TRAFFIC INCIDENT MANAGEMENT IN HAZARDOUS MATERIALS SPILLS IN INCIDENT CLEARANCE

U.S. Department of Transportation
Federal Highway Administration

QUALITY ASSURANCE

The U.S. Department of Transportation provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. USDOT periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement. This material is based upon work supported by the Federal Highway Administration under contract number DTFH61-06-D-0007. Any opinions, findings and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the Federal Highway Administration.

TECHNICAL REPORT DOCUMENTATION

1. Report No. FHWA-HOP-08-058	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Traffic Incident Management In Hazardous Materials Spills In Incident Clearance		5. Report Date January 2009 6. Performing Organization Code
7. Author(s) J. Neil Daniell, MS		8. Performing Organization Report No.
9. Performing Organization Name and Address PBS&J 482 S. Keller Rd. Orlando, Florida 32810		10. Work Unit No. (TRAIS) 11. Contract or Grant No. DTFH61-06-D-0007
12. Sponsoring Agency Name and Address Federal Highway Administration Office of Transportation Operations 1200 New Jersey Avenue, SE Washington, DC 20590		13. Type of Report and Period Covered Technical Report 14. Sponsoring Agency Code HOTO-1, FHWA

15. Supplementary Notes
Project performed under contract to Battelle for the Federal Highway Administration Office of Operations

16. Abstract
Hazardous materials spills provide unique challenges to traffic incident clearance. When hazardous materials are present, not only do response personnel have to deal with typical traffic incident issues, they also must deal with potential chemical hazards, environmental impacts and added safety requirements. The mitigation and clean-up of hazardous spills can be a major source of delay in clearing traffic incidents. In many instances, expensive, time consuming removal actions are initiated when other appropriate, quicker options could be deployed safely. This document deals with the protocol and necessary knowledge required by transportation operations personnel, and first responders, such as fire-rescue and police when dealing with hazardous materials spills on the roadway, especially vehicle fluids. It provides basic knowledge necessary for transportation first responders to enable them to make proper decisions in the identification of the material and on how such spills can be safely handled. It also highlights quick, safe clearance policies and practices of transportation (DOT) operations personnel when only vehicular fluid spills are involved.

17. Key Words	18. Distribution Statement
Hazardous Materials Cargo, Spills in Incident Clearance, Traffic Incident Management, First Responders	No restrictions. This document is available to the public.

19. Security Classif.(of this report)	20. Security Classif.(of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	56	N/A

Form DOT F 1700.7 Reproduction of completed page authorized

U.S. Department of Transportation
Federal Highway Administration

1200 New Jersey Avenue, SE.
Washington, DC 20590

October 31, 2008

Dear Transportation Professionals & Traffic Incident Management (TIM) Partners:

As part of the mission of the Federal Highway Administration (FHWA) to "***Keep America Moving,***" we need to safeguard the motoring public and those responding to traffic incidents. Safe, quick clearance of highway incidents—a foundation of both mature and developing TIM programs—depends on strong, coordinated multi-agency operations that are supported by integrated communications.

With more vehicles on the Nation's highways, traffic incidents become increasingly life threatening for those involved, including responders dispatched to help. According to the National Traffic Incident Management Coalition (NTIMC), "struck-by" secondary incidents are on the rise. In conjunction with the NTIMC partner organizations in the public safety and transportation arenas, FHWA promotes policies that enhance responder safety (such as driver removal and move-over laws); encourages the use of new technologies and gear to protect responders during roadside operations; and promotes improved safety procedures and safety training of traffic incident responders. In the coming year, FHWA will be launching a new campaign, similar to the highly successful "***Click It or Ticket*"** campaign, to increase driver awareness of their roles and duties in safely addressing traffic incidents or public safety responses on the roads.

As a part of this campaign and in support of TIM practitioners, FHWA is pleased to introduce a new set of primers, collectively known as the "***Safe, Quick Clearance Primer Series.***" This series includes five primers that address various issues associated with roadside clearance operations and provide basic building blocks on:

- ***Information Sharing for Traffic Incident Management***
- ***Traffic Incident Management in Construction and Maintenance Work Zones***
- ***Traffic Incident Management in Hazardous Materials Spills in Incident Clearance***
- ***Traffic Incident Management Resource Management***, and
- ***Traffic Control Concepts for Incident Clearance***

We encourage comments and contributions to these primers and other FHWA Traffic Incident Management documents. Please feel free to contact our Emergency Transportation Operations Team at ETO@dot.gov with suggestions for future revisions.

Sincerely,

Jeffrey A. Lindley
Associate Administrator for Operations

MOVING THE AMERICAN ECONOMY


ONLY

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Hazardous material spills provide unique challenges to traffic incident clearance. Not only do response personnel have to deal with the challenges posed in a typical traffic incident, they also have to work with chemical hazards, the environmental impacts to the surrounding community, and the additional safety requirements needed to work with hazardous materials. This type of event increases the confusion that exists at a normal traffic incident, and it may greatly reduce the normal capacity of roadways beyond the confines of the accident locality. All of these factors combine to increase the impact that even a minor incident has on traffic operations.

Traffic incident management (TIM) and spill management are two of the tools in the "responder's toolbox" that focus on reducing congestion. TIM focuses on developing procedures, implementing policies, and deploying technologies to identify incidents more quickly, improve response times, and manage the incident scene more effectively and efficiently. Spill management attempts to reduce the amount of time needed to clean-up and dispose of a hazardous spill and deploys strategies for moving traffic more effectively through an impacted area without jeopardizing the safety of the victims, responders or the traveling public.

While many states have established TIM programs, only a select few have begun to establish spill management programs. Spill management programs tend to be diverse and focus on three separate areas:

- Response management and deployment strategies,
- Planning and emergency preparedness, and
- Remediation efforts.

Agencies in the developmental stages of a spill management program will benefit from a combination of program highlights outlined in this series. Those entities with established programs will be able to improve or revise their spill management programs.

> ***Any incident has the potential to involve hazardous materials resulting from vehicle and/or cargo contents spills. To ensure safety from exposure at an incident site, all levels of responders should be knowledgeable of the potential hazards and be properly trained, at a minimum, to:***
>
> - ***Immediately size-up the incident scene for the presence of hazardous materials; and***
> - ***Know where, what, and how to look for hazardous material identification, and how to identify the risks associated with the materials.***

With this type of training, and by being able to accurately report the nature and type of hazardous materials involved, valuable time can be saved in identifying and requesting the proper support and equipment necessary for clean-up.

- ***Because of the number of safety and environmental regulations, including reporting requirements covering the exposure, handling, and disposal of materials, it is important that those involved in incident response understand the background, sources, and intent of these governing processes.***
- ***Valuable time and exposure can be saved during the clean-up phase of a minor incident involving only small quantities (under the reporting limits) of normal vehicular fluids if the initial response team members, including transportation personnel and tow truck drivers, have the necessary training and proper equipment available on-scene to clean-up and properly dispose of the spilt material.***
- ***For other larger spills, or for incidents involving hazardous cargo, well defined policies and practices subscribed to by all the responder agencies will facilitate safe and timely action for the necessary clean-up.***

Purpose of This Document

The mitigation and clean-up of hazardous spills is a major source of delay in clearing traffic incidents. In many instances, expensive, time consuming removal actions are initiated if the quantities exceed statutory limits. Motor fuels in the tank used for vehicle operation and other vehicle fluids are considered hazardous materials when spilt; however, the quantity is small when compared to the amount transported in cargo tank vehicles.

While the established safety standards designed to protect the responders, the traveling public and the environment from the adverse affects of exposure to these materials must be followed, some states recognize that incidental spills do not present the same threat as much larger spills from cargo tank vehicles. These states have adjusted laws and policies to permit quick and proper containment of minor spills. Some states are implementing best management practices in spill removal to improve incident clearance, reduce environmental impacts, and improve responder safety. The purpose of this document is to report practices regarding the clean-up of incidental spills and to explain the use of the United States Department of Transportation's (U.S. DOT) *Emergency Response Guidebook* (*ERG*). This document also describes techniques, and strategies that can be used to handle hazardous material spills at traffic incidents.

Target Audience

This document provides ideas and considerations for transportation officials, department of transportation (DOT) operations personnel, and first responders, such as firefighters and police. It is also a valuable tool for secondary responders from such agencies as the Environmental Protection Agency and United States Coast

Guard who can utilize this document as a training reference when they provide outreach training to first responders. The target audience for this document includes:

- *Operations Personnel* – DOT operations personnel responsible for implementing traffic incident management strategies.
- *First Responders* – Individuals responsible for the initial confinement and containment of a spill (state and local personnel).

Structure of this Guidebook

This guidebook is one in an Information Series on Traffic Incident Management Safe, Quick Clearance. This guidebook focuses on Hazardous Materials Spills in Incident Clearance. Other guidebooks available in this information series deal with the following topics:

- Traffic Incident Management in Construction and Maintenance Work Zones,
- Traffic Control Concepts for Incident Clearance,
- Information Sharing for Traffic Incident Management, and
- Traffic Incident Management Resource Management.

This document deals with the protocol and necessary knowledge required when dealing with hazardous materials spills on the roadway. It provides basic knowledge necessary for transportation first responders to enable them to make proper decisions in the identification of the material and on how such spills can be safely handled. Chapter 2 addresses the basic information necessary to understand the various types of hazardous materials; how these materials are classified to aid in their proper identification; and clean-up methodology. Chapter 3 deals with the identification of hazardous materials at a scene site. Chapter 4 provides an overview of the associated regulations governing the handling and disposal of all types of hazardous materials; examines the categories or levels and training necessary to be able to respond; and the necessary safeguards in place to protect responders. A sampling of available products to aid in safely cleaning up the more common, smaller hazardous material spills can be found in Chapter 5. Chapter 6 provides information on the guidance being given by some states to address hazardous materials incident clearance response. Chapter 7 provides a brief overview of the U.S. DOT *Emergency Response Guidebook* and how to use it. Chapter 8 contains references and other suggested readings that were used to develop this guidebook. Chapter 9 contains a glossary of terms.


CITY OF ORLANDO

2.0 TYPES OF HAZARDOUS MATERIALS AND HAZARDOUS MATERIAL SPILLS

Since they are such an integral part of our lives, hazardous materials are essential to the United States (U.S.) economy and its citizens. Large sectors of the U.S. economy, including agriculture, manufacturing, construction, mining, and medical and sanitary services, utilize hazardous materials. Hazardous materials fuel our vehicles, fight viruses and bacteria, as well as heat and cool homes. Yet, because of their physical, chemical, or nuclear properties, hazardous materials may pose a threat to public safety or the environment during transportation.

Millions of tons of flammable, corrosive, poisonous, and radioactive materials are transported daily in the U.S. The majority of hazardous materials cargoes make it to their destinations safely; yet some incidents do occur. Most of these incidents involve incidental releases, but occasionally there are more serious threats to life or property. This section discusses the basics of these incidents (basic vehicle fluid spills versus cargo spills), and department of transportation (DOT) hazard classes, grouping system based on the physical and chemical properties.

Understanding Hazardous Material Spills

Hazardous material spills that result from a traffic accident are either spills of vehicular fluids, hazardous material cargoes, or a combination of both.

