Public Safety Responsiveness to, and On-Site Management of, Highway Incidents

LAWRENCE A. PAVLINSKI, National Highway Safety Bureau,
U. S. Department of Transportation, Denver

•THE HIGHWAY safety standard for debris hazard control and cleanup most recently issued by the U. S. Department of Transportation widens the opportunity to improve many highway safety efforts—especially those in the important areas of public safety responsiveness to, and the on-site management of, highway incidents. Debris hazard control and cleanup is the process—other than normal or routine highway repair and maintenance—of containment, removal, and disposal of debris from a highway and the elimination of highway hazards. Debris consists of those substances, materials, objects, conditions, and phenomena that are foreign to the normal highway environment but that may be deposited, exist, or just occur as a result of a crash, spill, disablement, fire, or any natural causes. It includes objects left after a crash, materials from cargo spillages, abandoned vehicles, articles that fall off vehicles, mud and other material left on the highway by vehicles working from farms or in construction zones, animals (live, injured, or dead), rock and earth slides, trees and tree limbs, ice and snow patches, utility lines, trash, garbage, beer cans, and soft drink or hard liquor bottles.

Before discussing this new safety standard, I should like to review briefly the highway safety standards in general. The 16 highway safety standards issued to date by the U. S. Department of Transportation were developed by the Federal Highway Administration's National Highway Safety Bureau in consultation with many individuals and officials of government, public and private organizations, and associations. The standards were designed to help the states improve and expand their highway safety programs. The highway safety standards apply to a wide range of highway safety functions including periodic motor vehicle inspection, motor vehicle registration, motorcycle safety, driver education and licensing, traffic courts, codes and laws, alcohol in relationship to highway safety, traffic records, emergency medical services, pedestrian safety, police traffic services, and traffic control devices.

The standard on debris hazard control and cleanup is designed to provide for the assignment of official responsibilities at highway incident sites; to provide for the planning, training, coordination, and communications necessary to recognize, report, and promptly correct incidents or conditions that constitute potential dangers to motorists or to the general public; and to provide for restoring incident sites to a safe condition and for expediting the normal flow of traffic. In this standard, an incident is an event involving the presence of debris or the existence of a hazard upon a highway, including an accident. For example, a rock that falls on the highway and blocks a traffic lane constitutes an incident. If the rock strikes a vehicle and injury or damage results, it is defined as an accident.

The standard calls for each state, in cooperation with its political subdivisions, to rapidly, orderly, and safely remove from the highway wreckage, spillage, and debris resulting from highway incidents, particularly motor vehicle crashes, and to reduce the likelihood of secondary and chain-reaction collisions and conditions hazardous to

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the general public. Moreover, the standard calls for each state to have a program that as a minimum provides operational procedures for enabling rescue and salvage equipment personnel to get to the scene of accidents rapidly and to operate effectively on arrival. This applies to heavily traveled freeways and other limited-access roads as well as to other types of locations where wreckage or spillage of hazardous materials on or adjacent to the highway is a danger to the general public.

The standard calls for each state to have a program that provides operational procedures for extricating trapped persons from wreckage with reasonable care to avoid injury or aggravating existing injuries, and for warning approaching drivers and detouring them, again with reasonable care, past hazardous wreckage or spillage. Many states and their political subdivisions are accomplishing this objective within their emergency medical services, police traffic services, and maintenance engineering programs. Each state's program should provide procedures for the safe handling of spillage or potential spillage of materials that are radioactive, flammable, poisonous, explosive, or otherwise hazardous; for removing wreckage or spillage from the highways; and for assisting motorists to proceed in a safe and orderly manner. State programs should also ensure that adequate numbers of properly trained rescue and salvage personnel are available and that a communications system is provided, adequately equipped and manned, to coordinate efforts in incident detection and in the notification, dispatch, and response of appropriate services. The communications system and personnel may well be the police, fire, medical, and maintenance systems now functioning. The control center or dispatching personnel must be trained and capable of managing or, as a minimum, coordinating the multiplicity of manpower and resources required for debris hazard control and cleanup.

A program standard of this nature and scope has been needed for a long time. Congress articulated the need in two different reports. House Report 1700, issued in 1966, called for development of techniques to ensure the fastest possible notification of an emergency—call boxes, aerial surveillance, patrols, closed-circuit TV, and any other feasible system. The Report also indicated the need for control centers to be established, manned, and equipped to send to the emergency scene people and equipment capable of providing medical care, transportation for the injured, prompt assessment of all the elements involved in the accident, and restoration of traffic movement. It stated: "We can no longer be content with procedures that are directed at sweeping up the highway and deciding in that short interval only who was at fault." A concurrent Senate Report, No. 1302, echoed similar sentiments. It said: "Adequate methods of traffic handling at the accident scene and means for prompt removal of damaged vehicles and debris from the roadway are needed."

