Developing a Highway Emergency Response Plan for Incidents Involving Hazardous Materials

API RECOMMENDED PRACTICE 1112
THIRD EDITION, NOVEMBER 1997

REAFFIRMED, FEBRUARY 2011

AMERICAN PETROLEUM INSTITUTE

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0 Introduction

Responsible business practice suggests that companies develop programs to respond effectively to transportation accidents involving their hazardous materials. Companies have responsibilities that transcend business considerations and public relations: they have social responsibilities to react promptly and properly to emergencies in which they are involved. The ability to properly respond to transportation incidents should be the concern of those who have title to the materials; those who have custody of them; and those who have responsibility for them through contractual agreements, other kinds of agreements, or some other association with them. In keeping with those responsibilities, API has adopted these recommended guidelines for developing an emergency response plan for transportation emergencies primarily involving liquid hydrocarbons, such as gasoline, crude oil, and other hazardous materials transported in MC 306/DOT 406 and MC 307/DOT 407 aluminum cargo tanks.

Because of increasing demands for the many different products that the petroleum industry manufactures and transports, some government emergency response agencies may have difficulty maintaining the technical expertise needed to deal safely and effectively with transportation incidents involving hazardous materials. Company emergency response plans based on these guidelines assure that technical expertise will be available to mitigate incidents that occur.

A transportation emergency exists when sufficient quantities of hazardous materials escape or threaten to escape from their transportation containers to endanger people, the environment, or property. Emergency response plans should be devised for all hazardous raw materials, intermediate and finished products, and waste materials that are transported (see Section 4.3).

An Occupational Safety and Health Administration (OSHA) standard (29 *Code of Federal Regulations (CFR)* Part 1910.120) requires industry employers whose employees might respond to an emergency (even just as advisors) to have a plan in place. The Environmental Protection Agency (EPA) adopted the same standard for public sector employers in 40 *CFR* Part 311. A Department of Transportation standard (49 *CFR* 130) requires that persons transporting petroleum oils must have a plan in place that prescribes prevention, containment, and response to off-site transportation incidents.

Once a public agency arrives on the scene of a hazardous materials emergency, that agency normally takes the lead in managing the incident. In some states, the law determines who takes charge of an incident. In any case, decisions made during the first 30 minutes of an incident set the stage for subsequent operations. These decisions may determine whether damage to life, property, and the environment will be done in addition to that which will occur strictly as a result of the initial incident. The degree and quality of an affected company's participation in this decision-making process generally depends on whether it has an emergency response plan in place.

As response operations progress, state, federal, industry, and contractor personnel may become involved in addition to the original responders. The extent of their involvement will depend on decisions made within the critical first 30 minutes and the capability of the original responders. During the development and implementation of an emergency response plan, emergency response personnel from local fire and police departments, and other appropriate government entities should be consulted. These civil agencies must be made aware of local industry response plans so that efforts to control an incident can be properly coordinated and confusion about the chain of command can be avoided.

For some types of hazardous materials incidents, public safety agencies may not be able to train personnel in appropriate response techniques. To help fill this gap in knowledge, industry should keep public safety agencies informed of industry's capabilities and should offer to supplement the training of local fire department and other emergency response agency personnel in the safe handling of their products.

1 Scope

This recommended practice outlines and recommends minimum guidelines for developing an emergency response plan for incidents involving hazardous liquid hydrocarbons, such as gasoline and crude oil, and other hazardous materials transported in MC 306/DOT 406 and MC 307/DOT 407 aluminum cargo tanks and for coordinating and cooperating with local, state, and federal officials. These guidelines should be modified to reflect local, state, and federal regulations and individual company legal considerations and response capabilities. The appendixes to this recommended practice outline a highway emergency response plan (Appendix A) and suggest a procedure for removing liquid hydrocarbons from overturned cargo tanks and righting the tank vehicles (Appendix B).

2 Conformance to API's Environmental Mission and Guiding Principles

This recommended practice has been reviewed to determine if it conforms to API's Environmental Mission and Guiding Principles[1]. It has been determined that because this recommended practice directly addresses safety and environmental issues, it does conform to API's Environmental Mission and Guiding Principles. The following guiding principles have been determined to be especially relevant to this recommended practice:

- To recognize and to respond to community concerns about our raw materials, products and operations.
- To operate our plants and facilities and handle our raw materials and products in a manner that protects the environment, and the safety and health of our employees and the public.
- To make safety, health, and environmental considerations a priority in our planning and our development of new products and processes.
- To promptly advise appropriate officials, employees, customers, and the public of information on significant industry-related safety, health and environmental hazards, and to recommend protective measures.
- To counsel customers, transporters and others in the safe use, transportation, and disposal of our raw materials, products, and waste materials.
- To work with others to resolve problems created by handling and disposal of hazardous substances from our operations.
- To participate with government and others in creating responsible laws, regulations, and standards to safeguard the community, workplace, and environment.

3 References

3.1 REFERENCED PUBLICATIONS

The most recent editions of the following standards, codes, and specifications are cited in this recommended practice:

API

RP 2003	*Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*
Publ 2219	*Safe Operating Guidelines for Vacuum Trucks in Petroleum Service*

DOT[2]

Emergency Response Guidebook: Guidebook for First Response to Hazardous Materials Incidents

Research and Special Programs Administration (49 *Code of Federal Regulations*)

EPA[3]

40 *Code of Federal Regulations* Part 311

NFPA[4]

471	*Responding to Hazardous Materials Incidents*
472	*Professional Competence of Responders to Hazardous Materials Incidents*

OSHA[5]

29 *Code of Federal Regulations* Part 1910

3.2 OTHER PERTINENT PUBLICATIONS

In addition to this recommended practice and the documents listed in 3.1, the following documents may be useful in developing a highway emergency response plan. Company product-specific material safety data sheets should be used, as appropriate.