Vehicular fluid spills are releases of materials that are used in a vehicle's operation. The size of the release is usually small and limited to the amount used in vehicle operations. The most common hazardous materials used in vehicles include fuel (diesel or gasoline), radiator coolant (ethylene glycol), transmission fluid, hydraulic fluid, brake fluid, windshield washer fluid, and battery acid. Other less common materials that are used in vehicles include ethanol, propane, and compressed natural gas (CNG), though propane and CNG quickly transform to their gaseous state when released.

A **hazardous materials cargo spill** is a release of a substance or material capable of posing an unreasonable risk to health, safety, or property when transported for commercial purposes. Unlike a vehicular fluid spill, a multitude of factors dictate the size and nature of the spill, including the type of material being transported, the original load size, the physical properties of the material, and the amount of damage to the transporting vessel.

According to the U.S. DOT Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Hazardous Materials Safety (OHMS), current research indicates that hazardous materials traffic in the U.S. now exceeds 800,000 shipments per day and results in more than 3.1 billion tons of hazardous materials annually.[1] The "Hazardous Materials Incident Summary Data"[2] provided by the PHMSA OHMS, indicates that flammable-combustible liquids have consistently been involved in most

incidents over the last five years. In addition, corrosive materials have steadily been involved as the second highest amounts in incidents over the last five years. Table 1 illustrates the amount of incidents by DOT hazard classifications over the last five years.

Table 1. Incidents by DOT Hazard Classification Over the Last Five Years [2]

Rank	2002	2003	2004	2005	2006	2007
1	Flammable - Combustible Liquid (6,172)	Flammable - Combustible Liquid (6,419)	Flammable - Combustible Liquid (6,181)	Flammable - Combustible Liquid (8,729)	Flammable - Combustible Liquid (10,288)	Flammable - Combustible Liquid (6,315)
2	Corrosive Material (6,055)	Corrosive Material (5,691)	Corrosive Material (5,321)	Corrosive Material (4,046)	Corrosive Material (5,058)	Corrosive Material (3,604)
3	Poisonous Material (868)	Poisonous Material (787)	Poisonous Material (865)	Nonflammable Compressed Gas (574)	Infectious Substance (Etiologic) (1,067)	Combustible Liquid (980)
4	Miscellaneous Hazardous Material (493)	Miscellaneous Hazardous Material (578)	Miscellaneous Hazardous Material (544)	Miscellaneous Hazardous Material (516)	Combustible Liquid (1,042)	Nonflammable Compressed Gas (865)
5	Oxidizer (430)	Oxidizer (454)	Oxidizer (464)	Poisonous Material (379)	Nonflammable Compressed Gas (598)	Oxidizer (387)

A 2004 publication by the Federal Motor Carrier Safety Administration (FMCSA)[1] indicates that hazardous material crashes, fatalities, and injuries are low relative to the amount of hazardous materials moved on U.S. highways. However, hazardous material incidents have significant cost impacts on property and the economy.

The U.S. Census Bureau estimates that 11 percent of all freight transported by trucks is hazardous material and 7 percent of all truck ton-miles of freight are hazardous material; and the U.S. DOT estimates that 7 percent of all trucks are carrying hazardous material. Motor carriers that transport hazardous materials, their drivers, and the federal, state, and local government agencies that regulate the transportation of hazardous material can take satisfaction in the fact that hazardous material crashes are under-represented in the overall crash picture.

Despite these data, the transportation of hazardous material by trucks imposes significant costs on the transportation system. According to a 2001 Battelle report to FMCSA as referenced in the 2004 FMCSA publication,[1] highway crashes involving hazardous material shipments have a societal cost impact of slightly more than $1 billion a year. Furthermore, a single crash of a truck transporting hazardous material in a crowded area has the potential for deaths and injuries far beyond that of a truck carrying non-hazardous material cargo. Extensive property damage and economic and personal disruption from immobilizing traffic and/or evacuation of homes and businesses is not uncommon in hazardous material crashes. In this light, the finding that liquid hazardous materials are more likely than liquid non-hazardous cargo to be spilled or released as the result of a highway crash is of great concern. FMCSA

recognizes the potential for severe hazardous material highway crashes and has increased its emphasis on safety programs in this area over the past 3 years.[1]

DOT Hazard Classes

(Categories Based On Physical and Chemical Properties)

The U.S. hazardous material regulatory system is a risk-based system that focuses on identifying the hazard and reducing the likelihood of a hazardous material release. Under the DOT's Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180)[3] hazardous materials are categorized by analysis and experience into hazard classes and packing groups. Each shipper is required to classify a material according to these hazard classes and packing groups and communicate the material's hazards. The shipper repetitively communicates the hazard through the use of package labels, shipping papers, and placards on transport vehicles.

The DOT has broad jurisdiction to regulate hazardous materials that are in transport, including the discretion to decide which materials shall be classified as "hazardous." These materials are placed in one of nine hazard classes based on their chemical and physical properties. The hazard classes may be further subdivided into divisions based on their characteristics. Additionally, some materials may be reclassified as combustible materials or "other regulated materials" (ORM-D) because of limited hazard during transport. These properties and characteristics are crucial in understanding the dynamics of a spill during a traffic incident. Therefore, it's important for response personnel to understand the hazard classes, their divisions, and reclassified materials:

- Class 1: Explosives
  - Division 1.1 Explosives with a mass explosion hazard
  - Division 1.2 Explosives with a projection hazard
  - Division 1.3 Explosives with predominantly a fire hazard
  - Division 1.4 Explosives with no significant blast hazard
  - Division 1.5 Very insensitive explosives
  - Division 1.6 Extremely insensitive explosive articles
- Class 2: Gases
  - Division 2.1 Flammable gases
  - Division 2.2 Nonflammable gases
  - Division 2.3 Poison gases
- Class 3: Flammable liquids
  - Liquid material with a flash point of not more than 60 °C (140 °F), or any material in a liquid phase with a flash point at or above 37.8 °C (100 °F) that is intentionally heated and offered for transportation or transported at or above its flash point in a bulk packaging.

- Combustible liquid
    a. Any liquid that does not meet the definition of any other hazard class specified in the HMR and has a flash point above 60 °C (140 °F) and below 93 °C (200 °F);
    b. A flammable liquid with a flash point at or above 38 °C (100 °F) that does not meet the definition of any other hazard class may be reclassified as a combustible liquid.

- Class 4: Flammable solids; spontaneously combustible materials; and materials that are dangerous when wet
    - Division 4.1 Flammable solids
    - Division 4.2 Spontaneously combustible materials
    - Division 4.3 Materials that are dangerous when wet
- Class 5: Oxidizers and organic peroxides
    - Division 5.1 Oxidizers
    - Division 5.2 Organic peroxides
- Class 6: Poisons and etiologic materials
    - Division 6.1 Poisonous materials
    - Division 6.2 Etiologic (infectious) materials
- Class 7: Radioactive materials
    - A material that spontaneously gives off ionizing radiation where the activity concentration or total activity exceeds the values specified for certain radionuclides in the HMR.
- Class 8: Corrosives
    - A material, liquid, or solid that causes visible destruction or irreversible alteration to human skin; or a liquid that has a severe corrosion rate on steel or aluminum.
- Class 9: Miscellaneous
    - A material which presents a hazard during transport, but which is not included in any other hazard class (e.g., a hazardous substance or a hazardous waste).
- ORM-D: Other regulated material
    - A material which, although otherwise subjected to regulations, presents a limited hazard during transportation due to its form, quantity, and packaging.

3.0 HAZARD RECOGNITION AT THE SCENE

> ***The primary concern at any incident scene should be the safety of any victims, responders, the motoring public, and the environment. The first step that any first responder must perform is to quickly and accurately identify and assess field conditions to determine the proper actions. It is important to properly identify the presence of potentially harmful materials and to know the necessary mitigation requirements to minimize any harmful threat. The hazardous materials found at roadway incidents may range from normal vehicle fluids to actual cargo contents being transported.***

To quickly clear a hazardous material incident (vehicle or cargo spill), first responders should have a good understanding of the many safety, regulatory, disposal guidelines, and documented clean-up practices for spills. Knowledge of these criteria will dictate how quickly a hazardous materials incident is cleared from the roadway and how safely the job is performed. These criteria will also dictate the types of techniques that will be used to clean-up the spill and how quickly the techniques are implemented.

The DOT places strict guidelines on the proper labeling, marking, and placarding of hazardous materials offered for transport. These valuable tools are critical to the identification of hazards at the scene. Hazard recognition also plays an important role in scene management and incident mitigation.

Personnel responding to the scene of an incident have to be keenly aware of their surroundings. Storm drains, water sources, wind direction, and the ground's gradient are all critical clues that are important to the mitigation of an incident. When used in combination with packaging, container types, vehicle shape, labels, and placards, response personnel can develop a plan of attack for mitigating a hazardous material release.

For most traffic incidents, responders should note the type of vehicle, any placards, the container or tank type, and labeling. These items often dictate the amount and type of material that can be spilled and the hazards associated with the material. They are also important to incident clearance and the approach responders use to mitigate a traffic incident.

According to the FHWA Office of Operations Web site dealing with hazardous materials response procedures, "While some materials are extremely hazardous in any quantity, hazardous materials response procedures are frequently invoked when a gasoline or diesel fuel spill exceeds a legally specified amount, typically 25 gallons. Some states have adopted procedures that exempt larger spills of engine fluids (gasoline, diesel fuel, oil, anti-freeze, etc.) from hazardous materials response procedures, providing that the spill has been contained on the pavement. The

USDOT regulations and guidelines for hazardous materials apply only to materials being transported, not engine fluids."[3]

The average volume of operating fluids, excluding fuel in a car, is approximately 8.6 liters (approximately 2 ¼ gallons). Table 2 provides information representative of the average volume of the various types of fluids that can be expected from a car. Responders can use this information along with fuel tank capacity of the various vehicle makes to gauge the quantity of fluids involved in clean-up. Given these volumes, one can assess a reasonable quantity to a spill and provide a prospective with which to judge the amount. It is generally accepted that clean-up of spills under the reporting quantity of 25 gallons of normal vehicular fluids can be safely handled by First Responder-Operations Level certified personnel (see Chapter 4).

Table 2. Average Volume of Operating Fluids (Except Fuels) for Cars[5]

Engine oil	**2.6 liters**
Transmission oil	1.3 liters
Final drive oil	1.1 liters
Steering gear oil	0.8 liters
Coolant	2.8 liters

Maximum fuel tank capacity will vary with the vehicle make and model, with the largest tank volume being the saddle tank (normally 70 gallons) on a semi-truck. Depending on the number of tanks on the truck, the maximum capacity for fuel for a commercial vehicle can be as much as 350 to 420 gallons.

With the ever increasing number of hybrid vehicles on the roads, first responders must also be alert to the type of batteries in the various makes of hybrid vehicles. Depending on the technology, some of the batteries may be dry cell while others are wet cell.[6] The wet cell technology generally contains sulfuric acid or sodium hydroxide that can be cleaned-up using a universal absorbent in accordance with Guide 154 in the DOT *Emergency Response Guidebook (ERG)*.

Hazardous material placards are one of the best clues that a responder can use to quickly size up an incident when some type of cargo is involved. The DOT *ERG* Table of Placards (2008) provides a quick index for responders to identify the placards currently in use in the U.S.

