Greater Yellowstone Rural ITS Priority Corridor Incident Management Response Guide

Prepared For the

Montana Department of Transportation Wyoming Department of Transportation Idaho Transportation Department Yellowstone National Park Grand Teton National Park U.S. Department of Transportation Federal Highway Administration

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CHAPTER 1: INTRODUCTION

The Greater Yellowstone Rural Intelligent Transportation System Project (GYRITS Project) was initiated to move ITS forward by demonstrating and evaluating ITS in a rural environment. GYRITS began in January 1997 with a Congressional Earmark to fund (1) the development of a Regional ITS Strategic Deployment Plan, (2) the implementation of "early winner" projects, and (3) the development of supporting documentation. In February 2000 a strategic plan was completed that included stakeholder input, GYRITS organizational structure, regional architecture, legacy systems, and candidate projects. Incident Management is one of the projects selected for implementation and evaluation.

The Greater Yellowstone Rural Intelligent Transportation System Priority Corridor is a 200-mile long, 100-mile wide, heavily utilized rural transportation corridor between Bozeman, Montana and Idaho Falls, Idaho (Figure 1). This Corridor includes:

- three states: Montana, Idaho and Wyoming
- two national parks: Yellowstone (YNP) and Grand Teton (GTNP); and
- a variety of transportation facilities ranging from Interstate freeways to low-volume, two-lane rural highways.

Primary transportation facilities include:

- Interstate 90/15 from Bozeman, Montana to Idaho Falls, Idaho through Butte, Montana;
- U.S. Highway 191/20 from Bozeman, Montana to Idaho Falls, Idaho; and
- U.S. Highway 89/22 from Livingston, Montana through Jackson, Wyoming to Idaho Falls, Idaho.



Figure 1: Study Area

Highways added to the Corridor at the March 1998 Steering Committee meeting include:

- Highway 212 from Red Lodge, Montana, through Cooke City, Montana and into Yellowstone National Park;
- Highway 14 from Cody, Wyoming, through the east entrance of Yellowstone National Park and into the Park interior; and Highway 31 from Swan Valley Idaho, over Teton Pass to Jackson, Wyoming.

These routes represent vital transportation links for the economy and well being of the three-state area of Montana, Wyoming and Idaho. They also serve the recreational and resource needs of a growing number of individuals seeking to utilize the Greater Yellowstone ecosystem and Grand Teton National Park. The national importance of the Corridor is further emphasized by its function as the connector for the trucking industry between the upper Midwest markets along Interstate 90 and the Intermountain and Southwest markets accessible by Interstate 15.

CHAPTER 2: INCIDENT MANAGEMENT BACKGROUND

An incident is any planned or unplanned event resulting in disruption of normal travel during a particular time and at a specific location along the transportation network. While it is important that planned incidents (such as parades, sporting events, etc.) be properly managed, there generally exist sufficient information, time and resources to arrange logistics for their orderly conduct. Therefore, this document addresses only *unplanned* incidents that occur *spontaneously* along the transportation network and often threaten the lives of both the public and emergency service providers.

The overall purpose of this study is to determine and document state-of-the-practice, incident management policies, practices and procedures and, within the limits of available resources, apply them to incidents occurring anywhere within the study area. Doing so not only will enhance the opportunity to reduce the pain and suffering of incident victims, it will contribute greatly to the safety of emergency service personnel.

The approach to developing the *Incident Management Response Guide* as part of GYRITS Phase II was two fold. First, a two-day workshop, hosted by WTI and FHWA, was held in West Yellowstone, Montana to inform and solicit information from stakeholders. It was structured to identify and obtain a consensus regarding incident management issues as they affect tourists, other travelers, weather information systems, road operations, as well as maintenance and coordination of emergency services. Identification of these issues enabled stakeholders to coordinate information related to the regional transportation system in an effort to save time, lives and money.