DOT

49 *Code of Federal Regulations* Parts 171 and 172

OSHA

29 *Code of Federal Regulations* Part 1910

4 Developing a Plan

4.1 BASIC PRINCIPLES

4.1.1 General

Handling hazardous materials involves several basic principles. Emergency response plans that take the principles defined in Section 2 into account minimize uncertainty and ensure that decisions resulting in safe operations and efficient handling of emergency situations can be made.

4.1.2 Principles

4.1.2.1 Even when precautions are taken to ensure that hazardous materials are transported safely, an unintentional release is possible.

4.1.2.2 Some hazardous materials are more dangerous than others. The dangers due to exposure to a hazardous material depend on the composition, toxicity, and basic properties, such as flammability, of the material. The effect of a hazardous material usually depends on the type of material (the con-

[1] Charter and Bylaws of the American Petroleum Institute, American Petroleum Institute, Washington, D.C., April 3, 1991.

[2] U.S. Department of Transportation. The *Emergency Response Guidebook* and the *Code of Federal Regulations* are available from the U.S. Government Printing Office, Washington, D.C. 20402.

[3] Environmental Protection Agency. The *Code of Federal Regulations* is available from the U.S. Government Printing Office, Washington, D.C. 20402.

[4] National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, Massachusetts 02269-9101.

[5] Occupational Safety and Health Administration, U.S. Department of Labor. The *Code of Federal Regulations* is available from the U.S. Government Printing Office, Washington, D.C. 20402.

centration, toxicity, and dispersion), the degree of exposure, and the susceptibility of the individual exposed (the dosages received, routes of contact, and conditions of exposure).

CAUTION: The threats of hazardous materials may range from immediate injury, such as burns from acids or caustics, to death and may include long-term injuries, such as future illnesses, due to the inhalation of toxic fumes or vapors. Emergency response personnel must always approach an incident involving hazardous materials with caution.

4.1.2.3 Response personnel must focus on the solution to the emergency. The primary goal is to reduce or eliminate existing and potential dangers.

4.1.2.4 If a container is stressed beyond its limits, it will rupture and release its contents. When a container ruptures or becomes stressed or deformed due to heat or fire, a change will usually occur in the physical state of the contents. If contents are released, they must be contained and the original containers must be replaced, repaired, or resealed. If contents are not released, containers must be inspected for points of stress to ensure that they do not subsequently become defective.

4.1.2.5 Containers have to be broken, punctured, or breached in some other way for hazardous materials to be accidentally released. When a breach occurs, the contents can escape, and problems may arise. Each type of container will behave differently according to its structure and contents: cylinders may split, drums may leak, and tanks may rip apart, and any type of container may be punctured.

4.1.2.6 The damage due to an accidental release depends on the amount and type of hazardous materials released. Thus, liquids will spread out and usually affect larger areas than solids. If liquids vaporize, the resulting gases may disperse and affect an area larger than the area the liquids would have affected. If liquids or solids get into waterways or sewers, large areas can be affected in short periods of time.

4.1.2.7 The dispersion patterns of a hazardous material are determined by the nature of the material and the prevailing environmental conditions. When a container is broken, punctured, or breached in any other way, whether and how its contents will be released depend on the physical characteristics of the material and the actions taken to prevent its escape. If individuals making decisions are unsure of the proper course of action, they must get technical advice before proceeding.

4.1.2.8 When dealing with flammable or combustible vapors, caution should be taken to protect the accident scene from ignition sources. Danger from these sources could be some distance from the release scene and pose a threat dependent on the dispersion patterns of the vapors and the path they travel.

4.2 COORDINATION WITH LOCAL EMERGENCY PLANNING COMMITTEES, LAW ENFORCEMENT AGENCIES, AND FIRE DEPARTMENTS

Any emergency response plan must recognize that incidents can happen anywhere in the transportation system—at the loading facility, anywhere in transit, or at the delivery point. Planners must be aware of the capabilities of public emergency response units and of the preparations made by communities to deal with incidents. All the states have State Emergency Response Commissions as required under Title III of the Superfund Amendments and Reauthorization Act. Many communities also have local emergency planning committees (LEPCs). LEPCs may have resources or completed plans that require coordination with company plans. Many companies have employees that serve on LEPCs. Having a regular working relationship with community leaders and emergency responders will make communication during an incident easier and result in a more effective response to an incident.

By federal regulation, both industry and community emergency responders must use the Incident Command System (ICS). Training in and use of ICS will ensure a more effective response to an incident. Any individual who is reasonably expected to be involved at the scene of an incident must understand how to function within ICS.

In coordination with industry, major fire departments, and trade associations, NFPA has developed NFPA 471, which is widely used by fire departments in developing plans and policies. Standards such as NFPA 471 provide a common technical language, definitions of levels of response, and guidance on appropriate personal protective equipment and suggest incident mitigation and decontamination techniques. NFPA 471 also provides a list of references and organizations that may be useful in developing company emergency response plans.

4.3 EMERGENCY RESPONSE COMMUNICATION STANDARDS

DOT requires that any company offering hazardous materials for transportation must provide a 24-hour emergency response telephone number. The telephone must be monitored at all times by a person who knows the characteristics of the hazardous material being shipped, who has comprehensive emergency response and accident mitigation information for the material, or who has immediate access to a person with that information. The 24-hour phone number must appear on the shipping papers. To comply with the 24-hour telephone requirement, some companies use the Chemical Transportation Emergency Center (CHEMTREC), which was established by the chemical industry and is administered by the Chemical Manufacturers Association.[6] To meet the

requirement, companies may instead use other services or maintain their own 24-hour telephone service.