Table 3. DOT ERG Table of Placards (2008)[7]

Class 1: Explosives

Class 2: Gases

Class 3: Flammable and Combustible Liquids

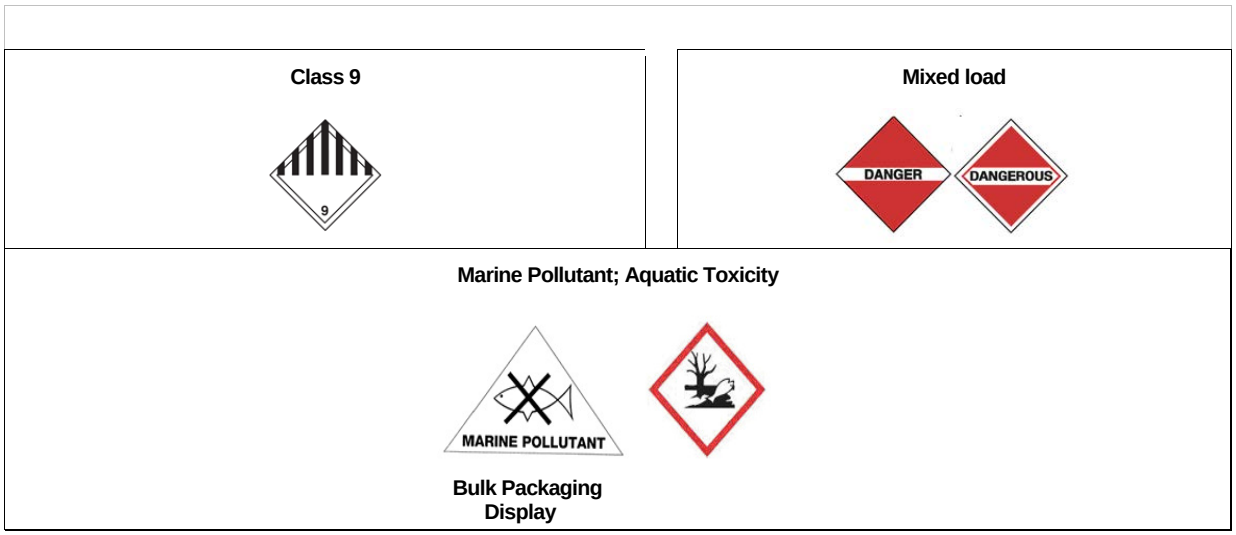
Class 4: Flammable Solids, Spontaneously Combustible, Dangerous When Wet

Class 5: Oxidizers and Organic Peroxides

Class 6 Toxics and Infectious Substances

Class 7

Class 8



The U.S. is beginning an effort to harmonize with the United Nations standard of labeling, the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals.[7] GHS is an internationally agreed upon system set to replace the various different classification and labeling standards used in different countries. GHS hazard classification criteria were selected for physical hazards and key health and environmental classes. For each of these hazard classes, standardized label elements—including symbols, signal words, and hazard statements—have been developed and agreed on. In addition, a standard format and approach to how GHS information appears on safety data sheets has been adopted.

Within the U.S., federal agencies with responsibility for regulatory and international affairs have formed an interagency committee to undertake GHS implementation. Lead by the Department of State, the U.S. Environmental Protection Agency (EPA), the U.S. DOT Pipeline and Hazardous Materials Safety Administration (PHMSA), Occupational Safety and Health Administration (OSHA), the Consumer Product Safety Commission (CPSC), the Department of Commerce, the Food and Drug Administration (FDA), the Office of the U.S. Trade Representative, the Department of Agriculture, and the National Institute of Environmental Health Sciences. GHS is in various stages of planning and implementation. These implementations have affected, and will continue to affect, how response personnel recognize hazards at the scene of a spill. The DOT has modified, or is planning to modify, most of its regulations to incorporate elements of the GHS that affect its programs. Criteria for physical hazards have been substantively aligned with GHS via HM-215I rule-making.[9] PHMSA has also adopted several elements of GHS in rulemaking HM-215F,[10] that directly affect the transport sector. For example, changes have been made to the hazard classification criteria for toxic materials and flammable liquids. In addition, the organic peroxide placard has also been modified so that the upper half is red and the lower half is yellow.

The GHS utilizes a number of other placards, and the DOT plans to implement some of these placards in the future. Table 4 illustrates the United Nations GHS Pictograms that may be implemented by the U.S. DOT in the future.

The next changes slated by the DOT relate to environmentally hazardous substances (aquatic toxicity). The 2008 *ERG* includes the "fish and tree" placard in its Table of Placards; this marking has been adopted and authorized under HM-215J. It must be used effective 1/14/2010.

Table 4. Proposed United Nations GHS Pictograms. All rights reserved.[7]

Other key resources that responders will be able to utilize include hazard communication systems and packing groups. While not as prevalent for vehicle spills, hazard communication systems provide valuable information for hazardous material cargo spills. The National Fire Protection Association (NFPA) 704M,[11] Hazardous Materials Identification System (HMIS®)[12] and the Hazardous Material Identification Guide (HMIG)[13] are often used on individual containers, tanks (intermodal, Baker, etc), drums, and barrels found inside semi-trailers.

> ***The hazard communication systems (NFPA, HMIS, and HMIG) utilize a color-coded system to communicate hazards associated with materials in regards to health, flammability, and reactivity hazard.***
>
> ***The blue, red, and yellow colored areas indicate the health, flammability, and reactivity hazard associated with a material, respectively. A value of zero in one of these areas indicates that the material poses essentially no hazard; a rating of four indicates extreme danger.***

Packing groups are central to the hazard recognition process for a hazardous material cargo spill; especially those spills that result from damaged packaging. They also indicate the strength of packaging required for shipment. Division 2.1, 2.2, and 2.3, Division 6.2 (other than "Regulated medical waste," UN3291) and Class 7 materials have no packing group assignments. Class 1 explosives, unless otherwise noted in the HMR, and Division 5.2 materials are assigned packaging group II. Class 3, Division 4.1, 4.2, 4.3, Division 5.1, Division 6.1, and Class 8 materials have been divided into three packing groups:

- *PG I – great danger; = X (UN)*
- *PG II – medium danger; = Y (UN)*
- *PG III – low danger; = Z (UN)*

A hazardous material is assigned to one of three packing groups based upon its degree of hazard—from a high hazard (Packing Group I) to a low hazard (Packing Group III). The quality, damage resistance, and performance standards of the

packaging in each packing group are appropriate for the hazards of the material transported.

> ***Packing group markings (as indicated by the letters above) are found on the packaging and indicate the performance standard under which the packaging design type has been successfully tested. On shipping papers, the packing group is identified in the basic description using roman numerals, i.e. PG I.***

4.0 HAZARD MATERIALS INCIDENT CLEARANCE COMPLIANCE REQUIREMENTS

In addition to being able to recognize the types of hazardous materials that might be at the incident site, the responders must be aware of the pertinent regulations covering the handling and disposal of the identified materials. Because of the potential harmful nature of these materials, safety regulations are in place to ensure that only those that do so are properly trained in the handling and disposal requirements of the hazardous substances.

These regulations:

- ***Identify the job duties and categories of employees at risk***
- ***Stipulate the level and frequency of training that is associated with specific exposure risks***
- ***Mandate the participation in a medical surveillance plan to ensure the ongoing health of exposed employees***
- ***Address personal protection requirements***

Safety Regulations

First and foremost, safety regulations put in place to protect the responders are vital to safely mitigating a hazardous material spill. Employees responding to a hazardous material spill ***must*** comply with the

1. Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard,[14]
2. Participate in a medical surveillance program, and
3. Participate in an employer respiratory protection program.

HAZWOPER Requirements

The **HAZWOPER Standard** applies to five distinct employer groups and their employees. Transportation department employees are included in these groups since their job duties associated with incidents may fit within one of the following categories:[14, 15]

- Clean-up operations required by a governmental body (whether federal, state, local, or other involving hazardous substances) that are conducted at uncontrolled hazardous waste sites;
- Corrective actions involving clean-up operations at sites covered by the **Resource Conservation and Recovery Act of 1976 (RCRA)**[16] as amended (42 U.S.C. 9601 et seq.);[17]

- Voluntary clean-up operations at sites recognized by federal, state, local, or other governmental body as uncontrolled hazardous waste sites;
- Operations involving hazardous wastes that are conducted at treatment, storage, and disposal facilities **(a semi-trailer or tanker for transportation purposes is included by definition)** regulated by **Title 40 Code of Federal Regulations Parts 264 and 265**[18] pursuant to RCRA, or by agencies under agreement with the U.S. Environmental Protection Agency to implement RCRA regulations; and
- Emergency response operations for releases of, or substantial threats of release of, hazardous substances regardless of the location of the hazard.

HAZWOPER Training Requirements

The training requirements for hazardous materials response are mandated by law. Response personnel at the scene of a traffic incident must have HAZWOPER training which fits their role and responsibilities. In general, most responders fall into the awareness level or operations level categories. However, some firemen, DOT personnel, and police officers should be trained as hazardous materials technicians for quick intervention of vehicular or small cargo spills.

Table 5. Training Requirements for Hazardous Materials Response Personnel

Responder Classification	Required Number of Hours of Training	Demonstrated Competency, Knowledge and Ability Required According to 29 CFR 1910.120 [14]
First Responder—Awareness Level Individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities. They would take no further action beyond notifying the authorities of the release.	No prescribed number of hours/demonstration of competency	Have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas: ● An understanding of what hazardous substances are and the risks associated with them in an incident ● An understanding of the potential outcomes associated with an emergency when hazardous substances are present ● The ability to recognize the presence of hazardous substances in an emergency ● The ability to identify hazardous substances, if possible ● An understanding of this individual's role in the employer's emergency response plan, including site security and control and the U.S. DOT ERG ● The ability to realize the need for additional resources and to make appropriate notifications to the communication center

Responder Classification	Required Number of Hours of Training	Demonstrated Competency, Knowledge and Ability Required According to 29 CFR 1910.120 [14]
First Responder—Operations Level Individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures.	8 hours	Have at least the stipulated hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level. The employer must also certify. ● Knowledge of the basic hazard and risk assessment techniques ● Ability to select and use proper personal protective equipment provided to the first responder at the operational level ● An understanding of basic hazardous materials terms ● Ability to perform basic control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit ● Ability to implement basic decontamination procedures ● An understanding of the relevant standard operating procedures and termination procedures
Hazardous Materials Technician Individuals who respond to releases or potential releases for the purpose of stopping the release.	24 hours	● Have received at least the stipulated hours of training equal to the first responder at the operations level and, in addition, have competency in the following areas. The employer also must so certify. ● Assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance ● Ability to implement the employer's emergency response plan ● Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment ● Be able to function within an assigned role in the incident command system ● Ability to select and use proper specialized chemical personal protective equipment provided to the hazardous materials technician ● Understand hazard and risk assessment techniques ● Be able to perform advance control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit ● Understand and implement decontamination procedures ● Understand termination procedures.

Responder Classification	Required Number of Hours of Training	Demonstrated Competency, Knowledge and Ability Required According to 29 CFR 1910.120 [14]
		• Understand basic chemical and toxicological terminology and behavior

.

> ***All employees trained in accordance with the Hazardous Waste Operations and Emergency Response standards must "receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly."*** [14]

Medical Surveillance Requirement

The medical surveillance requirement for hazardous materials workers is mandated by law. Personnel involved in hazardous materials operations should participate in a medical surveillance program as stipulated in the HAZWOPER regulations.

