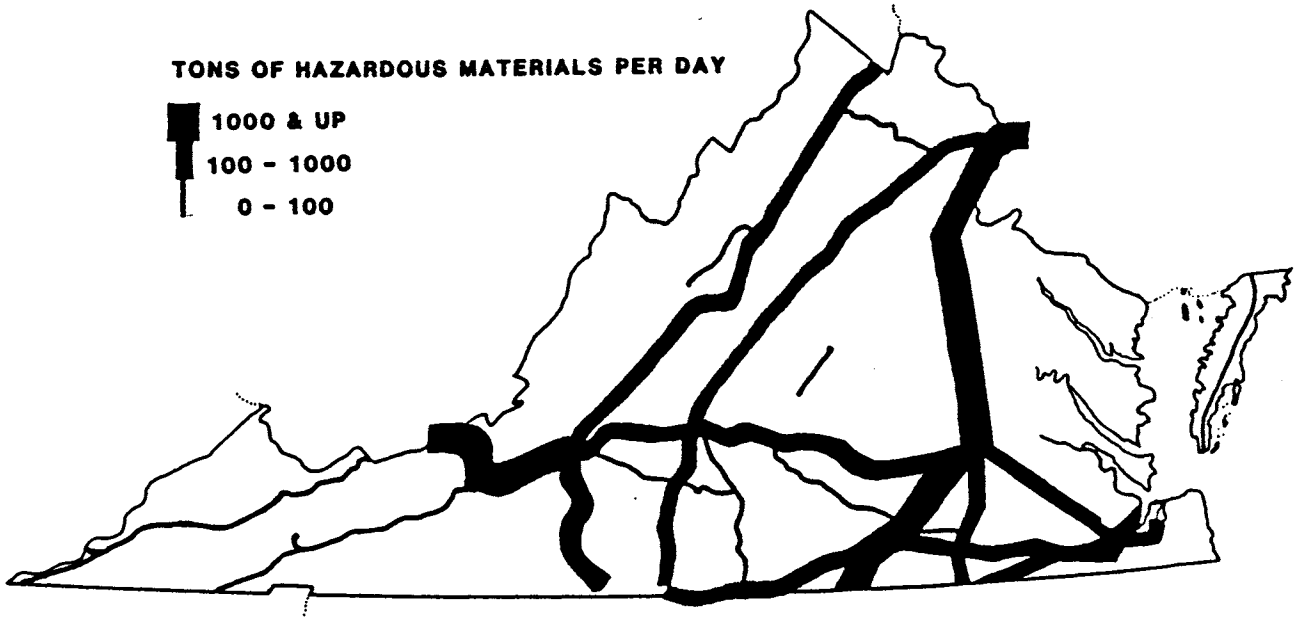


Figure 1-3: Quantity of Flow of Hazardous Materials by Rail, 1977

or interstate highways which also carry heavy volumes of hazardous material cargo. As with truck traffic, hazardous rail cargo is heaviest in and around metropolitan areas; in particular, the Richmond and the Arlington railroad yards handle more hazardous material than almost any other rail yards in the United States. Corrosive material (49.0%), flammable liquids (12.9%), and nonflammable compressed gas (10.9%) are the most heavily shipped hazard classes. Flammable liquids, combustible liquids, and corrosive materials are the hazardous materials shipped most frequently by truck, however. The total annual and seasonal flow of cargo per rail section varies from section to section and reaches a maximum average annual value of nearly 1450 tons per day for the section of rail between Petersburg and Centralia. In terms of railcars per day, the average annual flow reaches a maximum value of slightly more than 25 railcars per day between Salem and Roanoke.

In Multi-Modal Hazardous Material Transportation in Virginia, Price also evaluated hazardous material flow through Virginia airports and waterways. Since no serious hazardous material accidents have occurred involving those transportation modes in Virginia, air and water traffic are assumed to pose only a negligible threat to public safety.

Unlike most of the other states, Virginia has already overcome the first hurdle to developing a hazardous materials program: the collection of data about hazardous material flow through the state. The information available about commodity flow should be updated, but the information required to evaluate policy options is accessible.

C. Hazardous Material Incident Experience in Virginia

The Schmidt and Price work predicted the number of hazardous material incidents that would occur in the state over time. There is no comprehensive state data base on hazardous material incidents, so it is impossible to determine precisely how accurate the Schmidt and Price projections are, although the limited data that are available indicate that the forecasts are accurate.

Although the Department of Emergency Services, the State Police, and the Board of Health keep records of the hazardous material incidents in the state, their data underestimate the problem because some accidents are handled entirely by local government authorities or industry officials and the state government is not informed of the incident. Of course, there is a degree of self-selection in this process, such that the unreported accidents may not be serious anyway.

The available data indicate that the incidents in Figure 1-4 have occurred throughout Virginia in the past several years.

YEAR	TOTAL INCIDENTS	INJURIES	DEATHS
1982	N/A	32	1
1983	177	52	0
1984	190	20	0
1985	255	44	0

Figure 1-4: Virginia Accident Experience

Both actual accident experience and the accident forecasts demonstrate that the number of hazardous material accidents is not great. Every day, thousands of tons of hazardous material travel through Virginia without incident. Although the possibility of a catastrophic incident in Virginia exists, it has not yet occurred (the U.S. Department of Transportation estimates that the average hazardous material incident involves only $1,100 in property damage) and the best available data indicate that a catastrophe will not occur while the current levels of enforcement and emergency response resources are maintained.

Of course, every prudent observer of hazardous material transportation must recognize that there is the risk of a catastrophe, even though the probability of the event may be low. In 1947, a ship loaded with ammonium nitrate fertilizer exploded at Texas City, Texas, setting off a chain of fires and explosions that resulted in 576 deaths and thousands of injuries. The probability that such a disaster would occur in Texas was low, but the probability was irrelevant, in retrospect, once the deaths occurred.

The relevant analysis in examining hazardous material accident potential is a determination of what can be done, prospectively, to prevent a disaster. As tragic as the Texas City accident was, the range of preventive measures that could have been taken by government to avert the disaster was limited then, just as the range of policies that can be adopted by government to prevent future disasters is limited now. That is not to say that government can do nothing--certainly government can increase hazardous material safety through regulation, enforcement, and emergency preparedness, but government will not be able to guarantee absolute hazardous materials safety. This report is premised on this basic conclusion and recommends policies that will increase safety without, in turn, creating more serious externalities.

Chapter Two

FEDERAL REGULATION OF HAZARDOUS MATERIALS

The manufacture, storage, use, transportation, and sale of hazardous material, however that term is defined, is heavily regulated by the United States government. Since most manufactured substances are placed in the stream of interstate commerce, this federal regulation is appropriate. The specific content of the federal rules regarding hazardous material is so detailed and the volume of regulations is so ponderous that the federal effort has been criticized as incomprehensible by local officials who are responsible for enforcing the law. Further, the detail of federal regulations is so precise and comprehensive that the states may be preempted from promulgating additional regulations on hazardous material. This chapter will describe the development of federal regulation of hazardous material transportation, the current regulatory regime, and the requirements for state and local law to be consistent with the federal regulation.

A. History

In 1866, the first federal law regulating the transportation of hazardous material was passed. The law specifically regulated the shipment of explosives and flammable materials such as nitroglycerin and glynoin oil. In 1871, Congress imposed criminal sanctions on persons who transported certain hazardous commodities on passenger vessels in navigable American waters in violation of Treasury Department regulations.

As railroads stretched across the United States, the earliest federal regulations were directed at railroad safety. Rail shipments of explosives during and after the Civil War were addressed by uncodified statutes and contracts between shippers and carriers based on English common law. Under the common law, common carriers were granted a public charter to provide service to anyone upon reasonable request, for reasonable cost, 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 of the shipment's hazards.

The creation 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. While ICC requirements were first developed for rail transportation, they were eventually extended to other modes. As described below, the ICC was the primary

regulatory agency with authority over hazardous materials transportation through 1966.

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

Regulations adopted by the ICC in 1911 to implement the 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 the ICC to utilize the services of groups such as the Bureau of Explosives in its hazardous materials safety program. Subsequently, the ICC delegated extensive rule making and enforcement responsibilities to the Bureau.

Under the EODA, all hazardous materials transportation activity was barred unless specifically authorized by the 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 the ICC. This process is still used, and new permits are now known as exemptions. Periodically, if the ICC granted a series of requests pertaining to a particular section of the regulations, that section was revised and streamlined, usually for specific commodities. This pattern has continued, so that today's packaging requirements are ad hoc and individual in character.

Throughout the first half of the century, the roles of the ICC and the Bureau of Explosives continued to grow as rules originally designed for the railroads were applied to other modes of transport. The U.S. Coast Guard (USCG) was required to adopt ICC regulations for the classification of hazardous materials and for marking, labeling, packing, and certifying portable containers. Regulatory authority over highway transportation was given to the 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 the transportation of hazardous materials by air in the early 1940s. This was done through the wholesale adoption of ICC rules.

The ICC relied heavily on the technological expertise of nongovernmental groups for the development of new regulations, because the size and professional knowledge of the agency's in-house staff were limited. In 1960, Congress extended the 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 the AAR was given the authority to approve applications submitted to the ICC for designs, materials, construction, conversions, or alterations of tank cars.