DOT also requires that emergency response information be maintained aboard transportation vehicles during transportation and at facilities where hazardous materials are loaded, stored, or otherwise handled. Some companies place copies of the DOT Emergency Response Guidebook in trucks and at terminals and service stations to satisfy this requirement. Minimum requirements for emergency response information are described in 49 *CFR* (also see 49 *CFR* 130 Oil Spill Prevention and Response Plans).

4.4 SETTING PRIORITIES

An effective emergency response plan observes the following priorities, which are listed starting with the highest priority:

a. The safety of the public in general.
b. The safety of on-scene response personnel.
c. The safety of other support personnel at or near the scene.
d. The protection of the environment.
e. Notification of government and civil agencies not only of what is legally required but also of what good judgment dictates.
f. Once the emergency phase has been dealt with, continuing cleanup and final resolution of the incident, which is not closed until the condition of the site is at least as good as it was before the incident.

4.5 TRAINING PERSONNEL

The company developing a response plan is responsible for training its own personnel in the proper techniques and safety procedures to be used in handling company products. The company itself may train its personnel, or it may select an outside contractor or school for the training. The time and expense required to develop company training programs should be evaluated against the services provided by a private training facility that is willing to tailor courses to the specific work of a company.

Each driver must be familiar with the hazardous characteristics and the emergency response procedures of the materials they are transporting as required by 49 *CFR* 172.700 (HM-126F). Recurrent training is required at a minimum of every three years. The driver must receive hazard awareness training before transporting a new hazardous material.

Title 29 of the *CFR* provides specific requirements for emergency response plans and for training employees who will respond to incidents involving hazardous materials. Part 1910.120 of 29 *CFR* covers hazardous waste operations and emergency response and includes requirements for the emergency response to the release of hazardous materials. Requirements for emergency response operations conducted by company employees are found in 29 *CFR* Part 1910.120(q). What constitutes an emergency response is defined in 29 *CFR* Part 1910.120(a)(3).

In cooperation with the International Association of Fire Chiefs,[7] API, Chemical Manufacturers Association, major fire departments, and insurance companies, NFPA has developed standards for the professional competence of responders and published them in NFPA 472. Standards are provided for each level of emergency response training:

a. The first-responder awareness level.
b. The first-responder operational level.
c. The level of hazardous materials technician.
d. The level of hazardous materials specialist.

In addition to providing standards for training responders, NFPA 472 provides guidance on hazardous materials management and incident command and the roles of private and government sector incident technicians and managers.

Emergency response instructors must be qualified to teach by training, with academic credentials or professional certification, or by experience. Instructors must know tank truck and container design, product removal methods, containment methods, personal protective equipment, the properties of a variety of hazardous materials, and regulations and laws related to hazardous materials and spills.

Employees who are selected and subsequently trained to participate in emergency response activities should not only be properly trained in technical procedures but also be thoroughly familiar with the company's policies and procedures for responding to emergency incidents.

4.6 USE OF CONTRACTORS

The use of contractors, qualified by training and experience, as initial responders to transportation-related emergencies involving a tank truck incident may be a prudent and acceptable way to satisfy, supplement, or enhance a company's response to an incident. In certain instances, the use of skilled contractors may minimize response time.

The use of a contractor requires the following:

a. That verifiable documentation and assurance that the contractor meets all the OSHA emergency responder requirements are available.
b. That the contractor has a proven track record regarding transportation emergency first-responder activities and can provide indemnification to the satisfaction of the purchaser of the services.
c. That the contractor's activities be monitored by well-trained and knowledgeable company personnel.

[6] Chemical Manufacturers Association, 2501 M Street, N.W., Washington, D.C. 20037.

[7] International Association of Fire Chiefs, 1329 18th Street, N.W., Washington, D.C. 20036.

d. That the contact numbers and backup responders be periodically verified for accuracy and abilities.

4.7 EMERGENCY RESPONSE EQUIPMENT

4.7.1 General

The availability and readiness of emergency equipment and services can minimize delays. Plans for the use of equipment and services in a highway hazardous materials incident must be made in the same manner as plans are made for any other infrequent but foreseeable emergency. All equipment should be compatible in design and capacity and resistant to the chemical properties of the hazardous materials that may be encountered. Plans for decontaminating equipment and personnel must be considered. Depending on the substances involved, decontamination prior to leaving the emergency area may be necessary.

The equipment needed depends on the situation. However, equipment can be classified into three broad categories:

a. Personal protective equipment.
b. Special equipment.
c. Equipment used to identify hazards.

4.7.2 PERSONAL PROTECTIVE EQUIPMENT

Emergency plans should include a clear, written policy on the wearing of protective equipment and clothing and a program for training personnel in their use. Protective equipment and clothing can be particularly important when the specific properties of hazardous materials are unknown. Protective equipment and clothing, including head and body protection, respiratory protection equipment, impervious boots and gloves, and other items specific to the products involved and the situation at hand, can prevent vapors, liquids, and solids from contacting the skin or entering the respiratory system. Protective clothing must be constructed of materials that are resistant to anticipated hazards and must protect areas and functions of the human body susceptible to these hazards.

Some protective materials are intended to provide short-term protection. Long-term protection can only be provided by other special protective materials. The selection and use of protective clothing and devices depends on what hazardous materials the response personnel are exposed to and on the uncertainty of the identities of the hazardous materials. Until all the hazards of the substance are understood, the possibility of the worst case should be assumed.

Except during the initial phase of a response, when much can remain unknown and rapid action may be required despite unknown hazards, the use of protective clothing and devices should be tailored to the potential hazards of the situation. For example, in dealing with toxic products, for which ingestion, inhalation, or skin contact may be harmful, protective devices may include a positive-pressure air-supplied breathing apparatus or a vapor-tight suit with a self-contained breathing apparatus. Emergency responders are required by 29 *CFR* Part 1910.120(q) to be able to select and use proper personal protective equipment.