Members of an organized and designated hazardous materials (HAZMAT) team and the hazardous materials specialists are required to receive a baseline physical examination and be provided with medical surveillance. In addition, any emergency response employees who exhibit signs or symptoms, which may have resulted from exposure to hazardous substances during the course of an emergency incident, either immediately or subsequently after, shall be provided with medical consultation.[14]

Respiratory Protection Requirements

Respirators may be necessary to protect workers against inhalation hazards, such as dusts, fumes, and vapors. Respirators are categorized into two basic types, air-supplied and air-purifying. Air-supplied respirators provide breathing air from a source other than the surrounding atmosphere. Air-purifying respirators remove contaminants from the ambient air through the use of filters or cartridges.

The respiratory protection requirement for the use of respirators is not only mandated by law, it is a necessity due to the hazardous nature of the work and the likelihood for improper use. Factors, such as facial hair, weight loss/gain, and dental care, can each have a major impact on proper fit. Therefore, it's important for personnel involved in hazardous materials operations to participate in a respirator protection program based on requirements as stipulated in the HAZWOPER regulations.[14]

National Tow Truck Driver Certification

Towing & Recovery Association of America (TRAA) represents the towing and recovery industry on a national level. This group has recognized that the tow truck driver can also be a valuable contributor to the safe, quick clearance of an incident. With proper training and certification, they can provide help with the clean-up and handling of typical vehicle fluids at an incident. Because they are often the first at the scene, this assistance serves to reduce the clean-up time and allows for lanes to be opened in a more timely fashion.

Through a grant from the DOT, TRAA established national standards for tow truck operators and developed the National Driver Certification Program. This program is based upon light, medium, and heavy duty towing and recovery, and covers the following areas:

- Customer service
- Safety
- Incident management
- Truck
- Equipment

When assisting with traffic incident clean-up involving a hazardous material, the type of requirements for tow truck drivers will depend on the type of incident, the severity of the spill, and the location of the spill relative to the damaged vehicles. More information on the levels and curriculum topics, including handling of hazardous material, is available on the TRAA Web site at http://www.towserver.net/certification.htm.[19]

The applicable levels for TRAA tow truck driver certification when dealing with hazardous materials are:

> ***Level 1**: For most vehicular spills (car wreck) with only minor amounts of hazardous material spilled, Level I (Light Duty) requirements should be sufficient, provided that tow truck operators are not coming in contact with the spilled material.*
>
> ***Level II**: For vehicular spills (medium-heavy duty truck wreck) with moderate amounts of hazardous material spilled (partial saddle tank emptied), Level II (Medium Duty) requirements should be sufficient, provided that tow truck operators minimize their time near the spilled material.*
>
> ***Level III**: For large vehicular spills (tanker spill, blood-borne pathogens, etc.), Level III (Heavy Duty) requirements will be necessary to ensure tow truck driver safety.*

Response Management and Clean-up Regulations

> ***The regulations dealing with response management, including handling, reporting, and mitigation procedures of hazardous spills, are founded in a number of federal statues rather than just one source. It is important, especially for responders in charge, to know the origin of the various requirements, including the mandated reporting procedures and ensure the proper implementation.***

In the U.S., the response to an incident is regulated under many statues and many government agencies. It is important for responders to at least understand the basis of these regulations because they dictate everything, from how they manage a spill to the disposal of the spilt material. These regulations stipulate who should be notified and when it is not necessary, as well as what resources or assistance are available to local and state entities if the containment of a spill is beyond their capabilities.

Therefore, some of the major federal laws that responders should have knowledge of are listed in Table 6**. Responders should be aware of any local and state regulations that also apply to hazardous materials handling, reporting, and disposal in their jurisdictions.**

Table 6. Major Federal Hazardous Materials Incident Regulations

Regulations	Description
National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR) citation: 300.920 OMB Control No.: 2050-0141[20] Also known as the National Contingency Plan (NCP)	This is the federal government's blueprint for responding to both oil spills and hazardous substance releases. This plan is the result of efforts to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans. Congress has broadened the scope of the *NCP* over the years. As required by the Clean Water Act (CWA) of 1972[21] the *NCP* was revised to include a framework for responding to hazardous substance spills as well as oil discharges. Following the passage of the Superfund legislation in 1980, the *NCP* was broadened again to cover releases at hazardous sites requiring emergency removal actions. Additional revisions have been made over the years to help keep pace with the enactment of legislation, with the last revisions finalized in 1994 to reflect the oil spill provisions of the *Oil Pollution Act of 1990*.[21]
National Incident Management System, Homeland Security Presidential Directive[22]	After the attacks on the World Trade Center, the National Incident Management System (NIMS) was adopted and is being implemented across the nation as the federally mandated incident management system. Under this presidential directive, all communities, states, and federal government agencies will integrate into the NIMS in response to threatened and actual emergencies and disasters of all kinds. The NIMS is being implemented in accordance with criteria set forth in this directive.
Designation, Reportable Quantities, and Notification (40 CFR, Part 302)[23]	If there is a traffic incident involving a hazardous material release, this regulation will most likely play a large part of the response. These regulations were originally published under the authority of Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA),[17] the Designation, Reportable Quantities, and Notification regulation. The regulation identifies the quantity of substances which, when released, sets forth the notification requirements for releases of these substances and spells out the reporting requirements to the National Response Center (NRC). The NRC is the national communications center for the federal government and is staffed 24 hours a day by U.S. Coast Guard officers and marine science technicians. The notification requirement applies to any person in charge of a vessel, facility, or offshore facility. Releases that are continuous and stable in quantity and are not covered by this regulation are subject to reduced reporting requirements.

Regulations	Description
Emergency Planning and Community Right-to-Know Act (EPCRA), Emergency Release Notification Requirements[24]	EPCRA plays an important role in hazards material cargo spills. Under EPCRA, any motor vehicle or rolling stock that accidentally releases an extremely hazardous substance into the environment, as defined by the multiple regulations, in an amount greater than or equal to the minimum reportable quantity as required by the EPCRA Emergency Planning and Notification regulation is required to notify Local Emergency Planning Committee (LEPC) and State Emergency Response Commission (SERC). Emergency notification requirements involving transportation incidents can be met by dialing 911, or in the absence of a 911 emergency number, by calling the local operator. The Consolidated List of Chemicals,[25] subject to the EPCRA, was prepared to help companies determine whether they need to submit reports under Sections 302, 304, or 313 of EPCRA and, for a specific chemical, what reports may need to be submitted. This list should be used as a reference tool, not as a definitive source of compliance information. Compliance information for EPCRA is published in the *Code of Federal Regulations (CFR), 40 CFR Sections 302, 304 and 313*[26]
Immediate Notice of Certain Hazardous Materials Incidents and Detailed Hazardous Material Incident Reports (49 CFR, Parts 171.15 and 171.16)[3]	Two phases of incident reporting are required under this regulation. When a hazardous release occurs during transport, (including loading, unloading, and temporary storage), a telephone notice of a specified incident must be given “as soon as practicable, but no later than 12 hours after the occurrence” of the reportable incident. A follow-up written report (two copies) must be submitted “within 30 days of the date of discovery” on DOT Form F 5800.1.[2]
Discharge of Oil Regulation (under CWA, 40 CFR 110)[27]	This regulation is covered by the Clean Water Act, Discharge of Oil.[21] The regulation provides the basic conceptual structure for determining whether an oil spill to inland and coastal waters and/or their adjoining shorelines should be reported to the federal government. The Oil Pollution Act of 1990 (which amended the Clean Water Act)[21] broadly defined the term “oil,” also known as the sheen rule. This rule establishes criteria for determining whether an oil spill may be harmful to public health or welfare, thereby triggering reporting requirements. If the spill is determined to be harmful, the person in charge of a facility or vessel is required to report the spill to the federal government. The sheen rule applies to both petroleum and non-petroleum oils (e.g., vegetable oil). Under the Clean Water Act definition, many other substances are considered oils that may not be easily recognizable by industry, including mineral oil, the oils of vegetable and animal origin, and other nonpetroleum oils. As general guidance for any traffic incident, oils fall into the following categories: crude oil and refined petroleum products (e.g. gasoline, diesel fuel, jet fuel, kerosene, etc.), petroleum-derived products (e.g. turpentine), edible animal and vegetable oil, other oils of animal or vegetable origin, and other non-petroleum oils.

Sizing-up a Spill

Once a spill occurs along a roadway, it’s important for response personnel to identify the hazardous substance and prevent the spill from spreading. Initial response personnel should only attempt to determine the extent of the release by gathering

and analyzing information. This is called a size-up strategy, and is a **non-invasive** attempt to get a general picture or impression of the nature and severity of the event.

In general, responders should use a size-up strategy to obtain and evaluate the following information:

- Identity of the materials
- Amount of the release
- Hazards associated with each material(s)
- Effects and risks on the public, property, and environment
- Potential pathway of release—air, land, surface waters, or groundwater
- Most appropriate measures for controlling the release to prevent/reduce the impact
- Safety measures to protect all response personnel

A number of methods can be used to collect information for a size-up strategy. For the most part, responders should use visual observations to assist in detecting the presence or release of hazardous chemicals. Visual methods that may be utilized include the following:

- Types and numbers of containers or cargo tanks
- Placards, labels, and markings on containers or transportation vehicles
- Vapors, clouds, run-offs, or suspicious substances
- Biological indicators—dead vegetation, animals, insects, and fish
- Physical condition of containers

At other times, it may be necessary for first responders to utilize quantitative methods (monitoring, sampling, hazard characterization, etc.) to assist in detecting the presence or release of hazardous chemicals. Quantitative methods that are cost-effective and may be utilized at a traffic incident include the following:

- Colorimetric tubes
- pH paper
- Spilfyter classifiers strips

Containment and Confinement

Upon identifying an incidental hazardous substance release, first responders may perform limited clean-up activities provided that the mitigation follows a standard operating procedure and the responder has received adequate training (See previous section on training requirements). Incidental releases should not have the potential for safety or health hazards, such as fire, explosion, or chemical exposures in excess

of an OSHA Permissible Exposure Limit (PEL), or exceed the immediately dangerous to life and health level.

For first responders to a small spill, limited clean-up activities may entail basic containment and confinement techniques. Spill containment involves methods used to restrict the material to its original container (e.g. plugging, patching, overpacking, etc.). Spill confinement involves methods to limit the physical size of the area of the release (e.g. mist knockdown/vapor suppression, diversion, diking, booming, absorbing, fencing, and damming). Both methods can be very effective at controlling a hazardous release, if used appropriately. However, response personnel should not utilize either method without appropriate protection and regard for safety.

For small vehicular spills that occur along a roadway, one of the easiest ways to control a spill is the use of granular absorbents, oil absorbent pads, or universal absorbent pads for non-petroleum products. These items are readily available and very effective for remediation of small spills. However, response personnel should understand the properties associated with each, standard operating procedures for utilizing them, and the correct collection and storage methods for contaminated absorbents.

Disposal Guidelines

Once hazardous materials are spilled, the material becomes contaminated and should be either recycled or disposed of properly. Typically, first responders to a traffic incident do not possess the appropriate licenses to perform transportation and disposal of hazardous waste. Professional licensed firms should be contracted to perform this task following the regulations established under the Resource Conservation and Recovery Act.[16]

First responders can improve the disposal process by mitigating the spill following a standard operating procedure (SOP). The SOP should account for how to:

- Mitigate the spill,
- Package the waste for transport, and
- Secure the waste until a licensed transportation and disposal company can pick up it up.