The necessity for the new standard is perhaps best stated in the introduction to the standard itself. It reads:

> Needless hazards and delay occur, with attendant dangers to highway users, when no mechanism is provided which will assure the prompt detection, timely reporting, and expeditious removal of disabled or damaged vehicles and other articles and substances foreign to the highway environment.
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> Hazardous substances, flammables, and exotic fuels, if not removed quickly, are threats to the public safety on the highway and in surrounding areas.
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> Likelihood of accidents increases where roadway lanes are blocked or restricted by debris, damaged, partially disabled, or abandoned vehicles. Accident debris, such as wrecked vehicles, by attracting the attention of passing drivers, becomes a traffic impediment, is a major cause of congestion—particularly on freeways—and often leads to multiple or chain reaction crashes.
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> Prompt restoration of the accident scene to a safe condition is essential to lessen the probability of additional hazards and dangers, relieve congestion, and assure resumption of traffic flow.

The standard offers an opportunity to improve highway safety efforts—especially public safety responsiveness to, and the on-site management of, highway incidents—in

its approach to debris hazard control and cleanup problems. It is a systems management approach that goes far beyond just sweeping up broken glass and towing wrecked vehicles off the highway. It goes beyond routine roadway maintenance such as snowplowing, patching potholes, and picking up bottles, cans, and other litter from the highway.

This approach endeavors to eliminate environmental hazards associated with highway incidents involving debris. It emphasizes planning, coordination of effort, and training of personnel to carry out the plans. Because it overlaps the other standards, it presents an opportunity to integrate planning and control of many highway safety efforts, especially those concerning public safety responsiveness to, and the on-site management of, highway incidents such as fire, police, ambulance, and wrecker services; maintenance engineering; public utility services; public information; and public health, among other elements.

Public safety responsiveness is the concern for the public interest at the scene of the incident for the persons and property both involved and not involved in the incident. On-site management is the actual job of directing, providing leadership, or taking charge of rescue operations at the scene of the incident, albeit leadership, decision-making, and management are often conducted on an ad hoc basis without benefit of authority or responsibility. That this is so raises some questions concerning public safety responsiveness to, and on-site management of, highway incidents, and these must be answered:

1. What is the public interest, or public safety?
2. Who is responsible for on-site management of the incident?
3. Do the individuals or groups working in the public interest but representing several different disciplines operate as individuals or as a team?
4. Where is the legal authority vested for closing or clearing highways or both, for removing wreckage or spilled loads or unattended or abandoned vehicles, and for restoring normal traffic flow?
5. What is the authority, responsibility, capability, and availability of individuals and organizations for participating in cleaning up highway incidents? Further, how and when is the information made known to participants?
6. How are personnel and equipment resources managed to effectively provide rapid response to an emergency?
7. How are resources managed for fire prevention and elimination, for the extrication of injured persons and animals from wreckage, for the transportation of injured persons to medical facilities, for accident investigation, for accident cleanup, and for the restoration of normal traffic flow?

Up to now, states and their political subdivisions cope with incidents involving debris hazard control and cleanup primarily within their routine day-to-day traffic operations. However, I submit that the planning and procedures developed for Civil Defense (CD) and Emergency Highway Traffic Regulations (EHTR) are also there for use in day-to-day incidents, even though the incident may not have reached catastrophic proportions. A CD or EHTR declaration is not required to make full use of contingency plans.

Highway incidents may often require a concerted response to an unusual emergency condition, maximum use of resources, and greater need for coordination among emergency forces than those that usually exist. Contingency planning for highway incidents provides the means and procedures for making rapid and coordinated decisions. It forces answers by states and their political subdivisions to questions such as these: What is the maximum credible highway incident? What is the maximum probability of a highway incident occurring? What do you do if...? In this context, risks and trade-offs can be agreed to ahead of time. Incident classification must not be limited to fatal, personal injury, or property damage; other categories must be added, such as thermal, mechanical, electrical, chemical, and biological.

Planning provisions of the debris hazard control and cleanup standard provides for states to make a detailed study of their current debris hazard control and cleanup problems in which they specify objectives to be accomplished, consider the assignment of authority and responsibility, and identify specific operational requirements.

Such operational requirements include the communication system, control center, dispatch points, cross-monitoring capability, and backup provisions. Federal and state fire control services now have communications systems that will meet the requirements of many fires and, to a degree, a complex fire situation. This capability was recognized in a recent report (1) that pointed out that fire service communication systems become saturated at about three times the normal traffic load. The report stated that the four most common communication problems were (a) overloading or saturation of available frequencies, (b) difficulty in interlinking of separate frequencies, (c) lack of uniform procedures and terminology, and (d) inadequacy of equipment presently in use.