In 1966, authority to regulate the transportation of hazardous materials was transferred from the ICC, the Department of the Treasury, and the CAB to a new federal agency, the Department of Transportation (DOT). 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. Thus, although the secretary had cabinet-level responsibility for the transportation safety standards (including those for 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 (FHWA) and Railroad Administrations (FRA) for land, and the USCG for water transportation. 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 (HMRB), was created by the Secretary of Transportation to coordinate all hazardous materials activities within the department. The Office of Hazardous Materials (OHM), which served as the staff for the board, proposed revisions to the existing hazardous materials regulatory program. 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 the DOT, although rule making for such standards is now in progress.

After a series of accidents involving the rail shipment of propane, legislation pertaining to hazardous materials transportation and imposing greater requirements on DOT was passed in 1970. Under the Hazardous Materials Transportation Control Act of 1970, 49 U.S.C. 1761, the Secretary was required to establish facilities and technical staff for evaluating hazards associated with hazardous materials; establish a central reporting system for hazardous material accidents; conduct a review of all aspects of hazardous material 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. However, the DOT was unable to implement the statute as the staff increases requested by the department were not approved by Congress. The provisions of this law were incorporated into the Hazardous Material Transportation Act (HMTA) of 1975.

Continuing and systematic organizational difficulties in the early 1970s led the DOT to seek legislation that would consolidate hazardous materials regulatory authority. However, little happened until the crash of a Boeing 707 cargo jet hauling several tons of hazardous materials in 1973. The accident investigation by the NTSB clearly showed a general lack of compliance with existing regulations 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 and enforcement. These findings echoed the conclusions of studies conducted by the National Research Council, the Comptroller General of the United States, and the DOT.

The HMTA was finally passed into law 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:

1. Expanded the DOT's potential jurisdiction to any traffic "affecting" interstate commerce (49 U.S.C. 1802).

2. Authorized the designation of hazardous material, defined as material 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).

3. Authorized the DOT to issue regulations related to packing, repacking, handling, labeling, marking, placarding, and routing; 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).

4. Authorized the establishment of a registration program for shippers, carriers, and container manufacturers and reconditioners (49 U.S.C. 1805).

5. Codified DOT procedures for granting regulatory exemptions (49 U.S.C. 1806).

6. 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 the submission of an annual report to Congress (49 U.S.C. 1808).

7. Authorized the DOT to assess civil and criminal penalties for violations of the HMTA (49 U.S.C. 1809).

8. Defined the relationship between the federal regulations and those of the states and local governments, preempting non-federal rules found to be inconsistent with the federal program and establishing a procedure whereby the 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. The Hazardous Materials Regulation Board was terminated and the responsibilities of the OHM were transferred to the newly formed MTB. The MTB was delegated responsibility for issuing all hazardous materials transportation regulations except those governing bulk transport by water, which continues to be regulated by the USCG. However, the modal administrations continued to be responsible for safety regulations applicable to each mode. Inspection and enforcement authority was divided between the MTB and the modal administrations.

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

The DOT's RSPA issues most of the federal regulations governing hazardous material transportation. The DOT modal administrations, other federal agencies, private domestic groups, and international organizations also significantly influence the movement of hazardous materials in the United States.

The regulatory responsibilities of the RSPA and the four modal administrations (FHWA, FRA, FAA, USCG) are ostensibly coordinated by the

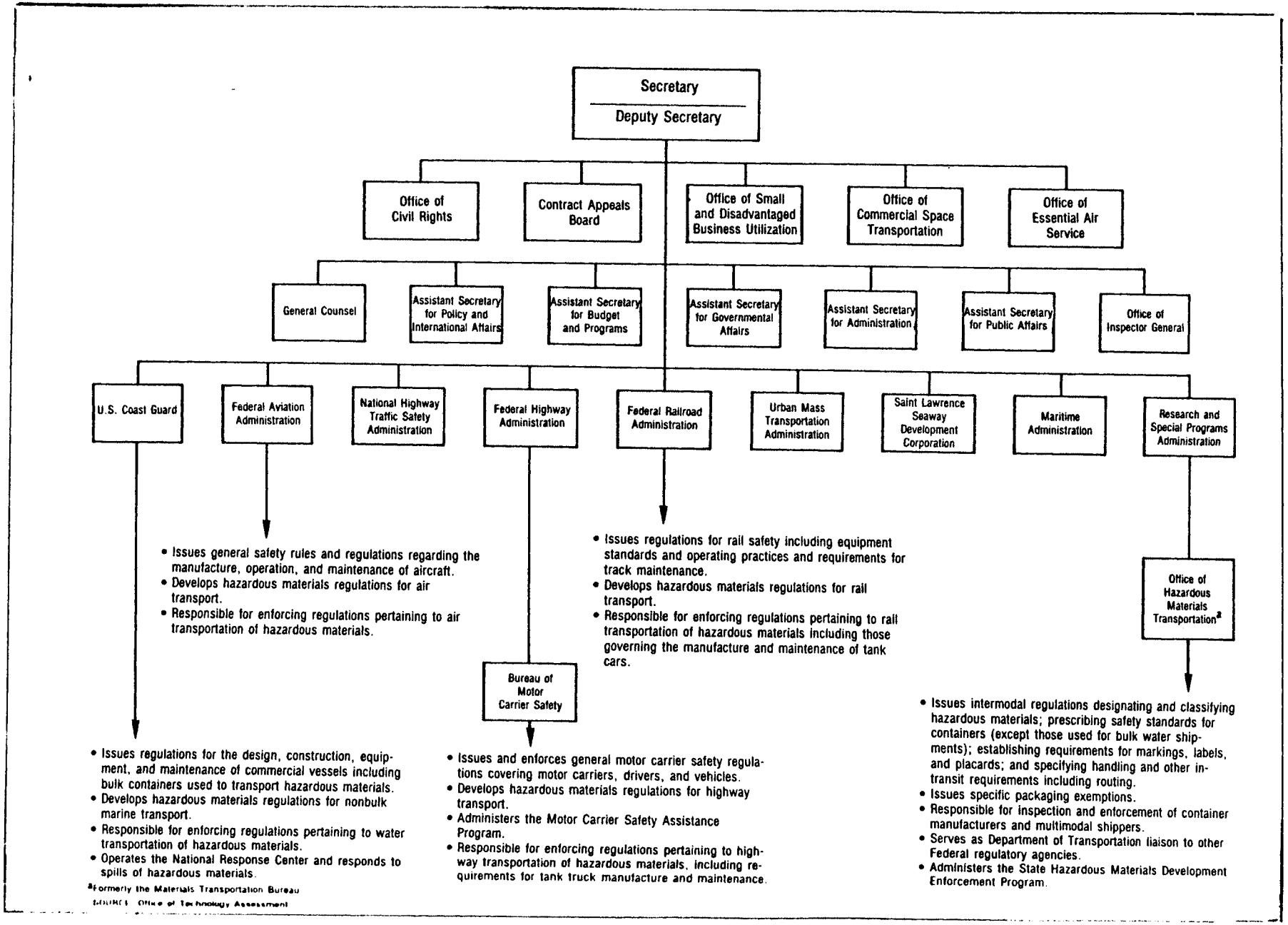
Secretary of Transportation. Regulations issued by the RSPA cover activities of both shippers and carriers of hazardous material in all four modes of transport (except for bulk shipments by barge or ship, which are governed by USCG regulations) as well as container manufacturers. The RSPA also carries out inspections and enforcement activities for multimodal shippers and container manufacturers. RSPA regulations, summarized on pages 18-19 are published in 49 CFR. Although the HMTA authorized the 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. 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 regulations.

Data collection is another activity undertaken by the RSPA, other DOT administrations, and other federal agencies. From a regulatory perspective, it is interesting that although the HMTA allows the DOT to establish a registration program, current registration requirements are limited to certain groups of shippers, carriers, and container manufacturers and reconditioners.

The modal administrations are also responsible for developing and enforcing hazardous materials regulations applicable to each mode. In addition, they have jurisdiction over safety regulations for operations, vehicles, and vessels under other federal statutes. There is little coordination among the intermodal administrations. Figure 2-1 illustrates the process for making hazardous material regulations within the DOT.

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 the 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, hazardous materials sent by mail must comply with DOT and U.S. Postal Service regulations.

The RSPA serves as the DOT liaison with the other federal agencies for hazardous materials. Memoranda of Understanding have been signed with the 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



Allocation of Functions in DOT
Figure 2-1

activities. Aside from these agreements and the 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, there is no method of ensuring effective coordination. 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.

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 the RSPA's small budget and staff.

Other organizations, like the AAR, develop standards and testing requirements, conduct inspections, and provide their members with information on existing and proposed regulations. 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 the DOT for domestic use.

B. Federal Laws

Congress has enacted a plethora of laws regarding hazardous materials--so many that it is difficult to determine exactly which laws in the United States Code, much less administrative regulations in the CFR, affect hazardous materials. Legal research in the United States Code is done only at the risk of missing a small, but potentially important, section of a law inapplicable to hazardous materials generally, but applicable in some small detail. The following discussion illustrates, but does not exhaust, the pervasive federal role in regulating hazardous material.