The workshop also enabled FHWA and WTI to assist their partner agencies with development of effective guidelines to manage unplanned events such as road closures, crashes, traffic delays, etc. The guidelines developed would primarily focus on coordination of transportation activities by providing valuable information to tourists and other travelers, particularly information about emerging situations that might influence their travel decisions. All participants had an opportunity to discuss incident management concerns and issues and how they might achieve the requisite cooperation, communication and coordination needed to reach the common goals. Those present heard from two national experts in the area of incident management. The group developed the list of incident management issues shown below:

- upper management involvement
- economic impact of crashes
- jurisdictional boundaries
- motorist information
- conflicting information
- incident detection
- resources
- drivers unfamiliar with the region
- liabilities

- motorist reporting of incidents
- communication among agencies
- public education/information
- institutional issues
- response resources

As a result, it was determined that the above issues would best be addressed in an Incident Management Response Guide that would be made available to all responders in the study area. Development of the *Incident Management Response Guide* would consist of the following tasks:

- 1. Review and documentation of existing incident management policies, practices and procedures of selected emergency response organizations within the study area as they practiced incident management.
- 2. Development of recommendations based not only on information provided by emergency service providers within the study region, but also from elsewhere around the nation in rural areas. This approach was intended to assure that agencies responsible for incident management in the study area could become aware of, and consider adopting, other innovative incident management protocols.
- 3. Development and recommendation of appropriate message sets for traveler information systems that could be used both *interstate* and *intrastate* to advise travelers of information related to incidents; examples include: Highway Advisory Radio (HAR), Highway Closure and Restriction Systems (HCRS) as well as portable and fixed Dynamic Message Signs (DMSs).
- 4. Provision of the opportunity for emergency service providers to convene regional incident management workshops, sponsored by WTI, to discuss and make recommendations with respect to the content of the draft *Incident Management Response Guide* in an effort to improve it and assure its recommendations are practical.

CHAPTER 3: STUDY OBJECTIVES

In 1999 over half of all police officers killed in the line of duty died while responding to (or at the scene of) traffic incidents. Nearly 10,000 police cars, 2,000 fire trucks and 3,000 other service vehicles were struck while going to, or at, traffic incidents. Secondary crashes resulting from queuing as a result of primary incidents make up 14-18 percent of all crashes. On freeways, these secondary crashes account for 18 percent of all deaths.¹ Fifty-four percent of all crashes, fifty-six percent of reported injuries and eighty-seven percent of all (motor vehicle) fatalities occur outside of urban areas.²

The overall objective of developing and distributing the Incident Management Response Guide is to reduce the time between incident occurrence and clearance so as to minimize the risk of secondary crashes and to reduce the staggering costs incurred annually by motorists and commercial vehicle cargo trapped in long queues of traffic. Specific objectives of this document include:

- Identification of opportunities for improving and implementing each component of regional incident management.
- Determination and compilation of recommendations for consideration by both primary and support emergency service providers.
- Determination of the extent to which improved training, additional equipment and other resources could enhance regional incident management.
- Identification of the means by which improved incident management procedures might be adopted and institutionalized.
- Identification of impediments to improving incident management that may only be overcome by state and local legislative initiatives and adoption of interagency agreements or similar compacts at the state and local level.

CHAPTER 4: THE STUDY PROCESS

The study process was initiated with a comprehensive literature review followed by distribution of a survey to determine how incident management is currently practiced nationally and within the study area. Subsequently, criteria were established to identify the best locations within the study area at which to focus the analyses. Seven candidate locations were identified; application of the criteria led to three primary locations being selected for further study. Finally, it was determined that one-on-one interviews likely would result in the best information on current incident management practices at, or in the area of, the three sites. The interviews are the fundamental basis upon which the recommendations are founded.