In designing personal protective equipment guidelines, the health, safety, and environmental regulations of federal, state, and local entities should be reviewed and complied with. OSHA permissible exposure limits (PELs) are legal limits and must be observed (see 29 *CFR* Part 1910.1000 and other sections of 29 *CFR* Part 1910, Subpart Z, for standards on specific substances). If exposure conditions warrant personal protective equipment, as when the PEL is likely to be exceeded, appropriate equipment must be used. The OSHA respiratory protection standard in 29 *CFR* Part 1910.134 describes the legal requirements for using respirators. Company-prepared material safety data sheets offer guidelines for respiratory protection and for recommended limitations on exposure to specific substances.

4.7.3 Special Equipment

Shippers and carriers with highway emergency response teams should have access to tools and equipment that are dedicated to emergency response and suitable for the products typically carried. Relying on plant equipment for emergency response could preclude quickly meeting an off-site need when the equipment is being used in the plant. However, this should not rule out using response equipment as backup equipment in case of a plant emergency or occasionally otherwise using or testing the equipment.

When establishing or updating an inventory of special emergency response equipment, each company should consider the emergency situations and the particular types of products that it is likely to encounter. The nature of potential incidents, climatic conditions, the speed of response, the availability of specialized contractors and equipment, and any mutual assistance agreements should also be considered. If outside contractors are employed, their personnel and equipment capabilities, response times, and response experience must be evaluated in advance.

A means of transporting supplies and equipment to the scene must be provided. A well-designed and properly organized response vehicle allows swift and easy access to all equipment. The response vehicle must be available on a 24-hour basis and should be tested regularly to minimize the possibility of delays due to mechanical problems during an emergency response.

Experience has shown that certain supplies and equipment are used more often than others. Supplies such as batteries may need to be replaced frequently to ensure workability. What supplies and equipment are required, however, depends on the circumstances surrounding each incident. Since a piece of rarely used equipment may be called for in an emergency response, each company should review for completeness its own equipment capabilities and the equipment capabilities of

outside contractors or other parties with whom it may contract for assistance.

4.7.4 Equipment For Identifying Hazards

Emergency equipment includes instruments and devices used to identify the hazards of particular toxic substances. The calibration capabilities and limitations of this equipment must be understood by response personnel. Thus, it should be recognized that an oxygen meter indicates only the level of oxygen, not that of explosive vapors; an explosimeter measures the percent of hydrocarbon vapor in the air. Analytic or spectrographic methods of evaluation can be used. Some instruments sample contaminated air and compare the sample with specific reactive substances to identify contaminants. All instruments must be maintained, calibrated, and ready for use.

There are no quick and simple field methods for identifying incompletely described hazardous materials. If the hazards of a material are not known, every effort must be made to access knowledgeable persons and appropriate sources of information, such as the shipper, the transportation agency, the consignee, and the documentation accompanying the shipment, to determine the nature of the hazard.

4.8 PREPARING HAZARDOUS MATERIALS DRIVERS FOR EMERGENCY SITUATIONS

A driver who is properly trained in emergency procedures is one of the most important assets a company can have at the scene of an accident. It is essential that all hazardous materials drivers receive training as described in Section 4.5 in the initiation of protective steps in case of an accident. All trucks should be equipped with spill kits for minor leaks and spills, hazard information and emergency response phone numbers on the shipping papers. Before getting out of the cab and if physically able, the driver is responsible for shutting off the truck engine and lights and for taking any other special precautions identified by the driver's employer. The driver should call or have someone else call local police and fire agencies and the company management and/or a service such as CHEMTREC (depending on company policy) to report information regarding the tank truck's cargo, condition, and location and should direct anyone in the area well away from the accident scene.

If the area might contain flammable or toxic vapors, the driver must take steps to keep unauthorized personnel from entering the area. All sources of ignition—such as vehicles with engines running or with hot exhaust systems, flares, cigarettes, and flash cameras—must be kept out of the immediate area. Because the risk of ignition increases with the amount of material spilled and it may be possible to stop a leak or flow immediately, the driver must inspect the area to assess the situation. After assessing the situation, the driver will be able to report the situation to the first public response agency arriving at the scene. The driver or another carrier representative may need to remind the responder of the importance of containing any spilled or leaking product within a limited area. The driver may also need to remind the responder that although flushing spilled material with water may move it away from the tanker, it can create more vapors, endanger a wider area, create environmental problems, and force the material into contact with some reactive agent. The driver must also inform on-scene authorities of any emergency response capabilities provided by the driver's employer to recover the product, clean up the area, and remove the vehicle.

4.9 PROTECTING PERSONNEL

The emergency response plan must include a step that establishes control of the area and restricts entry by personnel who are not directly involved in the response or cleanup. This step must be taken in cooperation with public safety officials on the scene. Police and barricades can be used for crowd and traffic control to ensure that only people and equipment required to deal with the emergency are in the immediate area. Personnel and equipment must also be restricted from any area on the periphery of the emergency scene that might be affected if conditions change and the danger escalates.

Emergency plans should provide for evacuating the area if necessary. A perimeter must be established; it can be established by roping off or marking the affected area with materials such as plastic fire line tape. The perimeter will serve to alert those who may not otherwise recognize the dangers associated with hazardous materials. Unauthorized persons who refuse to leave the area must be removed by law enforcement personnel if necessary. Personnel assigned to clean up should never enter the hazardous area until it has been determined that risks have been minimized. Qualified persons using explosimeters or other equipment must periodically check for the presence of flammable vapors or other toxic substances until the hazards are eliminated.