More importantly, the SOP should provide first responders with guidance on how to minimize roadway congestion by conducting hazard recognition to determine the hazards presented to the general public.


DANGER HAZARDOUS MATERIAL
DANGER HAZARDOUS MATERIAL
DANGER HAZARDOUS MATERIAL

5.0 AVAILABLE PRODUCT SAMPLES FOR CONTAINING/CONFINING A HAZARDOUS MATERIAL SPILL

There are two basic ways to control any type of spill: containment and confinement. Containment basically means restricting the material to its original container while confinement refers to limiting the physical size of the area of release. First responders should have an assortment of products for spill mitigation of a spill for both types of controls. Quick and simple actions by properly trained responders to minimize the amount of a spill as well as the area of involvement can reduce the amount of clean-up time and, thus, reduce the incident time frame requirements. For most traffic incidents involving incidental spills, Level II trained responders can effectively deal with the smaller vehicle spills if they have access to the appropriate equipment and materials. The impact of larger spills can be minimized by quick action, such as placing drain protection covers over the storm sewer inlets by DOT personnel. Properly trained responders can also reduce the incident time line in some cases involving minor vehicle crashes by having access to a spill kit containing an assortment of absorbents.

There are basically three types of spill kits. The type of spill kit that a first responder will use depends upon what liquids need to be cleaned up. The three main types are:

1. **Universal or General Purpose Spill Kits**. Universal or general purpose spill kits contain **gray** absorbents made with activated charcoal or a similar capturing agent. Universal or general purpose spill kits are used to clean-up both water-based fluids and hydrocarbons.

2. **Oil-Only Spill Kits**. Oil-only spill kits are used to clean-up hydrocarbons only (motor oil, jet fuel, diesel, gasoline, hydraulic oil, etc.) and contain **white** absorbents that repel and float on water.

3. **Hazmat Spill Kits**. Hazmat spill kits contain **yellow** absorbents to clean-up aggressive fluids, such as acids and solvents, and will absorb hydrocarbons as well as water-based fluids.

The size of the spill is an important factor in determining the mitigation technique a first responder will use. Spill kits come in various sizes. For small volume spills, first responders may use bagged or bucket spill kits. For large volume spills, a drum or wheeled cart/mobile spill kit may be better suited. In each case, both types of spill kits are easily carried on a response vehicle and can provide safe containment of the material until proper disposal can be facilitated.

If first responders do not have a spill kits readily available, there are an assortment of products that can be purchased individually and combined to produce a custom spill kit. Some of the more important items are absorbents pads, absorbent booms, drain protector covers, spill containment berm dikes, and spill classifier strips. Table 7 provides some examples of spill mitigation products as well as common types of spill kits and is not meant to be a complete comprehensive list.

Table 7. Examples of Available Spill Mitigation Products and Common Types of Spill Kit (http://www.spill911.com/Store/,[28] http://www.absorbentsonline.com/,[29] http://www.npscorp.com/[30])

Universal Maintenance (http://www.spill911.com/Store/) Absorbent Pads and Rolls, Pillows, Spill Socks, and Booms*:* Gray absorbent material considered as a general purpose absorbent which can be used to absorb all water-based fluids, oil, diesel, gas, coolants, cutting fluids, hydraulic fluids, vegetable oil, acetone, turpentine, ether, MEK, hexane, trichloroethylene, etc.   
Oil Absorbent Pads and Rolls, Pillows, Spill Socks, and Booms: White oil absorbent material used only for hydrocarbons, such as oil, gasoline, fuel oil, diesel, and lubricating oils.    
Hazmat Absorbent Pads and Rolls, Pillows, and Spill Socks: Yellow hazmat absorbent material used on all liquids including unknown materials and aggressive fluids, such as caustic soda, hydrochloric acid, sulphuric acid, sodium hydroxide, and nitric acid.    
Polybacked Absorbent Pads and Roll: Used as a general purpose absorbent for all fluids including water-based liquids. 

Anti-Static Absorbent Pads and Roll: Used for absorbing hydrocarbons, such as oil, gasoline, fuel oil, diesel, and lubricating oils that are volatile in cold applications, dry, low humidity areas or anywhere a potential for sparking exists.

Drain Protector Drain Cover: Used as a protective cover over drains, grates, and manholes to prevent hazardous materials from entering.

Spill Containment Berm Dikes: Bendable material used to divert or contain and control liquids.

Utility Tool Kits: Tool kits with the basic equipment which might be needed to quickly clean-up a spill in a proper manner, such as shovels, squeegee blades, broom and brush heads, expandable handles, pads, socks, storage containers, and personal safety equipment.

Drum Spill Kits and Mobile Cart Spill Kits: Kits that not only provide the tools, but also the necessary storage containers for larger spill quantity incidents.

Containment

Wedge, Patch and Plug Kits: An assortment of sizes of wooden wedges as well as plugs and patches that can be used to stop or temporarily reduce the flow of materials from small holes, rips, or punctures.

Containment Pools: These are used to capture a liquid spill or flow. Commercial pools are available, but a blow up kiddy wading pool can be an inexpensive, easy to transport, and effective alternative. The pools should be used with absorbent materials to facilitate clean-up and disposal.

6.0 DOCUMENTED PRACTICES FOR HAZARDOUS MATERIALS INCIDENT CLEARANCE

In an attempt to ease traffic congestion during incidents involving a vehicular fluid spill or a hazardous materials cargo spill, some states have begun adopting regulations, disposal guidelines, and documented practices to help guide first responders. Table 8 presents highlights of incident management practices which have been implemented and used by other agencies. These highlights are not all inclusive of how an incident is handled, but they show unique efforts to improve clearance efforts for a hazardous materials spill. For instance, the highlights provide a glimpse of efforts by states to:

- Use quick clean-up techniques by first responders;
- Protect water resources by implementing quick clean-up techniques by first responders;
- Hire pre-designated private response contractors to handle the spill; and
- Improve coordination and preparedness efforts by DOT, police, fire, and tow operators.

Table 8 Incident Management Practices Implemented and Used by Other Agencies

State	Guidance
Florida (1)	– In situations involving vehicle fluid spills on a roadway, from both commercial and private vehicles, the preferred clean-up method is to soak up as much material as possible using absorbent materials. The absorbent materials are also moved out of the travel lanes and stored at the roadside, preferably well off the shoulder. In some cases, the material may be containerized and placed in the damaged vehicle(s) for removal by the towing company. – **DOT and other crash-scene responders may apply absorbents and sweep off travel lanes regardless of the quantity. It is not necessary to await a licensed clean-up contractor.** – Clean-up normally involves the use of granular absorbents or vermiculite, floor sweep, peat moss, pads and booms, clay, or topsoil. In limited situations, sand can also be used, but it is better suited for increasing friction than for use as an absorbent. If immediately available, an alternative method for dealing with the thin film that may remain after absorbents are used is to apply a light dusting with Portland cement. – The responsible party is accountable for vehicle fluid spillage, including the final removal and proper disposal of absorbents and, if needed, the subsequent site remediation. If the responsible party does not or cannot handle this responsibility in a timely manner, the governing authority (State of Florida, county, city, etc.) will initiate disposal and the responsible party will be billed. Clean-up actions taken by early responders do not affect or limit this responsibility.

State	Guidance
	– Additional or incidental material spilled during the relocation of the vehicle out of the travel lanes of the roadway can be cleaned up and moved to the roadside with the other absorbents used at the scene. The responsible party remains accountable! – Absorbent material moved out of travel lanes may be bagged in heavy-duty trash bags, wrapped or 'diapered' in plastic sheeting, or containerized in pails or barrels. The material should be well off the travel portion of the roadway and can remain there for a reasonable time to allow for disposal by the responsible party or a contractor (paid by the responsible party). – The material may be placed in a container and placed in the damaged vehicles and removed by the towing company. The containers used to hold the material should be tagged and clearly marked to indicate the type of absorbent used and the material that was spilled. It is also desirable to indicate the responsible party. Care should be taken not to overload the containers used to store the absorbents. If trash bags are used, double bag and limit each bag to about 15 pounds. – The reportable quantity of 25 gallons does not automatically prevent or limit on-scene actions to mitigate the spill. In fact, prompt intervention is encouraged to limit the congestion impact and prevent the high probability of secondary incidents as a result of extended traffic blockage. It is very important that every effort be made to limit the amount of time the spilled fluids are in contact with asphalt pavement. – Vehicle Fluid Spill Clean-Up Quick Action Guide ● Identify spill as a vehicle fluid ● Stop leaking material at the source ● Contain and limit spill from spreading ● Apply available absorbents ● Sweep material off travel lanes ● Second application, if necessary ● Gradually restore traffic flow ● Identify responsible party and mark location of material ● Assure proper notification made to State Warning Point
Colorado (2)	– In situations involving a transportation accident/incident that results in a product/fuel spill, reporting and clean-up by the responsible party is necessary if: ● The amount of petroleum fuel spilled exceeds 25 gallons, or other reportable quantity according to Environmental Protection Agency (EPA) SARA Title III, Consolidated List of Chemicals[25] and/or ● The spilled materials have impacted or threaten to impact state waters. – Where a transportation accident/incident results in a product/fuel spill, any accidental discharge to a sanitary sewer system must be reported immediately to the local sewer authority and the affected wastewater OSHA Permissible Exposure Limit[31] treatment facility. – If the spill has affected surface water, downstream water users should be notified immediately. This may be coordinated with the Colorado Department of Public Health and Environment (CDPHE) through the 24-hour spill reporting line. – All appropriate actions should be taken to protect the incident scene, e.g., prevent vehicle/pedestrian access and move to a location upwind to await first response agencies. Persons should not attempt to mitigate or remediate the spill unless they have: ● Been properly trained and certified; ● The appropriate personnel protective equipment (PPE) available to them; ● The required support personnel available to effect an entry; and ● The response equipment necessary to stabilize the scene. – First response agencies should make a good faith effort to stabilize the scene to keep the spill from spreading and affecting additional soil and water resources and other environmental receptors. Suggested actions include, but are not limited to: ● Covering the spill area with plastic, ● Placing absorbent booms in affected water,