Literature Review:

A literature review was initially conducted to minimize redundancy in development of the *Incident Management Response Guide*. Incident management plans were reviewed for corridors in New England, Colorado and Montana. Maintenance operations plans were reviewed for Wyoming and Nebraska. Particular attention was given to plans of those states surrounding the GYRITS region so as to identify existing incident management practices. Review of these plans yielded information on local procedures, local contacts, and location of existing ITS infrastructure (e.g. Dynamic Message Signs, Highway Advisory Radio, etc.). Due to the multistate region encompassed by the GYRITS project, attention was also directed to the *interstate* communication processes described in these documents. Documents reviewed included:

- <u>Colorado I-25 Incident Management Plan</u>
- <u>MDT Rural Traffic Management Center Operations Guide</u>
- Quad-State Road Service Directory
- Wyoming District 1 Snow Removal Plan
- Wyoming District 2 Snow Removal Plan
- <u>New England Region I-95 Incident Management Resource Guide</u>

Survey Development and Distribution:

A six page questionnaire was developed and widely distributed to state, city and county law enforcement agencies; fire and rescue / HAZMAT personnel; state and local transportation agencies; transportation maintenance personnel; Yellowstone and Grand Teton National Park personnel; tourism agencies; towing and recovery companies and the media. Survey forms were given to agencies within and adjacent to the project region. The purpose of the survey was to determine how improved information systems might be made most compatible with an agency's current and planned procedures for information transfer. Questions were deliberately formatted to be consistent with the function of the agency being queried. The survey was structured to elicit answers to the following four categories of questions:

• Transportation-related information currently being *received by* the organization;

- Transportation-related information the organization would *like to receive* in the future;
- Transportation-related information currently being *provided by* the organization; and
- Transportation-related information the organization *would like to provide* in the future.

Supplemental questions specific to incident management also were distributed.

Responses to the survey varied widely. Some agencies failed to respond at all; a few provided extremely comprehensive and useful information. Unfortunately, no clear patterns emerged that could be construed as applicable to information transfer within or among agencies queried or with regard to incident management. This result, alone, would seem to underscore the need for development of a generic *Incident Management Response Guide* for use in the region.

Data Review and Analysis:

To identify locations best suited for development of the *Incident Management Response Guide*, attention was focused on the number and nature of incidents occurring within specific highway segments of the Corridor. Criteria included the location of emergency services, emergency notification/response times, crash type and frequency of crashes, tourist destinations and the presence of deployed Intelligent Transportation System (ITS) infrastructure. It was determined that highway segments presenting the greatest challenges were typically those that provide passage over mountainous areas.

The three highway segments chosen for additional study were: Interstate 90 over Homestake Pass in Montana, Monida Pass at the I-15 Idaho / Montana border and State Route 22 over Teton Pass near the Idaho/Wyoming border. *Homestake Pass* was selected due to the frequency of weather related incidents and a deployed Highway Advisory Radio System. *Monida Pass* was selected due to lengthy incident reporting/response times, as well as the lengthy distances to emergency services. *Teton Pass* was chosen because of its severe curvature, frequency of avalanches, proximity to the Idaho/Wyoming border, extensive incident notification/response times and distance from emergency services.

Results of the literature survey, survey analysis and data review were documented in a short paper entitled <u>Greater Yellowstone Rural ITS Incident Management Plan: Roadway Segment</u> <u>Assessment</u>. Although this *Incident Management Response Guide* offers guidance for managing all incidents within the Corridor, its recommendations are based upon an analysis of incident management protocols practiced within, and in the vicinity of, the three highway segments identified above and within Yellowstone and Grand Teton National Parks.

Personal Interviews:

Because the mailed survey results did not yield consistent results, a decision was made to conduct "one-on-one" interviews with emergency service providers and others who participate in incident management in the vicinity of the three selected highway segments and within Yellowstone and Grand Teton National Parks. Interview formats were developed and tailored to collect information based upon the function and/or responsibilities of the person(s) being interviewed. However, variations in the nature and sequencing of questions were minimized to assure that inquiries would be consistent from one venue to another.