1. The Hazardous Substance Act, 15 U.S.C. 1261, is the enabling legislation for the Department of Health and Human Services (HHS) to regulate "hazardous substances," as the Secretary of Health and Human Services defines that term. The act, and the regulations issued by the Department of HHS and published in 15 CFR, govern all substances not covered by the Food, Drug, and Cosmetic Act, 21 U.S.C. 301, the Federal Insecticide,

Fungicide,and Rodenticide Act, 7 U.S.C. 136, and the Atomic Energy Act of 1954, 42 U.S.C. 2011. Because most manufactured substances are viewed to have been placed in the stream of interstate commerce, the federal laws governing hazardous substances apply to all hazardous substances within the states. Generally, the Consumer Product Safety Commission and the HHS itself are responsible for promulgating regulations under the Hazardous Substance Act; the Food and Drug Administration (FDA) issues rules under the Food, Drug, and Cosmetic Act; and the NRC issues regulations under the Atomic Energy Act. The agencies issuing the regulations also enforce the regulations, although the police power of the states may be brought to bear in insuring compliance with federal law within the states. All of the federal enabling statutes provide for civil action to be brought by citizens to enforce the federal law, moreover.

2. The Occupational Safety and Health Act, 29 U.S.C. 1910, authorizes OSHA to regulate safety in the workplace. OHSA has issued regulations, published in 29 CFR pursuant to the statute. Subpart H of 29 CFR specifically deals with hazardous materials in the workplace and in areas where workers may be exposed to the hazardous materials. Although OSHA enforces its regulations, the states also enforce the federal standards and a citizen may bring civil suits for damages and injunctive relief when he believes the standards are being violated.

3. The National Environmental Policy Act, 42 U.S.C. 4321, declares a national policy to encourage environmental quality. Executive Order No. 11752, supplementing the act, created the EPA to establish and enforce standards of environmental quality. The EPA has issued rules, which are published in 42 CFR, which describe the procedures and standards required to prevent pollution of the environment and the measures required to clean up pollution once it has occurred. The EPA and the states are responsible for enforcing those regulations.

4. The Hazardous Materials Transportation Act, 49 U.S.C. 1471, empowers the DOT to establish and enforce standards for the safety of hazardous materials, as defined by the Secretary of Transportation. The regulations are published in 49 CFR and are enforced both by the Bureau of Motor Carrier Safety (BMCS), a federal agency, and state police agencies. The HMTA, is indexed as follows:

> Part 106 prescribes general rule making procedures for adopting Office of Hazardous Materials Transportation Regulations.

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 may be 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 hauling 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.

5. The Motor Carrier Safety Act, 98 Stat. 2829, provides the authority for the Federal Motor Carrier Safety Regulations, which provide standards for interstate motor vehicle carriers. The BMCS establishes the regulations, but most enforcement of the standards is done by state police agencies. Since most hazardous materials shipments are done by truck, the enforcement of the motor carrier regulations overlaps the enforcement of hazardous material transportation.

C. Preemption

The federal preemption doctrine arises from the interaction between the supremacy clause of Article VI of the United States Constitution and the Tenth Amendment's reservation of authority to the states to exercise all powers not delegated to the federal government. The doctrine stands for the principle that a valid exercise of federal power preempts or supercedes an incompatible state law.

The first question of a preemption analysis is whether Congress has validly established federal legislation in the hazardous material field pursuant to the powers delegated by the Constitution. A brief perusal of congressional findings makes it apparent that the power to regulate transportation comes from the commerce clause, the war powers clause, and the authority to promote the general welfare and to protect the general public. Accordingly, the majority of commentators and courts have assumed valid congressional authority to regulate interstate transportation.

The second inquiry is whether Congress has expressly preempted state and local authority to regulate in a particular field. If compliance with both federal and state law is impossible because the laws are in conflict, no finding of congressional intent need be ascertained, and the state or local law is preempted. This principle has been acknowledged by the Supreme Court in modern times in Florida Lime & Avocado Growers v. Paul, 373 U.S. 132 (1963). Absent any direct conflict between federal and state law, a court must determine whether Congress has manifested an express intent to preempt state law in a given area. If express intent to preempt is found, as in the case of federal regulation of interstate transportation by the Secretary of Transportation's

order of December 2, 1984, state law must give way to congressional authority.

If no express intent is found, Congress may nevertheless be said to have impliedly preempted state law where it has exercised a "scheme of regulation" in a particular field. In Santa Fe Elevator Corp. v. Rice, 331 U.S. 218 (1947), the Supreme Court said, "where the federal government, in the exercise of its superior authority in the field, has enacted a complete scheme of regulation...states cannot, inconsistently with the purpose of the Congress, conflict or...complement the federal law, or enforce additional or auxiliary regulations." The Court indicated that the goal in each case was to determine Congress' purpose in enacting the legislation:

> Such a purpose may be evidenced in several ways. The scheme of federal regulation may be so pervasive as to make unreasonable the inference that Congress left no room for the States to supplement it. Or the Act of Congress may touch a field in which the federal interest is so dominant that the federal system will be assumed to preclude enforcement of state laws on the same subject. Likewise, the object sought to be obtained by the federal law and the character of obligations imposed by it may reveal the same purpose....Or the state policy may produce a result inconsistent with the objective of the federal statute.

The preemption doctrine consists of a set of unstructured principles which, as the Supreme Court admitted in Hines v. Davidowitz, 312 U.S. 52 (1941), provides no "...rigid formula or rule which can be used as a universal pattern to determine the meaning and purpose of Congress." The Court uses various terms in attempts to pinpoint how federal law preempts state or local law, but acknowledged, in Hines, that, "...in the final analysis, there can be no one crystal clear, distinctly marked formula." However, the Court does assert that its "...primary function is to determine whether...[state] law stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress."

The states may have more freedom than has been thought, however. In Allway Taxi, Inc. v. New York, 340 F.Supp. 1120 (S.D.N.Y., 1972), an action by taxicab owners against enforcement of a city ordinance requiring exhaust emission controls for licensed taxicabs, the plaintiffs contended that the ordinance was null and void on the ground that the field of motor vehicle emission control had been preempted by the Clean Air Act. Specifically, the plaintiffs contended that (1) the section of the Clean Air Act which prohibits states or their subdivisions from regulating fuel and fuel additives if the federal administrator has found that no control is necessary or if he finds that adequate standards are already prescribed (42 USC 1857), and (2) that section which prohibits states or their subdivisions from creating

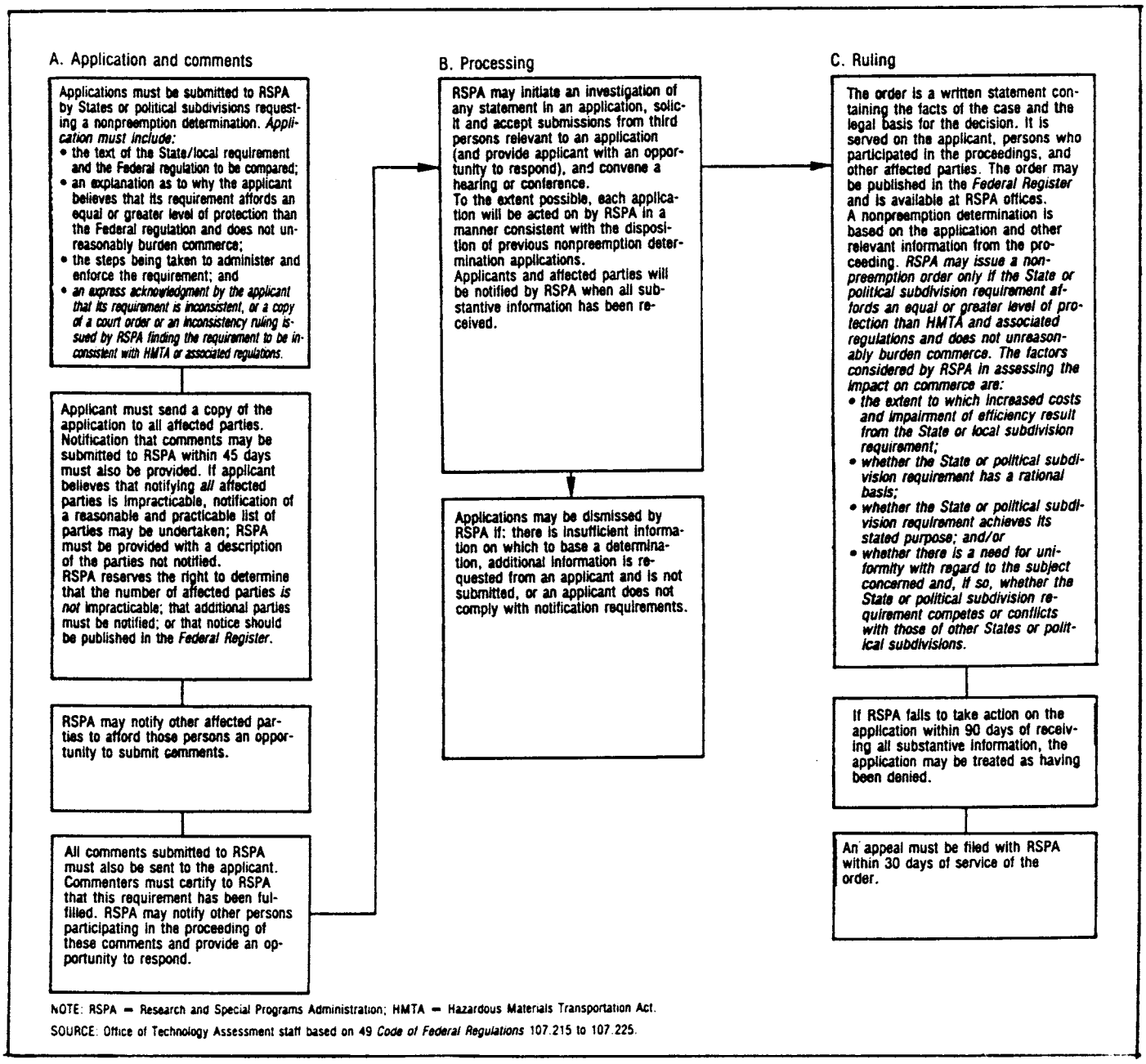
standards for exhaust emission control devices for new motor vehicles and new motor vehicle engines, and which also prohibits states from setting standards of approval as a condition precedent to the initial sale or registration of new motor vehicles, preempted the ordinances established by New York City. Rejecting this contention and granting summary judgement for the defendant city, the court, stating that a local ordinance will be upheld unless there is such an actual conflict between local and federal regulatory schemes that both cannot stand in the same area or unless there is clear evidence of congressional intent to preempt the field, held that the ordinances were neither in conflict with nor precluded by the first preemption section urged by the plaintiffs, since there was no showing that either condition required under that section, namely, that the federal administrator must have made a finding that no control is necessary or he must have already prescribed standards, had been fulfilled. The court further held that the ordinance was also neither in conflict with nor precluded by the second preemption section upon which the plaintiffs relied. Pointing out that the purpose of the ordinance, which is to try to clean the very air that people breathe, is clearly compatible with the goal of the act, the court explained that both the history and the text of the act show that the second preemption section was made not to hamstring localities in their fight against air pollution, but to prevent the burden on interstate commerce which would result if, instead of uniform standards, every state and locality were free to impose different standards for exhaust emissions control devices for the manufacturer and sale of new cars. The court further explained that the second preemption section restricts states and localities from setting their own exhaust emission control standards only with respect to the manufacture and distribution of new automobiles, but that it neither precludes a state or locality from setting its own exhaust emission control standards upon resale or registration of the automobile, nor does it preclude a locality from setting its own standards for licensing of vehicles for commercial use within that locality. The court pointed out that such regulations would cause only minimal interference with interstate commerce, since that would be directed primarily toward intrastate activities and the burden of compliance would be on the individual owners and not on manufacturers and distributors. The court added that the challenged ordinance would at most require taxicab owners to meet, at their own expense, emission control standards established by the city, but that such a requirement is fully supported by the congressional call for local cooperation toward the prevention and control of air pollution.