Emergency planners must consider the requirements for prompt medical assistance and identify available services. The sooner that medical attention can be provided to those in need, the more likely it is that harmful effects of exposure to the spilled materials can be reduced or eliminated.

4.10 NOTIFICATION REQUIREMENTS

Both DOT and EPA have notification requirements for incidents resulting in injuries, loss of life, property damage, evacuation of the public, the closing down of major transportation arteries or facilities, or spills of hazardous materials, including hazardous waste and hazardous substances. States and localities may also have notification requirements. Effective company emergency response plans designate who is responsible for which reporting requirement.

4.11 WORKING WITH THE MEDIA

Working with the news media is an important and necessary function in handling an emergency. The media keeps the public informed about pertinent events. The public has the right to know about incidents that may cause injury, property damage, environmental exposure, or public inconvenience.

The media can perform important functions, such as keeping rumors from spreading and preventing a minor situation from being exaggerated. In addition, if an evacuation or similar action is required, the media can quickly convey this information to the public.

Emergency plans should be developed with the understanding that the media will be a factor in any emergency situation. One member of the response team should be designated as the media contact. The company media contact must coordinate with local emergency response public information officers. The media contact should provide as much information as possible about the situation and what is being done by the response team. The media contact can communicate the company's concern for the safety of people and the protection of the environment and can provide information on what actions have been and will be taken to protect people and the environment. The media contact must be able to do the following:

a. Take control of the interview.
b. Provide an accurate account of the status of the incident and the response to it by providing facts and, if possible, by accenting the positive.
c. Provide information on injuries and fatalities, including times, places, and numbers injured.
d. Provide escorts for media personnel if the situation permits observation of the operation and if safety would not be compromised.
e. Ensure that information released is coordinated with that released by public officials.

The representative must not do the following:

a. Shut the media out.
b. Speak off the record.
c. Speculate on the causes or costs of an incident.
d. Speculate that negligence or fault may have led to the incident.
e. Release the names of any persons who have been injured or killed, pending notification of their families.
f. Make or repeat negative comments.

4.12 PROTECTING THE ENVIRONMENT

4.12.1 Immediate Response Phase

Response plans include contingency plans to provide responders with appropriate directions for and information on handling unintentional discharges of hazardous materials and for notifying the appropriate authorities. During some incidents, fire departments have responded to spills by washing the products into nearby storm sewers or roadside ditches. In many cases, washing the spill or residue into a sewer system may increase the hazard and may be a violation of federal, state, or local law. The fire department's actions will not relieve the company from liability for damages caused by the spill. Also, washing the material may cause it to reach a nearby body of water and, depending on the type of material and the quantity reaching the surface water, may harm aquatic life and human health and violate federal or state law.

A procedure more appropriate than washing the material is to contain it by constructing a retaining dike or containment basin. Simple dikes may be constructed of any readily available absorbent material. If soil is used, it must be checked frequently to determine whether permeation is occurring. Plans should include replacement of permeable dike material. Also, several types of commercially available quick-setting foams may be used to construct dikes. The inclusion in plans of simple pictures of dikes and berms that can be constructed or erected in the field is helpful for team reference.

If responders elect to contain hydrocarbons on land, potential fire and explosion hazards must be considered. If the product presents no immediate fire or explosion hazard, the best response is to contain the product and remove it as soon as safely possible. If vapors are being released, the appropriate response is to cover the material with foam.

4.12.2 Post-Emergency Cleanup Phase

One of the essential elements of a response plan is a flexible yet detailed plan to recover and clean up the spilled material. Which steps in the post-emergency cleanup plan are taken depend on the answers to the following questions:

a. What product has been or might be released from its container, and what volume of the product can be expected to be released?
b. If the product is released, where will it go?
c. Are any critical environmental areas that require special protection located nearby?
d. What personnel are available to handle the cleanup?
e. What control and removal equipment are available?
f. What outside contractors are available?
g. How to dispose of hazardous waste?

The equipment and materials available for the control and cleanup phase include booms, skimmers, sorbents, and chemicals. Chemicals, biodegradation agents, and dispersants must not be used unless approved by appropriate government agencies.

In recent years, numerous contractor companies have been formed to assist in hazardous materials cleanup operations. These companies range from very small organizations with limited equipment to large, well-staffed, and well-equipped

companies capable of handling major incidents. Prearranging for certain kinds of contract services may be appropriate.

Note: Only contractors who are aware of the requirements of 29 *CFR* Part 1910.120 and who have the expertise to comply with them should be selected.

Disposing of debris from highway incidents may require approval by a state, county, or local agency. If a contract disposal service is employed, it should be investigated to ensure that it is financially responsible, technically capable, covered adequately by insurance, reputable, and that it has the required permits to transport and dispose of contaminated, toxic, or hazardous materials.

4.13 POST-RESPONSE ACTIVITIES

A post-incident review provides information that will help determine whether correct actions were taken during the incident and what changes to the emergency response plan are required. An incident log maintained during response activities can offer valuable information to the review. After the incident, the log should be reviewed to help response managers:

a. Determine whether similar incidents can be prevented.
b. Check the efficiency of response personnel and equipment.
c. Ensure that the proper governmental notifications were made.
d. Communicate the findings of the post-emergency and cleanup phase to all interested parties.
e. Audit the strengths and weaknesses of the emergency response plan.
f. Recommend changes to improve the emergency response plan.
g. Share “lessons learned” with other response teams and related parties.

During the review of the incident and emergency response activities, the consequences of the incident itself should be distinguished from the effects of the emergency response to the incident.

4.14 THIRD-PARTY RESPONSES

If an organization has experience in responding to certain types of transportation emergencies, it may be asked to provide emergency assistance in an incident although it has not been directly involved.