Persons interviewed were *not* asked to complete any forms because it was considered that establishing a dialogue structured around a generic format, while maintaining a casual and informal setting for gathering the information, would be more productive. As a result of the individual meetings, a great deal of useful information about current incident management practices in the study area was gained. During some meetings, several individuals were present resulting in a great deal of synergy.

Standing out among all findings was the fact that emergency responders, regardless of their individual roles, carry out their responsibilities in a highly professional manner, often under the most adverse conditions imaginable. The many responders who contributed to development of this document freely offered their time, expertise, experience and, most importantly, their observations as to how incident management might be improved.

What makes the Incident Management Response Guide comprehensive is that it is based on

- The views of incident management practitioners,
- The policies and protocols of the agencies they represent,
- Institutional relationships among jurisdictions with regard to incident management,
- Resources available for incident management,
- Concerns (real and perceived) that might compromise the management of incidents,
- The geographic dispersion of sites where data were studied and collected,
- The processes used to determine current incident management practices, and
- Finally, a compilation of recommendations for consideration by emergency service providers as they manage incidents.

Information about incident management practices was obtained from the personal interviews, a number of the latest publications^{3,4,5,6} concerning incident management, and presentations at recent conferences⁷ organized solely for the purpose of discussing and disseminating information about incident management. The publications and conferences drew upon the expertise of incident management disciplines from around the country and other nations.

CHAPTER 5: COMPONENTS OF INCIDENT MANAGEMENT

As cited earlier, an incident is any planned or unplanned event resulting in disruption of normal travel during a particular time and at a specific location on the highway transportation network. However, this document addresses only *unplanned* incidents that occur (usually) *without warning* and that often threaten the lives of both the public and emergency service providers. Table 1 lists a large array of unplanned incident types that require emergency response and/or notification.

Weather Specific	Vehicle Specific	Other
Heavy and or Blowing Snow	Single Vehicle Crash	Smoke
Intense Rainfall	Multiple Vehicle Crash	Dust
Black Ice	Large Truck Crash	Animal on Roadway
Flooding on Roadway	HAZMAT (contained)	Pedestrian (Passenger) Illness
Avalanches	HAZMAT (spill)	
Mud or Rock Slides	Bio-Hazard	
Washouts	Rail Crash Near Roadway	
Wildfires	Vehicle Fire	
High Crosswinds	Stalled Vehicle in Roadway	
Fog		

Table 1: Unplanned Incidents

Typically, the incident types shown in Table 1 result in roadway closure or lane restrictions, reduced speed advisories or other travel restrictions such as chain-ups.

Management of incidents is often described in terms of its discreet components; doing so facilitates the *concept of operations* (who is responsible for what). Structuring a discussion of incident management in terms of its components also is conducive to understanding the logical sequence of actions which, which when executed as planned, maximize its safety, efficiency and effectiveness. The discreet components are: a) pre-incident planning, b) detection and



verification of incidents, c) response by emergency service providers, d) notifying the traveling

Figure 2 Incident Management Components

public about the incident, e) on-site management of the incident, f) incident clearance and g) post-incident debriefings.

The first and last components, *pre-incident planning* and *post-incident debriefings* are not routinely practiced. A schematic of incident management components is shown in Figure 2.

The above description of what constitutes incident management, taken literally, may imply a fairly simple, straightforward process. However, even the most minor incidents may be (or become) incredibly complex. If such an incident is to be managed successfully, it will demand extraordinary teamwork, excellent communication and pre-planning involving all responders. Moreover, it is not at all unusual for conditions at or near the incident scene to change significantly without warning. Often, incident management is analogous to shooting at a moving target. But it can be, and often is, accomplished without compromising the safety of victims, the traveling public or the responders themselves.

While it is not common for all emergency response agencies within a region to train together for incident management (including worst-case scenarios) and engage in "cross-training," those that

do are better equipped to deal with unanticipated events that may occur *during* management of an incident, and without question can carry out their responsibilities most effectively. Also, there is great value in conducting post-incident debriefings among responders to discuss what might have been done differently (lessons learned).