In another case, Exxon v. New York, 356 F.Supp. 660 (1973), plaintiffs challenged the validity of a New York ordinance prescribing the maximum lead content of gasoline sold within the city because of federal regulations on the same subject in 42 U.S.C. 1857. Denying the plaintiffs' motion seeking a preliminary injunction against enforcement of the law, the court held that since the federal regulations promulgated by the EPA were for the sole purpose of protecting automobile pollution

control devices, the city was free to enact and enforce its own regulations until federal regulations prescribing standards for the purpose of protecting the public health or welfare were announced by the EPA. There is a trend toward more state freedom in regulating hazardous materials transportation, despite inconsistency rulings or preemption rulings by the Department of Transportation. For instance, the United States Court of Appeals for the Third Circuit upheld a strict set of Pennsylvania laws regulating hazardous materials motor carriers, requiring safety inspections, over the objections of the American Trucking Association, in American Trucking Association v. Larsen, 683 F.2d 787 (3d Cir., 1982). The court, in Larsen, held that the Pennsylvania statute requiring all motor carrier vehicles to be periodically inspected under Pennsylvania law or the law of some other state did not impose unconstitutional burdens on interstate commerce because Pennsylvania had reason to believe that unsafe vehicles contribute to accidents, thereby meeting a minimal standard of showing that the statute contributed to highway safety.

Further, the inconsistency rulings issued by the OHMT in the RSPA demonstrate the wide range of possible state activity. The OHMT has issued seventeen rulings. All of the inconsistency rulings have relied on the standard criteria of undue interference with interstate commerce and deviation from Congress' intent. The DOT provides the following procedures for nonpreemption and inconsistency rulings on state and local laws affecting hazardous materials as seen in Figure 2-2.

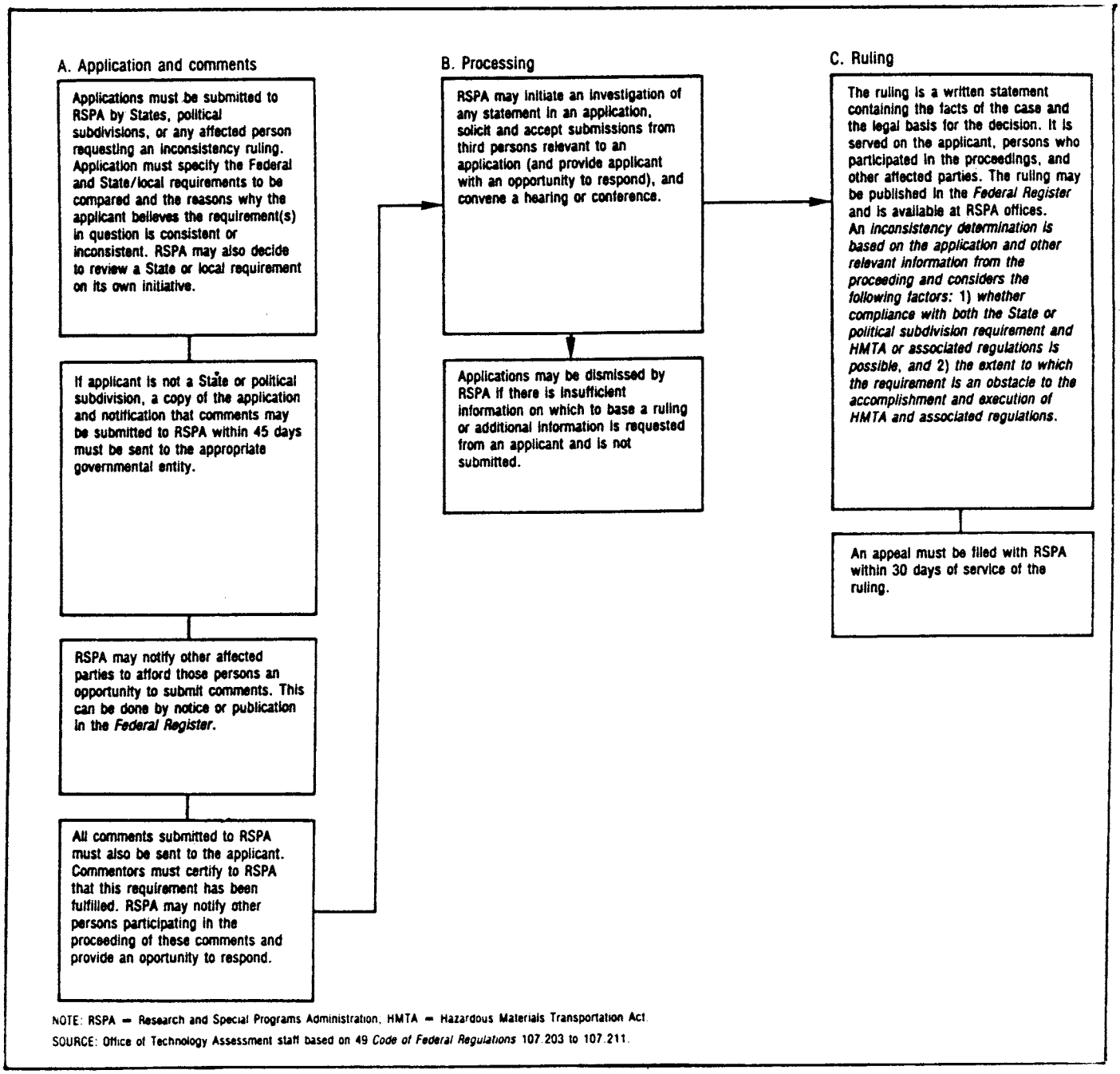
This analysis suggests that state and local authorities may supplement federal regulations with more stringent regulations if (1) the local regulations do not unduly burden interstate commerce, and (2) the local regulations are consistent with Congress' intent.



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* 107.215 to 107.225.

Procedures for Nonpreemption Rulings
Figure 2-1



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* 107.203 to 107.211.

Procedures for Inconsistency Rulings
Figure 2-1 (Continued)

Chapter Three

LAWS GOVERNING TRANSPORTATION OF HAZARDOUS MATERIALS IN VIRGINIA

The narrowest definition of hazardous materials links those materials to transportation safety. Therefore, the laws regarding the transportation of dangerous substances are important to the discussion of hazardous materials, regardless of the definition of hazardous materials adopted.

According to the OTA, a little more than half of all hazardous materials shipped in the United States are transported by truck. Most other shipments of hazardous material are done by rail with most shipments being bulk commodities, such as liquid or gaseous chemicals and fuel, carried in tank cars. In Virginia, air, and perhaps more importantly, ocean shipments of hazardous material are also conducted.