State	Guidance
	● Placing clean soil berms and/or absorbent booms downhill of the spill and/or between the spill area and nearest waterway, ● Neutralizing or chemical stabilizing, if appropriate, and ● Diverting surface and storm water. – Clean-up of spilled materials is required for any quantity of spilled fuel above the reportable quantity into soil or ground surface, and/or if the spill impacted soil, or has the potential to impact state waters. State OSHA Permissible Exposure Limit[31] waters include: lakes, reservoirs, ponds, streams, rivers, ditches, storm drains, manholes, wetlands, storm water, and ground water. – Spills need to be remediated to CDPHE and EPA-approved thresholds where applicable, and to the strictest standards, where different. Other clean-up thresholds may depend on the material spilled, the media affected (soil, groundwater, surface water), and the risk of leaving the material in place. Clean-up thresholds need approval by Colorado DOT in order to issue a "No Further Action" determination to the responsible party. – Excavation and off-site disposal is the preferred and most common method of soil remediation at Colorado highway spill sites. If excavation is not feasible or allowed, clean-ups may also include a variety of technologies, including, but not limited to, some combination of: excavation, air sparge, soil venting, bioremediation, steam cleaning, physical collection, and monitored natural attenuation. – OSHA Permissible Exposure Limit[31] – A closure report is required for all transportation incidents involving spills in excess of 100 gallons on property owned by the Colorado DOT. This report should be compiled by the responsible party or their designee after clean-up is complete.
Texas (3)	– Texas DOT (TxDOT) personnel may only participate in containment, clean-up, or neutralization of material that has been determined to be non-hazardous to their health or safety. – Texas Water Code requires that the Texas Commission on Environmental Quality (TCEQ) and TxDOT develop a contractual agreement whereby TxDOT may be used for spill and discharge clean-up throughout the state. The following conditions must be met: ● The TCEQ and TxDOT execute an Interagency Contract (IAC) each biennium that incorporates requirements of the Texas Water Code. A copy of this IAC is provided to each district. ● Clean-up activities performed under this contract generally are at locations off the right-of-way and at sites that TCEQ has assumed responsibility for clean-up actions. TxDOT personnel should comply with the requirements contained in the *Occupational Safety Manual*[32] when requested to handle oil and hazardous materials. – Only trained personnel should ever approach a fire or a spill. Containment, clean-up, or neutralization of the hazardous material should be accomplished by individuals or organizations familiar with or trained in such activities. The following steps should be considered general guidelines and may not apply for all circumstances: 1. Notify law enforcement and fire department of roadway accident. 2. Survey the scene from a safe distance and determine the responsible person. 3. Consult the USDOT *Emergency Response Guidebook*[7] for specific hazardous material information. From a safe distance, determine the integrity of the container(s), determine the existence or possibility of runoff, determine if any dead animals are near, evaluate the distressed nature of surrounding vegetation, evaluate any markings on containers, and assess the physical characteristics of the material (color, solid, liquid, powder, or granules). 4. Using guidelines in the *Emergency Response Guidebook,*[7] restrict access to the spill site. Keep the public away from the hazard. Provide traffic control, as needed. 5. Notify supervisor by radio or telephone.

State	Guidance
	6. Supervisor should notify local fire department, Department of Public Safety, and district hazardous materials coordinator. Supervisor should ensure that field personnel only conduct traffic control from a safe distance from the spill. 7. Determine if a reportable discharge or spill has occurred and if so, the district hazardous materials coordinator should ensure TCEQ has been notified of the spill or release as soon as possible but not later than 24 hours after the discovery of the spill or discharge. – **Contracting (handled through District Maintenance or District Safety Office) :** Contracting for clean-up, testing, and disposal is to be handled by: ● Third party—trucking company or manufacturer ● TCEQ—should they assume responsibility for the clean-up ● District—purchasing personnel with the assistance of the General Services Division Purchasing Section, if the responsible party is not taking appropriate actions or if TCEQ has not assumed responsibility for the clean-up. – **Hazardous Substance Spill Contingency Plan** - The TCEQ is the lead agency in hazardous materials spill response. Emergencies involving spillage, release, and/or abandonment of known or suspected toxic/hazardous materials are the prime responsibility of the TCEQ. (Ref. Texas Water Code) **It is important for TxDOT employees to remember that only trained personnel should ever approach a fire or spill. TxDOT personnel are specifically prohibited from handling, cleaning up, or otherwise coming in contact with toxic/hazardous materials at accident scenes or abandonment sites on TxDOT's right-of-way.** Doing so may adversely affect the health and/or safety of TxDOT personnel.
Ohio (4)	– The best practices for **transportation agencies** are to: ● Develop response protocols for freeway closures, which include pre-planned diversionary routes and traffic control in coordination with local public agencies. Meet with police, fire, and other local officials before incidents to review such plans. ● Install urban freeway reference markers at 2/10th-mile increments, which will allow cellular telephone callers to report incident locations with greater accuracy. ● Deploy freeway service patrol vehicles to remove debris from travel lanes and assist motorists who are broken down on the freeway shoulder or in travel lanes; include arrow boards to assist with traffic control for incidents. ● Create video links from traffic management centers to share with law enforcement and fire/rescue agencies. These video images can be used to minimize the amount of fire apparatus dispatched to a scene. ● Participate in the incident command system to communicate with fire and police agencies and advocate for the prompt clearance of the scene. ● Set up safe traffic control around the crash scene; divert traffic upstream of an incident through the use of changeable message signs; and provide traffic information to the media and general public. – The best practices for **law enforcement agencies** are: ● Meet with fire and transportation agencies to review predetermined incident response plans. ● Within the unified incident command system, communicate with transportation agencies to establish traffic management/ detours, and direct a partial or complete reopening of the roadway as quickly as possible, under OSHA Permissible Exposure Limit.[31] ● For accident investigations, efficiently collect evidence and survey scene using Total Station equipment or aerial surveying. ● For minor (non-injury) crashes, have dispatchers provide guidance to drivers on local policy for moving vehicles from travel lanes and exchanging information as per state law.

State	Guidance
	– The best practices for **fire and emergency medical agencies** are: ● Dispatch the minimum amount of equipment necessary to reduce the exposure of personnel at the scene. (Fire agencies can be aided by the receipt of video images from DOT traffic management cameras). ● Use effective training in the identification of hazardous materials to avoid lengthy lane closures for materials that do not pose a threat to people or the environment. ● Use effective training in temporary traffic control around incidents in order to keep lane(s) of traffic open when possible. Use effective communications as part of the incident command system so that partner response agencies are aware of progress in rescue efforts and can make correct decisions regarding traffic management and provide traveler information to local media. Commercial vehicle recovery involves unique considerations. Most importantly, commercial vehicle loads might still have value and there is an implicit right to salvage such cargo which can delay the prompt reopening of travel lanes. For recovery of some commercial loads, specialist companies are called in to handle a certain material, such as the case with a hazardous material or fuel spill. Other times, the trucking company or owner of the cargo will want to dispatch their own vehicles and personnel for the salvage operation. Involvement of such "third-party" recovery teams often takes inordinate amounts of time, depending on the distance of the company from the incident. Incidents involving hazardous materials, fuel spillage, and other pollutants may require oversight by the Ohio Environmental Protection Agency (OEPA) Emergency Response and local hazardous material handlers, where available. First responders involved with such an incident should call the OEPA Emergency Response Hotline. – The best practices for **towing and recovery** include: ● Pre-qualification of towing companies by municipalities, so the towing company called to an incident scene has the capability to handle the vehicles involved. ● Training law enforcement in the Towing and Recovery Association of America's vehicle identification guide to ensure the correct equipment can be requested and dispatched to the incident. ● Weighing the cost-benefit of calling in third-party recovery teams, if their distance/time of travel will have an excessive impact on the amount of time lanes remain closed. ● Moving commercial vehicles or trailers to the roadside or shoulder to restore as many travel lanes as possible, as soon as possible; then performing any necessary salvage operations after the peak hour. **Pre-Incident Planning, Incident Command, and Major Incident Review** Repeatedly, in the course of developing these best practices, it was revealed that communication is the key to improving incident management practices. Often, agencies are unaware of the impacts their operations have on traffic or the value of communicating incident information which can be relayed to the public. Pre-incident planning brings agencies together to review policies and best practices, so that all incident management operations can be carried out efficiently and safely when the need arises. The best practices for pre-incident planning are: ● Transportation agencies should pre-plan diversion routes, so that traffic control and detours are arranged as efficiently as possible when the need arises. Such pre-planning should include a review of practices for incident command, communication with local media, etc. Transportation agencies should have equipment on-hand to handle traffic control, such as arrow boards, portable message signs, etc. All agencies involved in incident management should meet regularly to review a transportation agency's pre-planned diversionary routes and best practices and policy.

State	Guidance
	● OSHA Permissible Exposure Limit[31] o Communicate with transportation agencies in the incident command structure, so that proper decisions can be made regarding traffic management; o Assess and request the proper towing equipment in parallel with other activities, so that towing and salvage can begin as soon as possible; o Provide regular updates to the media, who can help inform the public about road closures, detours, and expected duration of the incident. **Major Incident Review** It is unfortunate, but certain, that major traffic incidents will plague Ohio for the foreseeable future. Just as certainly, some incidents will not be handled as efficiently as possible, leading to increased exposure of incident responders, more traffic congestion delay, and secondary crashes. Best practices are: ● In an environment of mutual professional respect, hold meetings after major traffic incidents to review performance, decisions, policies, or procedures that conflicted with the goal of efficient incident management; ● Communicate the meeting results so as to resolve conflicts in future traffic incidents.
Virginia (5)	– CONTROL THE DISCHARGE (stopping the leak) - Procedures used to control the accidental discharge of motor vehicle fluids should be based upon the availability of a local fire department's equipment and training related to these activities. – CONTAIN THE DISCHARGE (preventing the spread) - Fire departments generally have equipment, such as shovels, absorbents, and plastic sheeting necessary to contain an accidental discharge of motor vehicle fluids (non-cargo). However, use of this equipment for containment activities also requires training at a minimum of the (HAZWOPER) Hazardous Materials Operations Level. In addition, the use of air-monitoring equipment, such as combustible gas indicators and photo ionization devices, is strongly recommended to provide for the health and safety of responders. – RECOVERY OF MOTOR VEHICLE FLUIDS (clean-up and disposal) ● Recovery includes the following steps: ● Step 1 – Reporting the incident ● Step 2 – Determining the responsible party ● Step 3 – Determining the appropriate clean-up enforcement authority ● Step 4 – Cleaning up the discharge ● Step 5 – Disposing of contaminated materials – CLEAN-UP EQUIPMENT RESUPPLY - There are several options available to allow fire departments to restock containment and clean-up supplies used during clean-up operations. These options, along with specific details to obtain resupply through the Virginia Department of Emergency Management (VDEM). – The following discharges, when NOT a threat to navigable waters, are exempt from reporting requirements (exemptions are permitted under VA Code, Section 62.1-44.34:23): ● Accidental discharges [Editor's note: meaning discharges of oil] from farm vehicles or noncommercial vehicles. ● Accidental discharges from the fuel tanks of commercial vehicles or vessels that have a fuel tank capacity of 150 gallons or less. For example, a commercial vehicle with two fuel tanks, each with 70-gallon capacity, has a total tank capacity of 140 gallons. – CLEAN-UP PERFORMED BY A FIRE DEPARTMENT, WRECKER OPERATOR, PROPERTY OWNER, OR RESPONSIBLE PARTY 1. Clean-up performed by a fire department, wrecker operator, property owner, or responsible party should be limited to spills of a magnitude within their capabilities. 2. Clean-up normally involves the use of granular absorbents, pads and booms, and dispersants. Dispersants are chemical agents applied to the spill.