Each phase of incident management is as important as the others; thus, each is discussed below both in terms of the "ideal" process and, conversely, in terms of things that can go wrong (most of which are avoidable). An all-encompassing principle of incident management is the importance of minimizing time: "get in, perform safely and get out quickly."

Pre-Incident Planning:

As suggested above, routine and continuous planning for incidents among regional emergency responders frequently is given inadequate attention. This is not to imply that responders do not train. However, within any emergency response region (usually a county in rural areas), responders sometimes do not train together. While simulations may be conducted on an annual or semi-annual frequency, they usually are for "mega-scale" incidents (often airplane crashes or mass evacuations) rather than for the more routine vehicle crashes. A notable exception to the previous statement is training for HAZMAT incidents.

Ideally, incident responders should know each other on a first-name basis. This is an excellent measure of mutual trust and confidence in each other's ability to perform under very stressful conditions. Frequent and relevant combined training exercises will quickly lead to knowledge of each other's responsibilities, capabilities and potential problems. *"Trust among responders cannot be developed during a crisis; it must be created through interim activities. Whatever is not working, will get worse during a crisis.*⁸ Training together for "what-if" scenarios is essential if responders are to work effectively as a team. Every responder at the scene must know specifically not only his or her own responsibility, but also the role of other responders at the scene.

Each responder should be provided the most up-to-date training opportunities available within the organization's resources. Upon completion, training should be shared with peers. "What-if" training exercises should include *all* potential responders to an incident: fire/rescue, law enforcement, paramedics, towing and recovery personnel, highway maintenance personnel and hospital Emergency Room personnel. Once training exercises are complete, they should be followed by a candid discussion among all participants as to what might have been done differently to improve management of the "virtual" incident. Incident management policies of agencies must be discussed and resolved if they are in conflict.

Equipment used to extricate victims, to up-right overturned vehicles or any other facet of managing an incident should be tested often enough to assure it is in working order. Location(s) of critical equipment should be known and readily available to responders qualified to operate it.

An additional and problematic part of pre-planning in rural areas is identification of alternative routing if a facility is to be closed or restricted to traffic for an extended period and queuing of vehicles is anticipated. Where alternative routing is available, sets of laminated maps could be placed in vehicles that are likely to be used to divert traffic. Bridges situated along probable detour routes should be load-rated beforehand to determine if they are able to carry legal loads and whether clearance restrictions exist that might render them unusable.

Agreements (preferably written) should be in place among agencies that may find it necessary to leave their jurisdictions to perform their function(s). In addition, agencies and jurisdictions should seek and receive legal advice regarding the appropriateness of their actions on scene. "Hold-harmless" legislation should be drafted and enacted to protect responders from litigation, unless gross negligence and/or willful misconduct occur.

Key telephone numbers (land-line/cell phone/satellite phone) of all regional responders should be available to each other. Radio frequencies vary among agencies; thus provision for communication, both on-scene and between the scene and agency headquarters, may become very problematic. Communication protocols should be worked out ahead of time.

Failure to adequately pre-plan for incidents may result in:

- delayed response of responders and equipment;
- compromising the well being of victims;
- long queues of vehicles, thus increasing the propensity for secondary crashes;
- increasing the likelihood of litigation against one or more of the responding agencies;
- poor communication among responders at the scene;
- increasing the risk of physical injury to responders at the scene; and
- unavailability of critical equipment when it is needed

Incident Detection, Verification and Response

Detecting and verifying incidents in rural areas is often difficult. Moreover, the technology often deployed in urban areas, such as Closed Circuit Television (CCTV), overhead Dynamic Message Signs (DMSs), etc., is far too costly to deploy extensively in rural locations. As a result, most rural incident detection is via motorist cellular 911 calls or by motorists driving to a telephone (often not the nearest one) to report the incident. When calls are received, the 911 center dispatcher usually must coax the caller to observe the immediate area for visual clues. Even though Interstate highways have mileposts and numbered exits, the vast majority of motorists approaching an incident scene are unable to identify their location.