The most important regulations governing hazardous materials transportation in Virginia are the federal regulations contained in 49 CFR. The federal regulations, issued by the DOT under the authority of the HMTA, dictate the safety standards that must be followed by carriers in interstate commerce. The Waste Management Board, under the authority of Chapter 6 of the Virginia Waste Management Act, has adopted the federal regulations regarding hazardous materials transportation to apply to intrastate commerce in Virginia. In general, the federal regulations are the dominant laws in the hazardous material field.

A. Scope of the Regulations

The federal regulations apply to hazardous materials (HM) transported from a point within the state to a point outside the state, or in a manner affecting interstate commerce. Virginia regulations apply to the movement of such substances only within the territorial limits of the Commonwealth. Federal regulations probably preempt inconsistent state requirements, except where the U.S. Secretary of Transportation has determined upon application of a state that the state's requirements afford an equal or greater degree of protection and do not unreasonably burden commerce (Secretary of Transportation Dole ruled on 2 December 1984 that federal regulation would not be supplemented by states in the hazardous material field). Virginia's regulations may be more restrictive than their federal counterparts, but not to the extent of unreasonably burdening commerce, which is ultimately a matter of judicial interpretation. Accordingly, Virginia exempts from its regulations (except those requiring the driver to obey Virginia's rules and officers' directions concerning tunnels and bridges) substances transported in interstate commerce which are packed, labelled, and accompanied by shipping papers in conformity with federal regulations, and also those substances declared exempt from federal regulations by the DOT.

Virginia exempts U.S. military forces, state militia, and Virginia fire and police departments from all HM regulations except those requiring the driver to obey state rules and officers' directions concerning tunnels and bridges. Federal regulations require compliance with HM rules except for radioactive materials shipped for national security purposes and supervised and escorted by the NRC or the DOD. Exemption from federal labelling requirements is afforded to carload or truckload shipments of ammunition for the DOD when loaded and unloaded by the shipper or the DOD, and also to packages of HM which are loaded and unloaded under the supervision of and escorted by DOD personnel.

Both federal and Virginia regulations prohibit the shipment of HM not in conformity with applicable regulations. Virginia prohibits the act of shipping or transporting HM in noncompliance with its regulations; the federal prohibition applies to persons offering or accepting nonconforming HM for transportation. Federal regulations also prohibit a person from representing, marking, certifying, or selling a package or container as complying with the regulations unless it is in such compliance.

Both Virginia and federal regulations provide for the imposition of civil sanctions for violations of HM regulations. The Virginia regulations authorize a fine of not more than $1,000 for judgements entered after a hearing. The federal DOT may impose fines not exceeding $10,000 for knowing violations of HM regulations and procedures. The penalty also applies to knowing violation of federal procedures relating to packages and containers. Each day of a continuing violation of federal regulations constitutes a separate offense.

Criminal sanctions are available under both regulatory schemes. Any violation of the Virginia regulations constitutes a Class 1 misdemeanor punishable by a fine not exceeding $10,000 and a year in jail. Criminal sanctions leading to a fine of up to $25,000, imprisonment for a term not exceeding 5 years, or both, may be imposed for willful violations of federal regulations.

B. History of Virginia Regulation of Hazardous Materials

The initial Virginia law allowing the regulation of hazardous material transportation was the Dangerous Article Act, passed by the General Assembly in 1958. The promulgation and enforcement of Virginia regulations was granted by that statute to the State Corporation Commission (SCC) and the Department of State Police, together with all Commonwealth law enforcement and peace officers. Enforcement in the federal regulatory scheme fell to the Materials Transportation Bureau with

respect to transportation or shipment of HM by highway vehicles (which included inspections of manufacturers, carriers, and shippers). The MTB exercised its enforcement responsibility through the Office of Hazardous Materials Operations, which conducted inspections of container manufacturers and intermodal shipments. In addition, the Bureau of Explosives, an industry agency of longstanding association with the federal government, conducted inspections of manufacturers, carriers, and shippers of HM. Under the Dangerous Article Act, the regulation of hazardous material transportation was less effective than had been anticipated by the authors of the act, and the accelerating development of toxic chemicals in the 1960s and 1970s made effective regulations essential. The federal regulations on HM cargo, vehicles, and drivers were more thorough than comparable Virginia regulations during the period. The Commonwealth exempted flammable liquids, and failed to regulate certain dangerous substances regulated by the federal government. Virginia regulations on containers and placarding lacked the detail of, and were inconsistent with, their federal counterparts. Further, Virginia authorized much lighter penalties for violations of the regulations than did the federal government.

In 1980, the General Assembly passed the Hazardous Materials Act, which transferred regulatory authority from the SCC to the Board of Health. The Board of Health, in turn, adopted the federal regulations in 49 CFR by reference, supplemented by several additional rules.

The adoption of the federal rules allowed the State Police to concentrate on enforcement of one set of regulations regarding hazardous materials as part of the State Police continuing effort to enforce motor carrier safety in general. The State Police has a special detail of troopers assigned to the enforcement of motor carrier safety regulations, which are also federal regulations under the federal Motor Carrier Safety Act.

The 1986 General Assembly replaced the Hazardous Materials Act, formerly Code of Virginia 18.2-178, with the Waste Management Act, Code of Virginia 10-264. The Board of Health responsibilities for the regulation of hazardous material transportation were thus transferred, under 10-305, to the Waste Management Board, although the Division of Solid and Hazardous Waste Management, the health agency responsible for the regulations, was also transferred to the new Department of Waste Mangement effective 1 July 1986.

C. The Current Regulatory Scheme

The regulation of hazardous material transportation in Virginia is authorized by several sets of laws, both federal and state.

As has been discussed earlier, the federal regulations issued pursuant to the HMTA are the overarching rules in the field. The regulations, contained in 49 CFR, dictate the safety standards that must be maintained by shippers involved in interstate commerce.

Since the adoption by the Board of Health of the federal regulations as state regulations, the rules in 49 CFR also apply to the intrastate shipment of hazardous materials by all modes of transport. An interesting wrinkle in the nature of hazardous material regulation in Virginia is the definition of the term "hazardous material" itself. Code of Virginia 18.2-278.1 records that a hazardous material is:

> ...a substance or material in a form or quantity which may pose an unreasonable risk to health, safety or property when transported, and which the Secretary of Transportation of the United States has so determined by regulation or order.

The effect of this definition, taken with the many definitions of related substances in the code, is to create the following relation of terms:

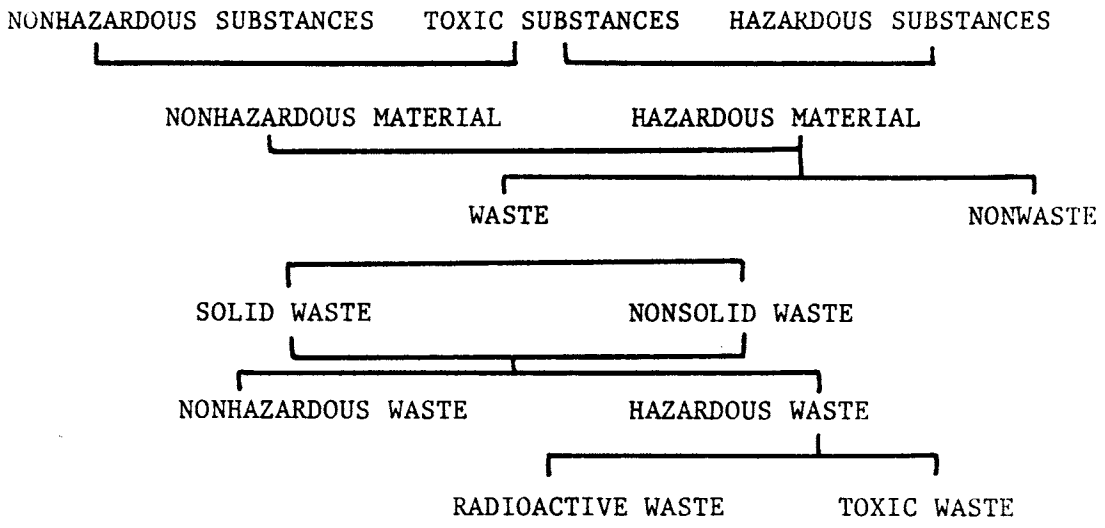


Figure 3-1

A federal program has been initiated to promote uniform adoption and implementation of 49 CFR by the states. In 1981, the RSPA initiated the State Hazardous Materials Enforcement Development (SHMED) program, designed to assist states in the enforcement of hazardous materials safety regulations, primarily those pertaining to highway transportation. The SHMED had two objectives: (1) decreasing the number of

hazardous material accidents by strengthening state enforcement capabilities and (2) promoting uniformity in state hazardous materials regulation and enforcement procedures. The SHMED program offered states contracts to conduct a three-phased program of data collection and legislative development, inspection program development, and establishment of enforcement systems. Virginia did not participate in SHMED. The maximum amount of funds a state can receive through SHMED, for the entire program, is $120,000. The SHMED program, which has not produced many tangible results, will expire at the end of FY 1986.

In addition, the Motor Carrier Safety Act of 1984, 98 Stat. 2829, authorizes the FHWA and the BMCS to issue regulations on commercial motor vehicle safety. These federal regulations apply to motor vehicles involved in interstate transportation, including those vehicles carrying hazardous materials. In Virginia, the State Police is responsible for enforcing the federal regulations.