Third-party responses are appropriate if any of the following is true:

a. The third party is trained in the nature of response required.
b. The third party is knowledgeable about the products involved.
c. The third party has entered into an agreement to provide a response based on specific products or classes of products.
d. Public authorities have directed the third party to assist because the response is urgently needed.

Before an emergency arises and an organization participates as a third party, it must establish an internal legal policy for a third-party response. It may be appropriate for company legal officers to be advised of specific requests for assistance.

Third-party responses are often due to participation in mutual aid agreements. These agreements are justified primarily because:

a. A third party can expect reciprocal services from other participants in the mutual aid agreement in future emergencies.
b. Mutual aid agreements can be cost effective for emergencies in which rarely-used equipment is needed by, and shared, among participants.
c. Mutual aid agreements can be beneficial when special technical knowledge is required.

The assistance of a third party, however, may be sought without prior agreement or understanding, at the request of fire and police departments. Usually, the primary responsibility for emergency response rests with the transportation company involved, the owner of the cargo, and public safety agencies such as fire departments, state agencies, and the U.S. Coast Guard. Third-party involvement should be avoided when the third party has insufficient knowledge or ability to respond effectively. However, under certain circumstances, failure of the third-party company to assist when asked can reflect adversely on it. It may be the only entity available and qualified to act. The potential third party must balance these factors against possible risks, liabilities, and the diversion of resources, especially if any of the following is true:

a. An emergency threatens public safety.
b. No other entity is available soon enough and qualified to handle a certain aspect of the problem.
c. Considering the safety of third-party personnel, refusal to help would be socially irresponsible.

4.15 LEGAL CONSIDERATIONS

On-scene response personnel must understand that their role is to minimize damage and risk associated with the incident. In addition, they need to be especially aware of the impact their actions may have on any subsequent legal action. On-scene response personnel must take care neither to express judgments on responsibility for the incident nor to comment on the liabilities arising from it. Accident liability and liability arising from an improper or inadequate response are significant concerns. An important principle for all on-scene response personnel to remember is that individuals may be judged by the courts as experts and would be expected to

have performed as such in an emergency. Therefore, response personnel must be thoroughly trained and under the direct supervision of a qualified person with the required knowledge, judgment, and experience.

If actions during a response are based on technically and legally sound decisions, personnel may reasonably expect that "good Samaritan" laws will protect them against liability claims. Since some states do not have good samaritan laws and laws differ from state to state, it is wise to check with your legal counsel for advice on liability.

5 Conclusions

The success of a company's emergency response plan depends on the commitment of its management to safety and environmental protection. In addition to the development of an emergency response plan tailored to the company's needs, the proper training of response personnel is required. Periodic drills and retraining with public safety officials will encourage a climate of cooperative liaison, promote effectiveness, and may be required to retain credentials. Company-owned or contractor-owned equipment must be maintained for immediate access and use. A policy concerning the company's response to incidents involving outside parties and to outside requests for assistance must be established. All aspects of the emergency response plan must be periodically examined and revised.

APPENDIX A—OUTLINE OF A HIGHWAY EMERGENCY RESPONSE PLAN

A.1 Notification of the Incident

An effective communication system is vital. Key factors to be considered when developing a communication system include:

a. The accessibility of all shipping and product information.
b. The ability to contact response vehicles.
c. The 24-hour ability to receive calls, with authorization to accept collect calls made by:
   1. CHEMTREC or similar organizations.
   2. Fire and police departments.
   3. Employees involved in the incident.
   4. Passing motorists or the general public.
d. The 24-hour ability to promptly locate and inform company personnel authorized to act (e.g.: a designated management coordinator).
e. The ability to maintain communications and action logs.
f. The ability to meet federal, state, local, and internal reporting requirements, including those concerning phone numbers, the information to be reported, the time frames for reporting, and follow-up reporting.

A.2 Management Coordinator

A prompt assessment of the situation is critical to an efficient response. The assessment is best handled by a trained, experienced employee, called the management coordinator in this text. The primary management coordinator must be specifically designated in the plan and must have a designated backup or a prearranged series of alternates. The responsibilities of the management coordinator include the responsibilities to:

a. Determine the level of response required, based on available information.
b. Authorize the activation of the emergency response plan and the people identified in the plan as on call (subject to activation by the management coordinator), including but not limited to the following people:
   1. Local area supervisory personnel (to report to the scene).
   2. Product, equipment, and/or engineering specialists.
   3. Safety, industrial hygiene, environmental, and/or spill advisors.
   4. Outside contractors for emergency response, spill cleanup, crane operation, or other duties.
   5. Insurance investigators, legal advisors, and public relations personnel.
c. Coordinate response activities.
d. Ensure that company procedures and policies are followed.
e. Maintain lines of communication with upper management.
f. Ensure timely notification of appropriate federal, state, and local government agencies.
g. Ensure compliance with the notification requirements of local, state, and federal laws and regulations such as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Clean Water Act, and the hazardous materials regulations.
h. Maintain a detailed log of the incident and the responses to the incident for documentation and post-incident review.
i. Advise CHEMTREC of progress and action taken (if CHEMTREC initiated the call).
j. Coordinate communication with the media and local public information officers.

A.3 Emergency Response

A.3.1 GENERAL

A company can offer assistance in the event of an emergency in three ways:
- Give off-site advice to public agencies handling the situation.
- Respond on-site in an advisory capacity.
- Offer active participation of personnel, equipment, supplies, or facilities to those handling the situation.

A.3.2 PROVIDING OFF-SITE ASSISTANCE

When requested to provide off-site assistance, the management coordinator does the following:

a. Determines whether advisory assistance via telephone will suffice, and, if it will suffice:
   1. Handles the situation personally.
   2. Assigns tasks to responsible employees who have the required expertise and are identified in the emergency response plan.
b. Monitors the situation and remains ready to increase the level of response, if necessary.
c. Keeps management informed of the status of the situation.