Sometimes law enforcement, highway maintenance or other authoritative sources of information will come upon the scene of an incident. Information can then be relayed by radio (or other means) to the official's 911 center and a proper response can be initiated. Automated or manually generated distress signals are rapidly gaining in popularity with the traveling public; millions of these MAYDAY, NAVSTAR and other systems are installed in vehicles today. Yet, the percentage of all vehicles having such a system on the road at a given moment is extremely small.

It should also be noted that the Federal Communications Commission has mandated that all cellular telephones be "geo-locatable" at a Public Safety Answering Point (PSAP) by 2005. The system, designated as "E911," can be operated via satellite-based Global Positioning Systems (GPS) or triangulation via telecommunication relay towers. When E911 is fully deployed, dispatchers will be able to determine the cellular telephone number and the location (latitude and longitude) of the caller.

Thus, current detection and verification of rural incidents can be incomplete at best unless reports are received from authoritative sources. Each agency must adopt a policy of either "accepting at face value" information provided by an emotional and possibly disoriented citizen, or of sending agency personnel to the scene to confirm the information prior to dispatching responders and equipment. Due to the vast distances and response times involved, virtually all agencies interviewed immediately dispatch resources based upon the initial information provided. Once responders are on site, additional equipment and/or personnel may be requested.

On the other hand, response decisions are not always straightforward or consistent. For example, towing and recovery vehicles sometimes are not called to the scene until emergency medical personnel have completed their responsibilities and departed. In addition, state or local highway agencies are not often asked to become involved (if they are asked at all) until virtually every other agency has completed its work.

Most agencies take a proactive approach and dispatch personnel and equipment immediately, based on the best information available. The alternative of waiting until an incident is verified by law enforcement personnel or other officials likely will result in significant delay in dispatching responders and equipment to the scene. The secondary consequences may very well result in deterioration of the victim(s)' condition and queuing of vehicles with the added risk of secondary crashes.

Incident Site Management

Incident Command System

Evolution of the Incident Command System (ICS) concept began in the early 1970s, because a new approach was needed for managing rapidly moving wildfires.⁹ At that time, emergency managers faced a number of problems, some of which are yet to be fully resolved. They include:

- too many people reporting to one supervisor,
- different emergency response organizational structures,
- lack of reliable information,
- inadequate and incompatible communications systems,
- lack of structure for coordinated planning and training among agencies
- unclear lines of authority,
- terminology differences among agencies, and
- unclear or unspecified incident objectives.

Without use of the Incident Command System, chaos will quickly occur: individual and organizational responsibilities will blur, communications will be misunderstood and ultimately break down, and valuable time will be lost in effectively and efficiently dealing with the incident. The Incident Command System is a *process* that provides responders with a flexible tool for directing, controlling and coordinating resources at an incident. ICS applies a common organizational structure that can be contracted or expanded as the response effort changes in nature and/or magnitude. It also applies a common set of management principles to help standardize response efforts.

Designing a standard emergency management system to remedy these problems took several years and extensive field-testing. The early developmental process recognized and focused on several requirements for the system that exists today. These include:

- Only one individual can be in charge of overall management of the incident: the Incident Commander.
- The system must be organizationally flexible to meet the demands of incidents of any kind and size.
- Agencies must be able to use the system on a day-to-day basis for routine situations as well as major emergencies.
- The system must be sufficiently standard to allow personnel from a variety of agencies and diverse locations to rapidly meld into a common management structure.
- The system must be cost-effective.

The ICS concept follows all the known and established principles of emergency management and does not require new or untried approaches, nor change the way various parts of the actual incident are managed. The concept is very flexible; there are no hard and fast rules to restrict experienced incident managers.