State	Guidance
	3. The use of dispersants is regulated. Guidance on the use of dispersants can be obtained from VDEQ. 4. **LARGE** amounts of granular absorbents should be used to safely clean-up spills of gasoline. This is necessary to reduce the concentration of gasoline's benzene component to acceptable levels for personal safety and health. 5. Biodegradable absorbents and absorbents that can release their contents when compressed (such as pads and booms) can only be disposed of in approved landfills as determined by VDEQ. 6. Contaminated absorbent material and soil should be placed in a suitable container, such as large plastic trash bags (double lined for strength), five-gallon plastic pails, or recovery drums. Care must be taken not to overload the capacity of any container used to store contaminated absorbents. 7. If possible, separate biodegradable and non-biodegradable absorbents into different containers. Non-biodegradable absorbents include "kitty litter," soil, sand, and vermiculite. 8. Each container should be securely sealed and clearly marked to indicate its content. Markings should include the type of absorbent used and the material absorbed. Also, if a fire department conducts the clean-up, a point-of-contact for the department should be included. The preceding information is critical to ensure proper disposal. – DISPOSING OF CONTAMINATED MATERIALS A. It is recommended that personnel from fire departments, law enforcement organizations, and transportation departments SHOULD NOT take possession of contaminated materials. B. Contractors or the wrecker company that conduct clean-up operations will remove and dispose of contaminated materials in a lawful manner. C. Fire departments that conduct clean-up operations should attempt to have contaminated materials disposed of in any one of the following manners: • Request that the wrecker operator remove the contaminated materials along with the vehicle being towed. - OR – • Leave all containers on site for disposal by either the responsible party or property owner. Stage the containers off the roadway and, if possible, behind existing guardrails, or otherwise in protected areas delineated by road cones, barrier tape, etc.
California (6)	– The California Highway Patrol (CHP) is the named Incident Commander (IC) on all freeways and most state routes. All communications will be through the IC. – California Transportation Department (CalTrans) will take the lead to ensure proper clean-up of spills, but must confer with the appropriate jurisdictions, such as the County Health Officer, the County Agricultural Commission, and the Air Pollution Control District. – If there is a disagreement between CalTrans and other responding agencies regarding closure or reopening of the roadway, the dispute will be resolved in favor of the maximum protection for the public and the CalTrans employees. – If an emergency is declared, the IC has the authority to waive the Hazardous Waste Control laws to allow CalTrans or its agents to haul any amount of spill off the highway in order to eliminate gridlock and restore public safety. – It is noted that CalTrans workers cannot work beyond their level of training or capabilities during hazardous materials emergencies. – Principal tasks for handling a spill include: 1. Safe approach 2. Isolation and containment 3. Notifications 4. Identification and hazard assessment 5. Clean-up and disposal – Depending on conditions, clean-up may be preformed by a qualified person with a minimum training at the First Responder-Operational Level.

State	Guidance
	– The spiller of the material is responsible for mitigation and associated costs. – All CalTrans personnel who may respond to a highway spill emergency must have received training in the Standardized Emergency Management System (SEMS) as appropriate for the level of responsibility. – Responsibilities, training, and reporting requirements according are specifically spelled out for each level of authority. – Clean-up responsibilities are primarily done by specialty contract either through the spiller or through CalTrans. – The *California Maintenance Manual* specifically addresses gasoline spills and recommends not using CalTrans personnel. If it must be done, the following conditions must be met. 1. The clean-up method involves no contact with the liquid or vapors. 2. The spill occurs in a well ventilated outdoor area. 3. Employees will work upwind of the spilled material. 4. Clean-up methods will produce no sources of ignition. – The CalTrans Maintenance program keeps a statewide database to track hazardous spills and costs.

NOTE: Information contained in this table was obtained by reviewing numerous documents, and selecting a cross section of incident management practices implemented and used by agencies. The following documents were used to highlight these practices:

1. *Florida – Guidelines For The Mitigation Of Accidental Discharges Of Motor Vehicle Fluids (Non-Cargo)*[33]
2. *Colorado - Procedures for Hazardous Materials Spills That Occur on State and Federal Highways Within Colorado as a Result of a Highway Transportation Incident*[34]
3. *Texas - Maintenance Management Manual, Texas Department of Transportation, Revised Jan 2008*[35]
4. *Ohio - Ohio Quick Clear Best Practices Guide, March 2003*[36]
5. *Virginia – Guidelines For The Mitigation Of Accidental Discharges Of Motor Vehicle Fluids(Non-Cargo) Prepared By Virginia Department Of Emergency Management In Cooperation With Virginia Department Of Environmental Quality, Virginia Department Of Transportation, and the Virginia State Police. July 2000*[37]
6. California--Chapter D5, Spills of Substance on Highway Rights of Way, California Department of Transportation Maintenance Manual. http://www.dot.ca.gov/hq/maint/manual/Ch_D5.pdf [38]

7.0 CLARIFICATION AND USE OF THE U.S. DOT EMERGENCY RESPONSE GUIDEBOOK (ERG)

The *Emergency Response Guidebook (ERG)*[7] was developed jointly by the U.S. Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico (SCT) for use by fire fighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving hazardous materials. The ERG was developed to 1) aid first responders in quickly identifying the specific or generic hazards of the material(s) involved in the incident, and 2) protect themselves as well as the general public during the initial response phase of the incident. For the purposes of the guidebook, the "initial response phase" is that period following arrival at the scene of an incident during which the presence and/or identification of hazardous materials is confirmed, protective actions and area requirement are initiated, and assistance of qualified personnel is requested. It is not intended to provide information on the physical or chemical properties of dangerous goods. The *ERG* incorporates dangerous goods lists from the most recent United Nations (UN) Recommendations as well as from other international and national regulations.

The *ERG* identifies small spills as those that involve quantities that are less than 200 liters for liquids and less than 300 kilograms for solids; and large spills than involve quantities that are greater than 200 liters and greater than 300 kilograms of solids. The guidebook then further subdivides an incident into daytime and nighttime situations.

Basics of the *ERG*

Information on how to use the *ERG* and other supporting information including definitions and emergency response telephone numbers can be found in the white pages of the *ERG*. Then, the Guidebook is divided into four color-coded sections: yellow, blue, orange and green.

The yellow-bordered pages index the list of dangerous goods in numerical order of 4-digit ID numbers. The user is provided with a corresponding guide number that references safety information in the orange section.

The blue-bordered pages are similar to the yellow section, but they provide an index list of hazardous materials in alphabetical order by name. Again, the user is provided with a corresponding guide number that references safety information in the orange section.

The orange-bordered pages or orange guide is the most important section of the guidebook as this is where all the safety recommendations reside. The orange guide comprises a total of 62 individual guides, each providing safety recommendations and emergency response information to protect yourself and the public. Recommendations include potential hazards, public safety, and emergency response actions.

The green-bordered pages recommend initial isolation or protective action distances for hazardous material spills that involve Toxic by Inhalation (TIH) material, chemical warfare agents, or produce TIH material when coming into contact with water. These distances differ based on whether the incident occurred during the day or at night. They also vary based on the size of the spill. In both the yellow-bordered and blue-bordered sections, an entry highlighted in green means an evacuation area needs to be established and the user should first refer to the green-bordered section.

Clarification of Coverage

The *ERG* was developed to assist responders that may be first to arrive at the scene of a transportation incident involving hazardous materials. For non-transportation related hazardous materials incidents, emergency responders should seek additional information to assist with interpretation of chemical properties and spill dynamics. This information may be acquired by contacting the manufacturer of the product, or by consulting an outside source.

Companion Resources

Numerous references have been developed over the years to assist personnel responding to a hazardous materials spill. Many of these references present important information on strategies and techniques for hazardous materials spills and incident clearance. In addition, many references have been computerized to improve the mitigation time of responders. Potential references that may be used in conjunction with the *ERG* include:

- Bureau of Explosives Emergency Action Guides
- National Institute for Occupational Safety and Health (NIOSH) Pocket Guidebook
- Spill Response Compliance Manual
- Police and Emergency Responders' Hazardous Materials Pocket Response Guide
- Field Guide to Tank Car Identification
- The Merck Index, 14th Edition
- CHRIS Manual (Chemical Hazards Response Information System)
- RIDS (Response Information Datasheets)

Computerized References

- Computer-Aided Management of Emergency Operations (CAMEO) (response.restoration.noaa.gov/cameo).
- Wireless Information System for Emergency Responders (WISER) (http://wiser.nlm.nih.gov/).
- HazMasterG3® (http://www.alluviam.com/community/Products/HazMasterG3/default.aspx).

8.0 REFERENCES AND SUGGESTED READING

1. Ralph Craft, Ph.D, Analysis Division, Office of Information Management, Federal Motor Carrier Safety Administration Office of Information Management. Crashes Involving Trucks Carrying Hazardous Materials, Publication #: FMCSA-RI-04-024, May 2004. Available at http://www.fmcsa.dot.gov/facts-research/facts-figures/analysis-statistics/fmcsa-ri-04-024.htm.
2. Hazardous Materials Incident Summaries and Data. Pipeline and Hazardous Materials Safety Administration (PHMSA), U.S. DOT. Available at http://www.phmsa.dot.gov/resources/data-stats.
3. U.S. Hazardous Materials Regulations (HMR; 49 CFR Parts 100-180). Pipeline and Hazardous Materials Safety Administration, US DOT. Available at. http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=585c275ee19254ba07625d8c92fe925f&c=ecfr&tpl=/ecfrbrowse/Title49/49cfrv2_02.tpl.
4. Federal Highway Administration. Traffic Incident Management Program, Office of Operations. http://ops.fhwa.dot.gov/incidentmgmt/on_scene_ops/policies/hazmat_proced.htm.
5. Clean Air Foundation. http://www.carheaven.ca/about/how.aspx.
6. http://www.sandia.gov/LabNews/LN09-08-00/hybrid_story.html.
7. Emergency Response Guidebook 2008. U.S. Department of Transportation (DOT), Transport Canada, Secretariat of Transport and Communications of Mexico (SCT) and with the collaboration of CIQUIME (Centro de Información Química para Emergencias) of Argentina. Available at http://hazmat.dot.gov/pubs/erg/guidebook.htm.
8. Department of Labor, Occupational Safety and Health Administration. A Guide to the Globally Harmonized System of Classification and Labeling Of Chemicals (GHS). http://www.osha.gov/dsg/hazcom/ghs.html#4.0 (http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html).
9. Hazardous Materials Rulemaking Actions, PHMSA. HM-215I – Hazardous Materials: Harmonization with the United Nations Recommendations, International Maritime Dangerous Goods Code, and International Civil Aviation Organization's Technical Instructions; Proposed Rule RIN 2137-AE16. Available at http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=e186b69dc839b110VgnVCM1000009ed07898RCRD&vgnextchannel=6750d3516bce9110VgnVCM1000009ed07898RCRD&vgnextfmt=print.
10. Hazardous Materials Rulemaking Actions, PHMSA. HM-215F – Revision and Reformatting of Requirements for the Authorization to Use International Transport Standards and Regulations (PHMSA-2005-23141). Available at http://www.phmsa.dot.gov/portal/site/PHMSA/menuitem.ebdc7a8a7e39f2e55cf2031050248a0c/?vgnextoid=2e06b69dc839b110VgnVCM1000009ed07898RCRD&vgnextchannel=6750d3516bce9110VgnVCM1000009ed07898RCRD&vgnextfmt=print.
11. NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response. National Fire Protection Association (NFPA). Available at http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=704.
12. Hazardous Materials Identification System (HMIS®). National Paint and Coatings Association, Inc. (http://www.paint.org/hmis/index.cfm).
13. Hazardous Material Identification Guide (HMIG), Lab Safety Supply, Inc. (http://www.labsafety.com/home.htm).