A.3.3 PROVIDING ON-SITE ASSISTANCE

When requested to provide assistance on-site, the management coordinator determines whether the situation is serious enough to require personnel at the scene. In case it does, the assistance can be offered at the advisory level or the hands-on level.

A.3.3.1 The Advisory Level

If practical, the management coordinator may advise on-site or provide company employees and experts to advise on-site. If company employees or experts are deployed, they pro-

vide on-site advice and professional expertise to non-company personnel handling the situation.

A.3.3.2 The Hands-On Level

The management coordinator offers the on-scene incident commander active assistance in controlling the situation. If the offer is accepted, company employees work actively within the incident command system to:

a. Assure the safety of on-site personnel.
b. Protect the public.
c. Protect the environment.
d. Assist with media communication.

With cooperation and advice from the management coordinator, the incident commander initiates a plan of action coordinated with public safety agencies and deploys employees to stabilize the situation by:

a. Identifying product safety requirements.
b. Stopping leaks.
c. Containing and/or recovering spilled material.
d. Recovering equipment.
e. Restoring the environment to the extent possible.

A.4 Post-Response Activity by the Management Coordinator

Post-response activities should include an evaluation of actions taken and an evaluation of response plans. The management coordinator should consult the incident log to:

a. Ensure that all government entities were properly notified.
b. Determine whether similar incidents can be prevented.
c. Audit the efficiency of response personnel and equipment.
d. Determine the strengths and weaknesses of the emergency response plan.

All findings and any recommendations for changes to improve emergency readiness should be reported to upper management (also see Section 4.13).

APPENDIX B—SUGGESTED PROCEDURE FOR REMOVING LIQUID HYDROCARBONS FROM, AND RIGHTING OVERTURNED, TANK VEHICLES

B.1 Cargo Removal

If a tank vehicle has rolled over, the proper cargo recovery method depends on the position of the cargo tank, the type of material that was being transported, the availability of resources, weather, and the terrain. Methods of removal may include pumping off through the discharge lines; removal via internal valves; removal through a dome funnel; pumping off through the vapor recovery system; and, if the tank is aluminum, drilling through the tank shell.

Although battery cables should not be arbitrarily cut at accidents involving cargo tanks, battery cables should be checked as sources of potential ignitions. To ensure safe working conditions, the area must be checked for lower explosive limits (LELs), oxygen, and toxic vapors such as hydrogen sulfide or benzene. Thereafter, the surrounding area must be rechecked to maintain safe conditions. No matter what removal method is employed, the vehicle must be grounded and bonded. The tank trailer is grounded to a rod by connecting the cable first to the trailer and then to the rod. Bonding must be provided before any flow of product from one container to another is initiated. The pump-off vehicle, hose couplings, downspouts, and recovery pans and tubes should each be bonded by connecting a bonding cable from the tank truck to the item. (For information concerning grounding and bonding, refer to API Recommended Practice 2003.)

Prior to product removal, the tank should be blocked and braced to prevent it from moving while the center of gravity is changed during the pump off process. Once a method of removal has been selected, one of the many means of transferring hazardous liquid cargos—including vacuum trucks, vehicles with power-take-off pumps, and portable pumps driven by air or water—must be selected. With proper precautions, gasoline, diesel, or explosion-proof electric pumps may be used only if other pumps are not available. For certain petroleum liquids, the pump-off rate must be restricted to 100 to 150 gallons per minute to reduce the possibility of static charge buildup. In all cases, the flow rate must be controlled so that enough air pressure is maintained in the compartment to prevent tank collapse.

CAUTION: Regardless of the type of any piece of equipment used, it must be bonded. Equipment must be kept upwind of any potential source of ignition. The site should be monitored with an explosimeter to help maintain maximum safety precautions during the product transfer.

B.2 Removal Methods

B.2.1 REMOVAL VIA A DRILLED HOLE

Normally, the fastest and one of the safest methods of removing a flammable liquid from an MC 306/DOT 406 or MC 307/DOT 407 aluminum tank trailer is to drill one or more holes in the shell and remove the liquid through them. This method is relatively simple and does not require detailed knowledge of tank truck valving systems. Each hole is made in the aluminum shell with a 3-inch hole saw using either an air-powered drill or a water-powered drill. Electric-powered drills are sources of ignition, and their use is prohibited around flammable vapors. The application of water while drilling and the use of a sharp hole saw provide an acceptable safety margin. An air drill requires appropriate lengths of air hose, a pressure regulator, and a source of air that can generate 100 pounds per square inch of pressure. When operating at a pressure of 90 pounds per square inch, a typical air drill requires 4 cubic feet per minute of air. If a diesel-powered generator is used to provide compressed air, positioning it properly is critical, as fugitive vapors of flammable products must not be allowed to enter diesel engine air intakes.

To avoid drilling into compartment baffles, each hole is drilled at the highest point in line with a dome cover. When an air drill is being used, a water stream is applied to cool the metal, lubricate the bit, and wash away shavings. The drill method provides the following advantages:

a. Each hole requires only 1–2 minutes to drill.
b. No additional product is spilled.

After the hole or holes have been drilled, a pump-out tube for each hole is bonded to the tank shell and inserted into the hole. Once the cargo is removed, a tapered wooden plug (bung) is driven into each hole. If the tank is to be put back in service, each aluminum plug that has been removed from the shell to form a hole is saved for welding back onto the tank.