The Incident Command System lends itself to uniformity of command essential to management of the incident. All the participants use the same terminology and organizational structure. When they work together managing an incident, there is a clear understanding of information and immediate knowledge of the chain-of-command. If all agencies "on-scene" are using similar organizational structures and procedures, there should be few differences in operations. In essence, they are "one" organization and can be managed as such by the Incident Commander. Clearly, the concept is not a "committee approach" to managing an incident.

Agencies responding to an incident will be filling one of two roles; they will either be jurisdictional with direct responsibility and authority, or they will be the assisting agencies that have been called to help. As a general rule, the Incident Commander will be the individual within whose jurisdiction the incident has occurred.

Unified Command Structure

One of the attributes widely used with ICS is the concept and application of Unified Command. Unified Command represents a management structure that has proven to be effective and efficient over time.⁹ It is a management protocol for coordinating responses to emergency incidents by two or more agencies. Under the Unified Command Structure the Incident Commander interacts only with the ranking individual of other on-scene responders. One of the most important benefits of the Unified Command Structure is that it leads to solid working relationships among all personnel involved in the management of an incident. It enables all agencies with responsibility for the incident to help manage the incident by establishing a common set of incident objectives and strategies.

All agencies functioning under a Unified Command Structure share equal responsibility in the overall management of the incident. All personnel assigned must have a clear understanding of the Incident Command System. Managers also need to understand their leadership role under the

Unified Command Structure. Unified Command can be implemented by all agencies regardless of jurisdictional or functional responsibilities.

Incidents vary considerably. Each has its own characteristics and presents its own problems. The Unified Command Structure must be applied in a configuration to meet the needs of any incident. Unified Command goals and guidelines provide only general information for Incident Managers. Personnel having responsibility for the outcome of the incident must make specific decisions and take actions they consider warranted under prevailing circumstances.

The goals of Unified Command are:

- Improve the information flow and interfaces among agencies at the incident.
- Develop a single collective approach to managing the incident regardless of its functional or geographic complexity.
- Ensure that all agencies with responsibility for management of the incident have an understanding of their organization's policies and restrictions.
- Optimize the efforts of all agencies as they perform their respective missions.
- Reduce or eliminate duplicated efforts.

Responders

From observations made during this study and from reviewing current literature, rural incident management tends to be regionalized (usually by county) in its structure. However, the nature and scale of an incident may, and often does, modify this organizational structure. For example, the management of large-scale incidents may require resources greatly exceeding those available to the jurisdiction within which the incident occurred. Thus, mutual-aid agreements among adjacent jurisdictions appear to be the rule rather than the exception. Usually these arrangements are codified in intergovernmental agreements; however, there exists among emergency service providers an understanding that whenever "outside" assistance is needed, it is provided.

For mega-scale incidents such as earthquakes and massive floods, even mutual-aid partners may be overwhelmed and simply not have the resources to deal with the incident. Incidents of this magnitude are considered disasters and are mentioned here only because most areas of the nation are prepared to respond to them at the state or even federal level. Moreover, disaster simulations and training are, for the most part, routinely practiced.

Responders to management of regional incidents usually include law enforcement, fire departments, towing and recovery companies, local and/or state departments of transportation, search and rescue teams and emergency medical personnel (the latter usually are aligned with regional/local fire departments). In addition, if severe trauma has occurred to one or more victims, helicopters or fixed wing aircraft will be requested to transport victims (once they are stabilized) to major trauma centers for treatment.

Incidents involving Hazardous Materials (HAZMAT) are potentially deadly throughout their management and require unique response procedures. Even if vehicles carrying hazardous materials have not overturned or the contents have not spilled or do not appear to be leaking, the consequences of mismanagement can be disastrous. For example, not all combustible gases are

visible to the observer. Even though no fire may be present, it can occur spontaneously, resulting in disastrous consequences to responders.