Motor carrier safety law enforcement is potentially the most important state initiative in increasing hazardous material transportation safety. The OTA found, in preparing its report on Transportation of Hazardous Materials, that truck driver error was by far the single greatest cause of hazardous material incidents, just as truck driver error was by far the greatest cause of nonhazardous material truck accidents. Rigorous enforcement of the laws regarding big trucks may be the most effective initiative that could be undertaken in hazardous material transportation safety.

The Motor Carrier Safety Assistance Program (MCSAP) grant program, administered by the DOT's 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 data base on compliance with safety regulations is a secondary goal of the MCSAP, and funds may be used for data collection, storage, and analysis. The Surface Transportation Assistance Act of 1982, which authorizes MCSAP, specifically indicates that the MCSAP may apply to enforcement of rules pertaining to vehicles used to transport hazardous commodities. Virginia participates in MCSAP; the State Police Safety Division administers the state program.

Under the MCSAP, states may apply for two types of grants. Development grants, available for a maximum of three years, provide funding for states needing to establish or substantially modify an enforcement program. Implementation grants provide funding for states ready to

initiate or enhance established enforcement programs. To qualify for an implementation grant, a state must:

1. Agree to adopt the Federal Motor Carrier Safety Regulations (49 CFR 390-399) including highway-related portions of the Federal Hazardous Material Regulations (49 CFR 171-173 and 177-178) or compatible state rules, regulations, standards, and orders applicable to motor carrier safety;

2. submit an enforcement and safety program plan and designate a lead agency for administering the plan;

3. agree to devote adequate resources to administration of the program and enforcement of the rules, regulations, standards, and orders; and

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

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

D. Other Regulatory Areas

The state regulates the transportation of hazardous materials through other sets of regulations besides the transportation-specific regulations. For instance, the Code of Virginia 40.1-22 authorizes the Safety and Health Codes Board to issue regulations to protect the health and safety of workers within the state. The Board has, as a consequence, adopted the federal OSHA regulations contained in 29 CFR 1910. Subpart H of the OSHA regulations concern hazardous materials and dictates safety standards for hazardous substances that are in proximity to workers, even in transportation.

Another example of regulations that affect hazardous material transportation are the regulations regarding waste. The new Department of Waste Management, assuming legislative and Board of Health functions, is responsible for regulating the entire range of toxic, radioactive,

and hazardous wastes. The regulations, previously issued by the Board of Health, govern the safe handling of wastes, even in transport.

E. Other States

In the Fourth Circuit, Maryland and South Carolina regulate the transportation of hazardous material in much the same way as Virginia.

Maryland has designed a system of vehicle and driver certification where controlled hazardous substances are involved (7-252). This system requires that transporters of controlled hazardous substances label their vehicles, have adequate training, and hold a bond or other security sufficient to indemnify the state for the cleanup of any pollution that may result from the improper transportation of a controlled hazardous substance.

In addition to a system of operating permits, notification requirements and general air and water quality monitoring, Maryland law allows the inspection and the taking of samples from any establishment or vehicle reasonably believed to be involved in the manufacture, processing, packaging (or repackaging) of hazardous material (7-107). Maryland has also established a Health Department duty to inspect, upon receipt of a complaint, a controlled hazardous material facility (7-246). The state also allows the inspection of any establishment reasonably believed to be involved in the manufacture or packaging (or repackaging) of a dangerous household substance (5-312).

South Carolina, with many toxic waste shipments travelling the state's roads en route to the regional toxic waste site, has adopted and enforces the federal regulations on hazardous material transportation for interstate and intrastate shipments.

Many states have adopted licensing, registration, and permit requirements to 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 permit or license programs, which are 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 material

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 instance, 34 states require transport companies carrying hazardous waste to register and pay a fee on a per company basis. 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 certification, vehicle registration, and proof of liability insurance.

Local jurisdictions may also require separate permits for carriers within their boundaries. Denver, Colorado, for example, requires carriers of hazardous materials to obtain annual permits by mail. Fees are assessed based on the number of trucks in the carrier's fleet; they range from $50 per year for a fleet of 1 or 2 trucks to $600 per year for more than 50 trucks. A description of the material to be transported, proof of liability insurance as required by 49 CFR 397.9, and acknowledgement 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.

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 material they are likely to encounter to develop 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.

California requires private 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) 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. Monies collected are used to administer the program and support terminal hazardous material inspections. Data on registrants allow the state to provide appropriate regulatory information to carriers, such as routing restrictions for transporters of explosives, and have enabled the state to set up a computerized hazardous materials information system.

The 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.

Notification requirements have been established by numerous local governments. A study conducted by Battelle Memorial Institute for the DOT found that 136 localities had established laws requiring carriers to notify local officials when hazardous materials were going to be transported in the area. The Battelle study found that even when notification is made under these laws, local police authorities are too busy with other activities to monitor the movement of the hazardous materials shipments. Further, transporters are concerned that the proliferation of state and local notification requirements will create insurmountable scheduling difficulties and require the creation of large staffs to monitor shipments.

A recent insurance industry publication indicates that one out of every three tractor-trailers can be expected to crash in a year. While BMCS requirements 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. Virginia is one of the most progressive states in vehicle licensing; truck drivers must have a classified commercial license. 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 the consequences of multiple violations in any one state. A 1980 investigation by the NTSB of drivers involved in crashes of large trucks found that 44 drivers held 63 licenses, had 98 suspensions, had been involved in 104 previous crashes, and had 456 traffic convictions. In recognition of this situation, the American Trucking Association (ATA) has urged Congress and the DOT to promote the implementation of a single license by all states so that truck drivers may hold licenses from their legal state of residence only. The ATA has also recommended that applicants for a license to drive trucks be given written examinations and road tests applicable to the type of vehicle that will be driven.

Several states have already established special certification requirements for drivers of vehicles used to transport hazardous wastes. California recently passed legislation requiring special certification for drivers of vehicles hauling hazardous materials, including hazardous wastes. Certification requirements include a medical examination and a written test on all 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.

Routing is an important tool for use by local governments in preventing or reducing the consequences of hazardous material accidents, and increasing numbers of cities, counties, and townships across the

country 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, thus providing a low-cost prevention measure that local police can enforce without additional equipment or training.

To assist states and communities with the designation of routes for both radioactive and nonradioactive shipments of hazardous materials, the DOT published two guidance documents, the most important of which is the Peat-Marwick-Mitchell program in Guidelines for Applying Criteria to Designate Routes for Transporting Hazardous Materials. 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 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 routing analysis. 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.

A variety of state laws are already in place in Virginia that, if rigorously enforced, may increase hazardous materials transportation safety. Beyond the laws already on the statute books, many other initiatives, suggested by the federal Government or tried in other states, may be appropriate in Virginia.

Chapter Four

VIRGINIA REGULATIONS GOVERNING HAZARDOUS MATERIALS EMERGENCY RESPONSE

Much of the regulatory effort in the hazardous material area is directed toward preventing hazardous material incidents from occurring. A different set of regulations governs the activities that must be undertaken to contain and clean up hazardous material accidents with the minimum amount of disruption to collateral property and populations. This chapter will describe several hazardous material emergencies that have occurred in Virginia, the laws governing emergency response in the Commonwealth, and some initiatives that might be advanced to improve the emergency response capability in the state.

A. Case Studies in Hazardous Material Emergencies

1. The Pentaporane Accident

In 1985, a New Jersey company attempting to treat the contents of several compressed gas cylinders at an industrial park in Hanover County caused the release of the toxic gas pentaporane, resulting in the death of one worker, the permanent injury of another, and the injury of numerous rescue personnel trying to evacuate the injured persons.

When the leak was discovered, the local volunteer fire department was called and responded to the incident. Since the fire department was not trained in hazardous material incident management, the state Department of Emergency Services (DES) was called for assistance. Early in the response, fire personnel and the DES representative were able to shut the valve through which the gas was leaking by using special equipment supplied by air. A contractor was hired by the responsible company to dispose of the gas cylinders and other materials at the site. The local fire chief remained in charge with a DES representative, who acted as a technical adviser, remaining at the site for approximately a week.

Once the local officials were satisfied that the emergency was under control, they called the U.S. EPA's Regional Response Team to clean up the site and arrange for final disposal of the cylinders.

Since the Department of Health suspected that the accident may have resulted from a breach of state hazardous material regulations, a State Police criminal investigation of the disposal operation was initiated.

Although the fire chief was nominally in charge, there was confusion among the actors at the scene about who was in charge during the

initial phase of the incident. Although the DES representative was only a technical advisor, many participants were under the impression that he was the controlling authority at the site, which diminished the actual authority of the fire chief. Until the EPA was called in, there was confusion as to how the cylinders would be evacuated. The total lack of hazardous materials training of the local responders contributed to the injury of more than 34 rescue squad members.

A variety of agencies were involved in managing the incident. Besides the active intervention of the local fire department and the DES, the Department of Health was required to identify the substances involved and provide technical assistance in dealing with the chemicals that posed a danger. The Health Department also issued the necessary emergency permits for destruction of the pentaporane cylinders. In addition to its work on the criminal investigation, the State Police provided site security, managed the evacuation of the surrounding area, provided an escort of vehicles carrying the cylinders, and assigned an explosive ordinance disposal team to detonate the cylinders. The EPA's Regional Response Team assumed full responsibility of the cleanup. The Department of the Army allowed the use of Fort A.P. Hill for destruction of the cylinders.