B.2.2 REMOVAL VIA THE UNLOADING LINES

If a trailer is lying on its side and the regular discharge lines are undamaged and facing downward, product can be removed through the discharge lines. A bottom-loaded trailer will have product in the discharge lines that must be drained into a grounded container before pump-off is initiated. A 90-degree quick coupler is fitted onto the discharge outlet, and a pump-off hose is attached to the coupler. On trailers with multiple compartments, one internal valve at a time must be opened to allow product flow from each tank compartment.

CAUTION: The vent must be blocked off or kept closed; otherwise, opening the internal valve will open the vent, allowing liquid to enter the vapor recovery system or spill out of the vent opening. On units with air-activated internal valves where the air line from the internal valve to the vent is outside the tank, the line must be blocked off and disconnected, and a source of compressed air at a pressure of approximately 50

pounds per square inch must be used to open the valve. Tire air or regulated bottle air from self-contained breathing apparatus on an emergency vehicle will normally provide sufficient air for this purpose.

B.2.3 REMOVAL VIA THE VAPOR RECOVERY LINES

If a vehicle's roll-over rail is undamaged and the vapor recovery system is accessible, product can be safely removed through the vapor recovery system. The vapor recovery outlet is connected to the pump-off equipment. With the hoses and connections in place, the vent is opened, allowing product to flow through the vapor recovery system. The remainder of the product can be pumped out the vent opening, through the dome, or through the internal valve opening using the grounded downspout or grounded suction hose.

If the vapor recovery piping or the roll-over rail has been damaged in any way, the vapor recovery system cannot be used for product recovery. The vapor recovery system can be checked for leaks by connecting the vacuum truck to the vapor outlet. If the system holds 10 inches of vacuum for 1 minute, it is intact and can be used for product recovery. Do not use this method if the rubber connecting boot between the vent and rail appears to be damaged or in poor condition unless appropriate repairs are made prior to pumping.

B.2.4 REMOVAL VIA THE INTERNAL VALVE

If a tanker has been completely overturned, the product can be recovered by removing the internal valve and pumping the product out through the valve opening: more specifically, by disconnecting the victualic coupling, removing the valve bolts, pulling out the valve, and pumping the product out through the bonded downspout. On a bottom-loaded trailer, the discharge lines or piping may be full. Before removing the coupler, the lines must be drained back into the tank by opening the internal valve.

CAUTION: The vent will be open unless it has first been disconnected.

When a unit is on its side, the product can be removed via the internal valve if the product has been pumped down to or below the level of the valve. Regardless of whether they face upward or downward, the discharge lines contain product and must be drained as described in the preceding text.

Once the discharge lines have been drained, they may be unbolted from the internal valve. A special adapter is required to connect the internal valve to the pump-off hose. With the vent blocked off and the internal valve opened, product is pumped off to below the valve level or until suction is lost. The remainder of the product in the tank is pumped out through the grounded suction hose or downspout. The internal valve must be reinstalled before the unit is righted.

B.2.5 REMOVAL VIA THE DOME COVER AND A FUNNEL

A tank compartment can be accessed through an aluminum or neoprene funnel placed over the dome cover. A gasket or seal is placed around the hatch, and the cover is placed over the gasket and clamped down. The pump-off hose is attached, and the pump is activated. The hatch is opened, and the product is pumped out. When the product reaches hatch level, the bonded pump-out tube is used to recover the rest of the product. Because maintaining a tight seal around the dome cover is frequently difficult, removal via the cover and a funnel is the least desirable method.

B.3 Righting the Vehicle

Tank truck manufacturers advise against trying to right a cargo tank while it contains any product. The tank is designed to contain product under normal conditions of transportation. A collision or overturn imposes strain on the structure of the tank vessel that cannot be measured. Speed, impact, terrain, surface levelness, and the weight of the load contribute to the stress on the tank due to overturning. In addition, movement will cause the product to surge and make the vehicle unstable.

Once the tank has been emptied, it may be lifted. No place on the tank itself is suitable for the attachment of hooks. The only lifting points are chassis components. If nylon lifting straps are used, precautions must be taken to avoid the areas of the tank between the bulkheads.

Tow trucks, mobile cranes, and air bags are normally used to right a tank trailer. Air bags or cushions were never designed to replace wreckers or cranes in recovery operations. They are tools to be used by the conscientious contractor to improve safety and to conduct an efficient recovery. Air cushions are portable and are made of neoprene, which limits the danger of sparks.

Several questions should be asked in selecting a contractor to right the vehicle:

a. What is the contractor's ability to respond?

b. How much equipment is available to the contractors?

c. What kind of response time can be expected?

d. What is the operator's experience and reputation?

e. Has the contractor had experience in righting cargo tanks and handling hazardous materials?

f. Can the contractor's equipment handle a tractor-trailer combination?

g. Does the contractor have an extended boom with the appropriate cables, straps, chains, and blocks?

Once the vehicle has been righted, the damage must be assessed, and whether a flatbed is required to transport the damaged vehicle or if it can be towed safely must be determined.

B.4 Vacuum Trucks

In operations to recover liquid hazardous materials, the vacuum truck is an economical, efficient, and expeditious tool. Nevertheless, it is not inherently safe, especially in handling flammable liquids such as gasoline or crude oil. (Refer to API Publication 2219.) The evacuation of air saturated with flammable vapors can create hazards. However, certain mechanical and physical precautions can make the vacuum truck safer. An exhaust hose should be connected to the exhaust of the vacuum pump to vent the vapors to another area with due consideration for factors such as wind direction and speed, terrain, and adjacent structures. As a shift in wind could cause vapors to reach a source of ignition or create other hazards, wind direction must be continuously monitored. To ensure that no vapors are in the flammable range, continuous explosimeter measurements must be taken in the area immediately surrounding the operation. Material being recovered must be compatible with the material of the vacuum truck. The truck and hoses must be bonded to the tank being emptied, and the truck must be properly grounded.

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