What is the impact of a highway incident on a community's public and private communication system? In Washington, D. C., the impending arrival of a forecast snowfall causes telephone circuits to be severely strained and to deliver many busy signals. If families and car-pool riders saturate the telephone system in this kind of situation, what will be the effectiveness of 911, the universal emergency telephone number, in a concurrent emergency? Dispatcher and control center personnel and training must be resource-management oriented.

Other operational requirements are the vehicle repair facilities and material storage yards, equipment devices and special materials, and the related personnel skills and training to acquire those skills. Others that should be identified and considered relate to special or unusual conditions that arise because of climate, terrain, or accessibility; areas where hazards may exist regularly or occasionally; areas of high accident rates related to known or anticipated traffic volume; and factors that influence response and cleanup time for different highway environments.

The necessity for establishing on-site management authority and responsibility cannot be overlooked. If the firemen are pouring water onto a flaming truck or flushing a load of spilled chemicals from the highway, and the public health officer is concerned with pollution of a nearby stream or reservoir, who decides—and makes it stick—whether to stop or continue the flushing? Can alternative, or concurrent, actions be taken? Who really is in charge of the incident cleanup?

After reviewing requirements, states should take an inventory of their existing resources and capabilities: the type, availability, and current use of existing resources and capabilities; the agency or service responsible for different functions at different locations; the type of communications system, user, and location; the function various services perform and location of these services; the number of trained personnel and their location; and the type of training and training sources and their location.

A logical next step is to compare requirements with resources and capabilities. At this point, current overall debris hazard control and cleanup capability can be established and additional needs determined in terms of communications, facilities, equipment, personnel, and training. Significant elements to be considered are identifying the primary and support responsibilities of the various agencies and services involved, establishing mutual understanding of operational terms, developing interagency working agreements, providing coordination among functional service elements at control or dispatch centers, and developing operational procedures for on-site management dispatching that includes listing telephone numbers of personnel and services, following safety precautions, using special equipment, and handling unusual or hazardous materials. In addition, the desired response times and cleanup performance levels, the authority to move or impound vehicles or cargo (this may require enabling legislation), and the priorities for program development must all be established.

Improvements in public safety responsiveness to, and the on-site management of, highway incidents will undoubtedly come from the provision of training. Currently there is no single source for training in debris hazard control and cleanup known to the National Highway Safety Bureau, but there are many agencies and organizations that provide instruction in certain skills needed. Because debris hazard control and cleanup occur at local political jurisdictional levels, the necessary technical skill and procedural training should be provided through existing training programs of local agencies. Similarly, orientation for local agency officials, both public and private, should be provided on the scope of the problem, current response capability with available resources, interagency coordination, special problems, operations forecasting based on weather and

time of day, holiday or special event traffic flow considerations, and data collection. Comparable orientation sessions should be provided for agency officials at the state level, although it is assumed that at this level the emphasis would be on area-wide problems, coordination, planning, and program development rather than on actual operations.

Operational crew training should include communications by telephone, radio, or alternate backup provisions; dispatching procedures; coordination procedures among public agencies and related private organizations; basic traffic control procedures; driver training; emergency vehicle equipment; highway nomenclature; expressway design and operation; area geography and special conditions; public transit operations; basic fire-fighting skills; special hazard conditions such as solids or liquids that may present danger of fire, explosion, or injury; flammable or toxic vapors; poison and radioactive materials; and basic and advanced training in rescue and first-aid techniques. Increased public awareness should be developed concerning safety considerations at incident sites through mass information media and other educational facilities.

Large metropolitan areas with complex traffic configurations and sophisticated communications and control facilities should explore the possibility of training special accident cleanup or freeway patrol teams. Field sites might be established for training in the use of special equipment and the handling of hazardous materials. Periodic exercises should be conducted, using simulation techniques, particularly for personnel located at control points in the communications network. The National Highway Safety Bureau is participating with the California Division of Highways in a $3-million project that will provide a program of debris hazard control and cleanup on 42 miles of freeways in the Los Angeles area. Helicopters will be used to provide airborne video direct to a control center so that management of the incident is coordinated.

The typical sequence of activities in a debris hazard control and cleanup situation is detection, notification, response, restoration, and resumption of traffic movement. Detection is the initial recognition of a crash, the presence of debris, or a hazardous highway condition. Of particular importance are (a) the sources of detection—police units, citizens, maintenance crews, aerial reconnaissance units, or sensing devices are possible sources; (b) the severity and criticality of the incident—on-site determination of the seriousness of the situation and of the hazards involved should be made, if possible, by the persons reporting the incident; (c) the procedures—agencies and related service personnel should be trained in proper reporting procedures; and (d) public awareness—citizens should be made aware of what and where to report.