2. The Weighing Station Incident

A loaded truck, which had pulled into a Department of Highways and Transportation weighing station along an interstate highway, was observed leaking its liquid cargo from the container on its trailer. The State Police officer at the station directed the truck to pull over and the officer examined the truck's manifest. The manifest revealed that the truck was carrying a hazardous chemical and the police officer called the local fire department. The fire department's initial response was to wash down the truck and the spill area with a hose, which washed the chemical into the scale pit, forcing the entire weighing station to be closed. The lack of training by the fire department led to their use of water, an inappropriate response, and then delayed the cleanup of the accident. The trucking firm reluctantly hired a contractor to clean up the mess.

3. The Caroline County Incident

In December 1984, a tanker truck on its way through the state with a hazardous waste load destined for a disposal facility in New Jersey was observed leaking by a State Police officer. Because the truck was in the town of Bowling Green when the officer observed the leak, the trooper had the truck continue to a remote location on U.S. 301 in Fort A.P. Hill. The officer called the fire department and the local emergency coordinator assumed control of the scene. In addition, the state

DES and the Department of Health sent personnel to the scene to provide technical assistance. Since the Caroline County fire department was not trained in hazardous materials response, the Henrico County Hazardous Incidents Team was called to the scene. When the chemical content of the load was verified, U.S. 301 was closed in the area around Fort A.P. Hill. It was determined that the leak could not be safely repaired with the waste material still in the trailer, so the chemicals were allowed to continue to leak onto the ground; containment was set up to prevent runoff of the chemicals from the site. The owner of the waste assumed responsibility for the incident and hired a private contractor to clean up the site. All contaminated materials and soil were removed from the site and the area returned to normal.

As with the other hazardous material incidents, a variety of agencies were involved in the Caroline County spill. The Caroline County emergency coordinator was clearly the executive authority at the scene. State Police maintained road closure throughout the emergency. The DES coordinated state agency support and arranged for the use of the Henrico County Hazardous Incidents Team.

The primary problem with the Caroline County accident was the long time required to stop the leak and clean up the spill. U.S. 301, a heavily travelled road, had to be closed for several days, causing inconvenience to many citizens. The disruption of traffic created pressure to use Virginia Department of Highways and Transportation personnel to clean up the mess and open the road, even though the highway workers did not have protective clothing. The contractor eventually cleaned up the mess caused by the leak, but the process of working an accident while in protective clothing is necessarily slow.

B. Emergency Response Law in Virginia

The primary statutory foundation for Virginia's emergency preparedness is the Emergency Services and Disaster Law of the Code of Virginia (44-146.13-44-146.28). In part, this created the Office of Emergency Services. In this role, and with the authority granted by 44-146.17(1), the governor issued Executive Order Number 15-1982, which was revised September 19, 1983, promulgating Volume II of the Commonwealth of Virginia Emergency Operation Plan--Peacetime Disasters. Annexes I-U of the plan outline the scheme for responding to incidents involving hazardous materials and describe the role of particular individuals, agencies, and organizations in dealing with emergencies. In the "Concept of Operations," the plan declares:

> ...local governments have the primary responsibility for the protection and well-being of their citizens. Depending on the material involved, local government will take steps necessary to provide public warnings, initiate protective actions, and seal off

the general area affected. If the shipper, manufacturer, or other responsible party is unable to respond, neglects to take the proper steps, or lacks the capability to act, then local government, within its capability, must act to prevent or minimize injuries and personal property damage.

Under Virginia law, the local government is clearly responsible for hazardous material emergency response.

Although each locality organizes for emergency response in a slightly different manner, the Code of Virginia outlines the local responsibility to allow coordination with state agencies in emergency situations. 27-15.1 vests the local fire chief with the authority to manage all emergency situations to which the fire department is called. When the department is answering an alarm, extinguishing a fire, and returning to the station, the chief is empowered to maintain order at the fire and its vicinity, direct the action of the firefighters, keep bystanders at a safe distance, and control traffic until the arrival of the police.

In 1984, the General Assembly amended 27-15.1 to expand the fire chiefs' authority in relation to hazardous material incidents. The law was amended to read, "...at an emergency incident where there is imminent danger or actual occurrence of fire or the uncontrolled release of hazardous materials which threaten life or property," the fire chief is in command. The chiefs' powers were also amended to include investigations into the origin and cause of the incident. By law, the fire chief is clearly the man in charge at the hazardous material incident site.

The Emergency Services and Disaster Law directs each political subdivision (defined in 44-146.16(8)) to appoint a director of emergency services and to "be responsible for local disaster preparedness and coordination of response." The terms "natural disaster" and "man-made disaster" are defined for the purpose of the statute in 44-146.16(1) and (2), and include fire, transportation accident, and other environmental contaminations, "...which threaten or cause damage to property, human suffering, hardship or loss of life." From the plain meaning of the statute, it appears that the fire chief is assigned frontline duties at the scene of the incident, while the local director of emergency services choreographs efforts at the scene with other activities such as overall evaluation of the scene, receipt and dissemination of information, and communication with the DES, other political subdivisions, state and federal agencies, etc. Indeed, the statute specifically provides that "...nothing in this chapter is to be construed to...affect the jurisdiction or responsibilities of fire-fighting forces...."

When a local emergency (defined in 44-146.16(6)) is declared pursuant to 44-146.21(a), the appropriate emergency plans are activated,

and the local director of emergency services is granted additional powers which enable him to respond more readily to the crisis. Under the declaration of a local emergency, then, the local director of emergency services is in charge of the accident scene. As the local representative of the DES, the local director of emergency services is responsible for apprising the DES of the developments at the scene.

In a very serious emergency, the governor is empowered under the Emergency Service Law to declare a state of emergency. During a state of emergency, the governor, as the state Director of Emergency Services, assumes control of the scene. The governor may make arrangements to deal with the incident as he sees fit. No hazardous material incident in Virginia has led to such widespread mobilization.

Several regulations address the power of government to compel clean up of hazardous material accidents. The Board of Health, acting under the Waste Management Act, has promulgated regulations requiring the clean up of hazardous waste spills. It is a felony for a common carrier who deposits hazardous waste on the ground to refuse to clean the waste up. On several occasions the State Police has compelled clean up of waste spills under pain of the Board of Health regulations. Since July 1, 1986, the regulations promulgated by the Board of Health have passed proponency to the Department of Waste Management under the authority of the Waste Mangement Act, (Code of Virginia 10-264).

Several other laws on the state books could probably be used to compel clean up of hazardous material spills not reached by the law on hazardous wastes clean up. 18.2-324 disallows throwing or depositing certain substances upon the highway and requires the removal of such substances. The State Police has not enforced this law to force carriers to clean up spills, but a Class I misdemeanor (a year in jail and a $1,000 fine) could be assessed for refusal to comply with the law. In addition, the State Water Control Board and the State Air Pollution Control Board are empowered by the General Assembly to establish regulations to protect the water and air environments, respectively.

This review of the laws of Virginia relating to hazardous material incident response illustrates that sufficient authority has been created to deal with hazardous material emergencies; execution of the laws is required, however.

C. Regulatory Initiatives

1. Training for Emergency Response and Enforcement

The Virginia program of training for hazardous material emergency response is based on a four-level training program.

Level I Training, a 16-hour program, is designed for first responders. It covers an introduction to hazardous materials terms and definitions, identification and nature of hazardous materials, use of the DOT Emergency Response Guidebook and other resources such as CHEMTREC and decontamination.

Level II Training is based on two 16-hour courses offered by the National Fire Academy--Hazardous Materials Incident Analysis and Hazardous Materials: The Pesticide Challenge. An additional 8-hour segment involves hands-on training.

Level III Training, a 120-hour program, focuses on the activities of an actual response team. A simulation of a hazardous materials accident is included in the training.

Level IV Training is still under development by the Department of Fire Programs, but is expected to focus on incident management and emergency planning.

Although the concept of this program has been developed, widespread emergency response training in Virginia is a chimera. Only five fire departments in Virginia -- Roanoke County, Henrico County, Fairfax, Newport News, and Harrisonburg -- have adequately trained first responders.

An important step in promoting emergency response training would be to require such training by law. Since most firemen, the likely first responders, are volunteers, such legal requirements would probably be futile, however.

Ohio has one of the most successful state training programs. In 1976, Ohio developed a computerized fire reporting system. Analysts studying the results of emergency response personnel who respond to hazardous materials incidents found that many firemen were being injured. This catalyzed the establishment of a hazardous materials training program for firefighters. A three-phase training program began in 1978. Phase I is a 4-hour program that covers the identification of hazardous materials, placards, labels, and methods for assessing community areas. Phase II is an 8-to-12-hour program that deals with containment, patching, personal protection, hands-on training, and other response procedures. Phase III is a simulation of an actual incident in the community, and includes participants from response organizations, local government agencies, and others that might be involved in an accident.

Since 1980, 36,702 firefighters have been trained through 1,637 courses. In 1982, Ohio assisted the National Fire Protection Association in the development of a similar training program for national distribution to other fire services. Ohio has also made special equipment available throughout the state, because many local fire departments are unable to finance such purchases. Five trucks equipped with

approximately $60,000 worth of personal protective equipment have been stationed around the state for dispatch to hazardous materials accidents. Support for training development and equipment purchase was initially provided by two highway safety grants totalling $90,000. Continued support of the training and equipment program is now provided by the state at a cost of $400,000 a year.