14. Hazardous Waste Operations and Emergency Response (HAZWOPER) (29 CFR 1910) U.S. Department of Labor, Occupational Safety and Health Administration. Available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9765.
15. Safety and Health Regulations for Construction (29 CFR 1926). U.S. Department of Labor, Occupational Safety and Health Administration. Available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10593.
16. Resource Conservation and Recovery Act (RCRA) (http://www.epa.gov/rcraonline/).
17. Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), (42 CFR, Section §9601 et seq.) Chapter 103, Section 102. US. Code of Federal Regulations. Available at http://www.epa.gov/lawsregs/laws/cercla.html.
18. Protection of the Environment (40 CFR Parts 239 through 282). U.S. Code of Federal Regulations. Available at http://www.epa.gov/lawsregs/search/40cfr.html.
19. Towing & Recovery Association of America. http://www.towserver.net/certification.htm.
20. National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Citation 300.920 OMB Control No. 2050-0141). U.S. Code of Federal Regulations. Available at http://www.epa.gov/fedrgstr/EPA-WASTE/2007/February/Day-14/f2544.htm.
21. Title 33—Navigation and Navigable Waters (33 CFR), Chapter 26—Water Pollution Prevention and Control, Chapter 40—Oil Pollution. U.S. Code of Federal Regulations. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-http://www.access.gpo.gov/uscode/title33/title33.html.
22. Management of Domestic Incidents. Homeland Security Presidential Directive/HSPD-5. The White House, Office of the Press Secretary, February 28, 2003. Available at http://www.whitehouse.gov/news/releases/2003/02/20030228-9.html.
23. Protection of the Environment (40 CFR) Section 110—Discharge of Oil, Section 302—Designation, Reportable Quantities, and Notification, Section 355—Emergency Planning and Notification, Section 372—Toxic Chemical Reporting: Community Right to Know. U.S. Code of Federal Regulations. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=6671500c30800ffd870be76143a8b621&c=ecfr&tpl=/ecfrbrowse/Title40/40cfrv27_02.tpl.
24. Emergency Planning and Community Right-To-Know Act (EPCRA), Emergency Release Notification Requirements. U.S. Environmental Protection Agency. (http://www.epa.gov/OEM/content/epcra/epcra_report.htm).
25. Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-To-Know Act (EPRCA) and Section 112 of the Clean Air Act. U.S. Environmental Protection Agency. Available at http://www.epa.gov/ceppo/pubs/title3.pdf.
26. EPCRA Chemical Reporting Requirements Sections 302, 304, or 313. U.S. Environmental Protection Agency (http://www.epa.gov/oem/content/epcra/index.htm).
27. Protection of the Environment (40 CFR) Section 110—Discharge of Oil. U.S. Code of Federal Regulations. Available at http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=9f6b83193c517a7a707e84ba1afc0fc9&c=ecfr&tpl=/ecfrbrowse/Title40/40cfrv21_02.tpl.
28. http://www.spill911.com/Store/.
29. http://www.absorbentsonline.com/.
30. http://www.npscorp.com/.
31. Occupational Safety and Heath Administration. Permissible Exposure Limits. Available at http://www.osha.gov/SLTC/pel/.
32. Texas Department of Transportation. Occupational Safety Manual (internal document).
33. Guidelines for the Mitigation of Accidental Discharges of Motor Vehicle Fluids (Non-Cargo). State of Florida. June 25, 2004. Available at

http://sunguide.org/docs/trafficincident/Guidelines_for_the_Mitigation_of_Accidental_Discharges_of_Motor_Vehicle_Fluids__Non_Cargo__062504.pdf.

34. Colorado Department of Transportation. Procedures for Hazardous Materials Spills That Occur on State and Federal Highways Within Colorado as a Result of a Highway Transportation Incident, 2005. Available at http://www.dot.state.co.us/environmental/Hazardous/docs/ProceduresHazMatSpillsCOHighways05.pdf.
35. Texas Department of Transportation. Maintenance Management Manual, Revised January 2008. Available at ftp://ftp.dot.state.tx.us/pub/txdot-info/gsd/manuals/mmt.pdf.
36. Ohio Lane Closure Protocol Committee. Ohio QuickClear Best Practices Guide, March 2003. Available at http://i95coalition.org/Incident-toolkit/documents/Guide/Guide_QC_OH.pdf.
37. Prepared By Virginia Department Of Emergency Management In Cooperation With Virginia Department Of Environmental Quality, Virginia Department Of Transportation, and the Virginia State Police. Guidelines for the Mitigation of Accidental Discharges of Motor Vehicle Fluids (Non-Cargo), July 2000.
38. California Department of Transportation. Maintenance Manual-Chapter D5 Spills of Substance on Highway Rights of Way. Available at http://www.dot.ca.gov/hq/maint/manual/Ch_D5.pdf.

9.0 GLOSSARY OF TERMS

Chemical Hazards Response Information System (CHRIS) Code – The *CHRIS Manual* contains 3-letter codes used by the U.S. Coast Guard to identify individual chemicals.

Computer-Aided Management of Emergency Operations (CAMEO) – Developed by NOAA and the EPA, CAMEO is a suite of software programs that supports a number of information management functions, such as retrieval of chemical-specific information to support emergency response activities, threat zone calculation and plotting for risk assessment, organization and management of EPCRA information, and storage and computer display of area maps. More information about CAMEO is available on the NOAA Office of Response and Restoration Web site. (response.restoration.noaa.gov/cameo).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) –The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also known as the Superfund, is a framework for federal involvement in response and clean-up activities following hazardous substance releases. More information is available at http://www.epa.gov/superfund/policy/cercla.htm.

Extremely Hazardous Substance (EHS) – EHS chemicals have been identified by the U.S. Environmental Protection Agency as particular toxic threats. They are listed under EPCRA in the appendices to 40 CFR 355, Emergency Planning and Notification.

Emergency Planning and Community Right-to-Know Act (EPCRA) – The EPCRA (also known as Title III of SARA) defines 360 chemicals as extremely hazardous substances whose release from facilities require planning for and reporting of. More information is available at http://www.epa.gov/emergencies/content/cameo/help/Chapter85.html#913330.

Extremely Hazardous Substances (EHS) – EHS chemicals have been identified by the U.S. Environmental Protection Agency as particular toxic threats. They are listed under EPCRA in the appendices to *40 CFR § 355, Emergency Planning and Notification*.

Facility – Defined in Section 302 of EPCRA as all buildings, equipment, structures, and other stationary items located on a single site or on contiguous or adjacent sites and which are owned or operated by the same person (or by any person who controls, is controlled by, or under common control with, such person). For purposes of emergency release notification, the term also includes motor vehicles, rolling stock, and aircraft.

Hazard Category – Five categories of hazardous chemicals are defined in *29 CFR § 1910.1200*. They include immediate (acute) and delayed (chronic) health hazards as well as fire, sudden release of pressure, and reactive hazards. CAMEO's Chemicals Inventory records contain checkboxes for all of these hazard categories.

Hazard Class – One of nine categories of hazardous materials used on DOT hazard labels. The hazard class indicates the highest hazard of a given material (e.g., Explosives or Poison Gas). While some materials meet the criteria for more than one class, each material is assigned just one class.

Hazardous Material – A substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under section 5103 of Federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Material Table (see 49 CFR 172.1.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of this chapter.

Dangerous to Life and Health (IDLH) –IDLH is a level of concern for adult workers. It is an estimate of the highest concentration from which escape is possible without permanent injury. The IDLHs were established by the National Institute for Occupational Safety and Health (NIOSH). More information is available at www.cdc.gov/niosh.

Level of Concern (LOC) – Exhibits the threshold concentration of an airborne pollutant, usually the concentration above which a hazard to people is believed to exist.

Local Emergency Planning Committee (LEPC) – A committee appointed by the State Emergency Response Commission (SERC), as required by EPCRA. The LEPC's purpose is first to design, then to regularly review and update a comprehensive emergency plan for an emergency planning district. More information is available at http://www.epa.gov/emergencies/content/cameo/help/Chapter85.html#945377.

Lower Explosive Limit (LEL) – LEL, also known as lower flammability limit is the lowest concentration of a flammable vapor in air at which explosion or combustion can occur.

Liquefied petroleum gas (LPG) – LPG is a mixture of hydrocarbon gases used as a fuel in heating appliances and vehicles.

Material Safety Data Sheet (MSDS) – These are product data sheets prepared by the manufacturer or marketer of a hazardous material under Occupational Safety and Health Administration Regulation *29 CFR § 1910.1200*. These data sheets describe products, their hazards, and safe handling and response procedures.

National Fire Protection Association (NFPA) – This is a private, non-profit organization that produces technical data related to fire protection and prevention,

including the widely used "NFPA diamond" containing codes representing chemical hazards. More information is available at www.nfpa.org.

NFPA Diamond – This standard placard is used to identify the level of chemical hazard at a fixed location or in a transported container.

National Institute for Occupational Safety and Health (NIOSH) – This federal agency is responsible for conducting research and making recommendations for the prevention of work-related disease and injury. NIOSH is part of the Centers for Disease Control and Prevention (CDC). More information is available at www.cdc.gov/niosh.

National Oceanic and Atmospheric Administration (NOAA) – NOAA uses the role of the oceans, coasts, and atmosphere in the global ecosystem to make social and economic decisions for the environment. More information is available at www.noaa.gov.

National Response Center (NRC) – This is the central federal clearinghouse for information on hazardous chemical spills and other oil or hazardous substance releases. Responsible parties should contact the NRC (www.nrc.uscg.mil) in order to fulfill reporting requirements for spills of oil and hazardous substances (hotline: 1-800-424-8802).

Occupational Safety and Health Administration (OSHA) – This agency within the U. S. Department of Labor is responsible for ensuring worker safety and health in the workplace. More information is available at www.osha.gov.

Response Information Data Sheets (RIDS) –These are a set of detailed descriptions of chemical properties, hazards, and emergency response information in the OSHA Chemical Library records.

Reportable Quantity (RQ) – The quantity of a hazardous substance or extremely hazardous substance that, if released, must be reported to the National Response Center, the State Emergency Response Commission, and the community emergency coordinator for areas likely to be affected by the release. More information is available at http://www.epa.gov/emergencies/content/cameo/help/Chapter85.html#913379.

State – Any State of the United States, as well as the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Northern Mariana Islands, and any other territory or possession over which the United States has jurisdiction.

State Emergency Response Commission (SERC) – This is a commission appointed by each state governor under EPCRA. A SERC designates emergency planning districts, appoints local emergency planning committees (LEPCs), supervises and coordinates the activities of planning committees, reviews emergency plans, receives chemical release notifications, and establishes procedures for receiving and processing requests from the public for information.

Superfund Amendments and Reauthorization Act of 1986 (SARA) – Title III of SARA is also known as the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA).

U.S. Department of Transportation (US DOT) – U.S. Department of Transportation was established by an act of Congress on October 15, 1966. More information is available at www.dot.gov.

U. S. Environmental Protection Agency (EPA) – The EPA was established by Congress in 1970 to protect human health and the environment. More information is available at www.epa.gov.

U.S. National Response Team (NRT) – This organization is a planning, policy, and coordinating body consisting of representatives from 16 federal agencies with interest and expertise in emergency response to pollution incidents. The NRT provides national level policy guidance prior to an incident and can provide assistance during an incident. More information is available at http://www.nrt.org/.


MSA

U.S. Department of Transportation
Federal Highway Administration

FHWA Office of Operations, HOTO
1200 New Jersey Avenue, SE
Washington, DC 20590

http://ops.fhwa.dot.gov

FHWA-HOP-08-058
January 2009