Notification is the initial notification or alert to an official or agency that an incident creating a debris problem has occurred. The communication system should be capable of receiving notification from alternate sources (e.g., police radios, work crews, dispatchers, citizens, news media, helicopters) and be able to handle multiple alerts during peak traffic periods.

Response is the assembly and dispatch of personnel and equipment to the site. Control center personnel and the reporting person should attempt to evaluate the incident to determine hazard classification (e.g., chemical, electrical, mechanical, biological, or thermal), the services estimated to be needed at the site, and the probable length of time the highway will be affected. Response to the services needed at the site should be coordinated, and other service units alerted. Where hazardous material is involved, efforts should be made to notify the owner, carrier, addressee, shipper, or manufacturer of the cargo. Service units should be directed to the site in sufficient quantity, and all units involved should be informed of the action taken. Using information provided by the on-site manager, the control center personnel should monitor progress and request additional services as necessary. If service units arriving at the site find access impaired, alternate routing should be determined, and other services should be informed through the control center. In major incidents, the control center should coordinate with news media regarding early public announcement of highway congestion or blockage and possible alternative routes.

Restoration procedures are the corrective steps required to restore the incident site to a safe condition. These steps include isolating the site, giving advance warning to motorists, evaluating the hazards, extricating the injured, getting additional support,

removing vehicles, rerouting, and making temporary repairs. Safety considerations are of prime importance; therefore, the site should be isolated to prevent secondary or chain reaction collisions, protection and working space for service crews and vehicles should be provided, and indiscriminate stopping by uninvolved motorists should be prevented. Warning should be provided for approaching motorists. An assessment of actual or potentially hazardous conditions should be made and precautions taken prior to actual restoration actions. Removal of trapped persons from wreckage may be necessary if fire or other hazards become imminent. In such cases care should be taken to avoid injury or aggravating existing injuries. Additional specialized support should be requested as needed. Vehicles should be removed from the highway as expeditiously as possible under previously established legal authority. In instances of major restorative action, traffic rerouting of considerable duration may be necessary. All relevant services should be alerted and the public informed. Containment, removal, and disposal of debris should be performed with consideration given to side effects and the handling of unusual materials (e.g., flammable, explosive, or poisonous). Necessary temporary highway or structural repairs should be made.

After disabled vehicles and debris are removed, traffic movement should be promptly restored at the incident site. Applicable traffic control techniques should be employed including the use of control devices such as barrier assemblies, cones, flares, and signs. Such devices are particularly necessary for highways with high traffic density.

This program in the highway safety field does not cover any unfamiliar or new areas. It overlaps many of the other highway safety standards. Achievement of the level of coordination, communications, and training necessary to improve public safety responsiveness to, and the on-site management of, highway accidents as required by the standard will, in most cases, require considerable upgrading of routine traffic operations. Some cases will require the establishment of intergovernmental relationships and agreements on areas of functional responsibility. As the standard suggests, these should be established through advanced planning at regional, state, and local levels. Pre-incident (or precrash) planning, based on day-to-day operations, will assist in upgrading relationships among all services and agencies involved in debris hazard control and cleanup.

Maximum effectiveness in debris hazard control and cleanup will be obtained when all personnel in all the related services and agencies operate as important, identifiable parts of the system directed toward preventing incidents from occurring. In other words, they will operate both independently and collectively in routine incidents even though they do not have primary authority or responsibility to maintain the highway traffic system at its highest level of safety.

Individual training in separate disciplines must progress to multidiscipline group training. Individuals and groups expected to function as teams during post-accident or post-incident conditions must participate in planning and coordination, and they must receive team training to be effective in emergency situations. The results of these efforts by state and local officials should be reductions in crashes, delay, traffic congestion, and economic losses.

We will really be dealing with the problem of debris hazard control and cleanup when we have a plan of action for tomorrow—and start acting on it now. We must not continue to improvise from day to day. Documentation of on-site organizational action and evaluation of outcomes must be conducted. A system of public safety responsiveness depends on the interactions and understanding of interorganizational relationships.

We can effectively improve highway safety by use of a multidiscipline public safety sector. We can manage highway incidents much more effectively through legal and administrative planning that overlooks political and jurisdictional boundaries where necessary but is, at the same time, cognizant of geographical barriers and population and traffic densities, which provide the rationale for jurisdictional and administrative boundaries for particular functions or disciplines.

REFERENCE

1. Forest and Grass Fires. 90th Congress, 1st Session, U. S. Govt. Printing Office, Washington, D. C., House Document 30, May 19, 1967.