The commitment of state resources to hazardous material emergency response is the primary difference between the Ohio and the Virginia programs.

2. Community Emergency Response Planning

The state DES has prepared an operations plan under the Emergency Services Law to describe state response to hazardous material emergencies. Like a military operations plan, the DES plan describes the activities that one echelon of government will take to abate an incident.

The localities of Virginia are not required to develop, and most have not developed, a community emergency response plan to systemize the community reaction to a hazardous materials emergency. This void threatens to hamstring the state plan, since local officials often act without coordinating their efforts with the state officials on the scene and, further, often are forced by the lack of local planning for such contingencies to improvise, thus causing an inefficient use of response resources. The case studies above illustrate this phenomenon.

The requirement for localities to prepare community emergency response plans to dovetail the state emergency response plan may solve this problem. A variety of demonstration programs in other states, described in the DOT RSPA's A Community Model for Handling Hazardous Materials Transportation Emergencies, illustrate the efficacy of such efforts. Not only does the preparation of such plans increase the quality of emergency response during emergencies, but the data collection required to develop the plan allows localities to target prevention and enforcement efforts to prevent disaster.

3. A State Emergency Response Fund

The possibility of hazardous material transportation incidents, causing property damage and injury to life, are classic externalities caused by economic activity. The appropriate policy response to such externalities is to tax the creator of the risk, causing him to be an insurer of the risk he creates, and forcing him to internalize his externality. Several states have done this through the creation of a state hazardous material emergency response fund.

South Carolina has created the Hazardous Waste Contingency Fund, which is administered by the South Carolina Department of Health and Environmental Control. The fund is created by a per-ton-mile fee assessed against each private company that creates, transports, or dumps hazardous waste in the state. The fund is distributed among state agencies and the localities to train and equip emergency organizations to deal with hazardous materials, not just hazardous waste, emergencies. For example, the fund can be used to pay for hazardous material clean up: the fund administrators are responsible for pursuing a carrier for restitution to the fund, in court if necessary.

Virginia has a Virginia Disaster Response Fund which can be accessed in limited circumstances. Most hazardous material incidents do not qualify as disasters under the rules governing the fund. The creation of a hazardous materials fund in Virginia would require legislative imprimatur.

4. Emergency Response Teams

The formal establishment of some type of hazardous material emergency response capability is clearly a need in the Commonwealth of Virginia. Currently, there are only five fire departments in the entire state that have a hazardous materials response capability and only one of those departments, Henrico County, has a mutual aid agreement with the state. As a result, Henrico County's Hazardous Incidents Team responds to incidents all over the state.

Localities that develop hazardous response capabilities are not inclined to enter mutual aid agreements with the state because such agreements are de facto nonreciprocal. The state has nothing to provide the county in return for the county fire department's expenditure of time and money, the risk of death, legal liability, higher insurance rates, and the risk of an embarrassing incident in the home county while the fire department is on an emergency across the state.

A variety of initiatives could be undertaken to remedy the lack of regional response. One possibility is the establishment of state regional response teams. The model program in the United States, Tennessee's, provides ample evidence that regional response teams are suboptimal. After the 1978 hazardous material disaster at Waverly, Tennessee, Tennessee created eight regional response teams, fully equipped with special vehicles and staffed by full-time hazardous materials responders. Once the teams were in place, it was realized that so few hazardous materials incidents occurred that the eight teams were not needed. The program was gradually reduced, so that now there are only six individuals in the Tennessee program. Those individuals are district coordinators responsible for training local fire departments and civil defense work related to nuclear war. In the state of Tennessee,

there are now four fire departments that are well-equipped to deal with hazardous material incidents, and all are funded by local revenue. The equipment purchased for the regional response teams is now parked in a motor pool in Nashville.

A better system of regional response might be a scheme of aid from the state to finance the purchase of hazardous materials equipment and the training of firemen in hazardous material response in certain fire departments around the state in return for agreements from the localities involved to respond to emergencies on call from the state. Such a system would be true "mutual" aid. A technique for determining which fire departments in the state would be selected as the regional response sites could be based on the Virginia Highway and Transportation Research Council's 1985 study, Methodology for the Placement of Maintenance Area Headquarters. That program allowed the mapping of response contours around the state, allowing more rapid reponse from highway maintenance offices to highway contingencies, while reducing the number of such offices.

Regional response is an important step to improving the state's ability to handle hazardous materials emergencies, but the particular system of response, which will require legislative approval, must be carefully considered.

REFERENCES

1. Barber, E.J. and L.K. Hildebrand (Peat, Marwick, and Mitchell Co.). Guidelines for Applying Criteria to Designate Routes for Transporting Hazardous Materials, Implementation Package FHWA-IP-80-20. Washington, D.C.: U.S. Department of Transportation. 1980.

2. Commonwealth of Virginia, State Board of Health. Regulations Governing Transportation of Hazardous Materials. Richmond, Va.: State Board of Health. 1984.

3. Commonwealth of Virginia, Joint Secretarial Task Force on Hazardous Materials in Virginia, Committee on Regulation and Enforcement. Working Draft Committee Report, July 29, 1986. Charlottesville, Va.: Virginia Highway and Transportation Research Council. 1986.

4. Commonwealth of Virginia, Office of Emergency Services. Virginia Emergency Operations Plan. Richmond, Va.: Office of Emergency Services. 1985.

5. Commonwealth of Virginia, State Corporation Commission. Rules and Regulations Governing the Operation of Motor Vehicles Transporting Explosives and Other Dangerous Articles. Richmond, Va.: State Corporation Commission. 1958.

6. Fleming, Anne, ed. Big Trucks. Washington, D.C.: Insurance Institute for Highway Safety. 1985.

7. Schmidt, J. William and Dennis Price, Hazardous Material Highway Accident Potential in Virginia. Blacksburg, Va.: V.P.I. & S.U. Transportation Safety Office. 1980.

8. _____. Virginia Hazardous Materials Flow by Rail. Blacksburg, Va.: V.P.I. & S.U. Safety Projects Office. 1980.

9. _____. Multi-Modal Hazardous Materials Transportation in Virginia. VDOTS/SPO-16. Richmond, Va.: Virginia Department of Transportation Safety. 1981.

10. Rasmussen, N.C. "The Application of Probabilistic Risk Assessment Techniques to Energy Technologies," Annual Review of Energy. Vol. 6. 1981.

11. Rowe, William D. Risk Assessment Procedures for Hazardous Material Transportation. Washington, D.C.: Transportation Research Board. 1983.

12. Swift, Marvin and Maris Wicker. "The Role of Localities in the Transportation and Disposal of Nuclear Waste." University of Richmond Law Review. Vol. 18. 1984.

13. U.S. Department of Transportation, Research and Special Programs Administration, A Community Model for Handling Hazardous Material Transportation Emergencies. DOT/RSPA-DPB/50/81/30. Washington, D.C.: N.T.I.S. 1981.

14. U.S. Office of Technology Assessment. Transportation of Hazardous Materials. Washington, D.C.: G.P.O. 1986.

15. Wolfe, K. Eric. An Examination of the Risk Costs Associated with the Movement of Hazardous Materials. Washington, D.C.: Association of American Railroads. 1984.

16. Wyant, David. Methodology for the Placement of Maintenance Area Headquarters. Charlottesville, Va.: Virginia Highway and Transportation Research Council. 1985.

Form R-396 (7-85)

Standard Title Page -- Report on State Project

Report No.	Report Date	No. Pages	Type Report:	Project No. : N/A
VHTRC 87-R9	October 1986	46	Final Period Covered: N/A	Contract No.: N/A

Title and Subtitle

Response to House Joint Resolution #135-1986 Session: Requesting the Board of Education to Evaluate the Public and Commercial School Driver Education Programs

Author(s)

C. B. Stoke and B. G. Johnson

Performing Organization Name and Address

Virginia Highway and Transportation Research Council
Box 3817, University Station
Charlottesville, Virginia 22903-0817

Sponsoring Agencies' Names and Addresses

Va. Dept. of Highways & Transp.
1221 E. Broad Street
Richmond, Virginia 23219

University of Virginia
Charlottesville
Virginia 22903

Key Words

Driver Education
Public
Private
Commercial
School(s)
Accident
Convictions
Simulator
Driving Range

Supplementary Notes

Project funded by:
Virginia Department of Motor Vehicles, Transportation Safety Administration

Abstract

This report was published as a result of an action by the Virginia General Assembly requesting that certain driver education programs be evaluated. The report analyzes the effectiveness of commercial school programs, concludes that students successfully completing their driving instruction at these schools have driving records worse than those for students completing their instruction in the public and private schools, and recommends that commercial school instructors be required to take additional course work, that each school evaluate its own Performance Report to determine strengths and weaknesses of its program, and that the state DOE monitor the results of these actions. The report also analyzes the effectiveness of the 4 types of educational programs used in the public schools, concludes that the traditional classroom/behind-the-wheel program was the most effective, and recommends that hours spent at a simulator or on an off-street driving range not automatically substitute for hours of instruction on-street behind-the-wheel, that an appeals board be established for use by local school divisions that wish to substitute simulator and range hours for on-road hours, that each school division evaluate its own Performance Report to determine strengths and weaknesses of its program, and that the state DOE continue to produce and furnish the Performance Report for use by the school divisions for evaluative purposes.