Vehicles carrying HAZMAT materials carry placards with numbers indicating the contained material. Manuals that easily fit in the glove box of any responding vehicle are routinely distributed to anyone having incident management responsibilities. Without exception, safety of the traveling public and responders is paramount over all other considerations. When a HAZMAT incident occurs, the facility is usually closed or travel is restricted until it can be determined that the nature and status of the on-board material poses little or no threat to human life. An example might be diesel fuel leaking from the tank of an overturned tanker carrying otherwise non-hazardous cargo.

As a general rule, local responders (usually departments of transportation or towing and recovery firms) will attempt to contain spills of non-lethal materials as long as their personnel are not at risk in doing so. Cleanup, however, is universally accepted to be the responsibility of the owner of the material being transported. Rarely will public agencies attempt to remove the substance from the vicinity of the roadway. Even when public agencies contain minor spills (e.g., to prevent environmental degradation), the cost is borne by the owner/transporter of the cargo.

Every HAZMAT incident is unique and it becomes the responsibility of the Incident Commander to use his/her best judgment and/or established agency policies as to what actions should be taken.

Responder Safety

The Study Objective section of this document cited some staggering statistics with regard to the number of responders killed at or en-route to the scene of motor vehicle incidents. They bear repeating here. In 1999 over half of all police officers killed in the line of duty died while responding to (or at the scene of) traffic incidents. Nearly 10,000 police cars, 2,000 fire trucks and 3,000 other service vehicles were struck while going to, or at, traffic incidents. Fifty-four percent of all crashes, fifty-six percent of reported injuries and eighty-seven percent of all (motor vehicle) fatalities occur outside of urban areas. Anecdotally, there has been an alarming increase in the number of towing and recovery personnel killed or injured at incident sites.

A number of theories have been offered to explain this escalating phenomenon. They include:

- Inadequate attention to moving traffic passing the scene of the incident.
- Improper placement of temporary traffic control devices to guide motorists past the incident.
- Inattention by motorists to temporary traffic control devices at the scene.
- Preoccupation by responders with their responsibilities resulting in unsafe movement toward passing traffic.
- Improper and unnecessary placement of emergency vehicles.
- Failure to adopt a "quick clearance" policy for disabled vehicles.
- Unnecessary and continuous use of "strobe" lights on emergency vehicles.

The last theory deserves explanation, as it is a relatively new research area. Use of "strobes" both en-route and at the scene of the incident is very common among responders. A recent¹⁰ study reached the following conclusions:

- As flashing lights increase, driver reaction times increase.
- As flashing lights increase, the ability of a driver to detect a warning light is decreased.
- Strobes are very poor warning lights due to flash duration.
- As flashing lights increase, there is no reduction in accidents.
- There is a limit to the flashing light population on an emergency vehicle. The problem is compounded if there is more than one vehicle present.
- Strong light stimuli in the periphery of the visual field causes drivers to divert their vision toward the bright light.
- Drivers drive toward where they look; i.e. toward the strobe lights.
- The problem is compounded if the driver is impaired by alcohol, drugs (prescription or illegal) or fatigue.
- Excessive flashing lights draw attention and do not release.
- Strobe lights obliterate drivers' night vision for up to fifteen seconds; i.e., they may be driving "blind" as they approach the incident scene.
- Impairment by alcohol or drugs may double the length of night vision loss.

Notifying the Traveling Public

Notifying the traveling public of an incident should be proportional to the magnitude, severity, anticipated duration and nature of the incident. If the incident is relatively minor and the Incident Commander believes restricted flow of traffic can occur during management of the incident and/or normal flow of traffic can be restored within an hour or so, notification of regional electronic commercial media, activation of public electronic media, such as Highway Advisory Radio (HAR), Highway Closure and Restriction Systems (HCRS), activation of upstream permanent and/or portable DMSs are adequate in rural areas. Placement of temporary traffic control devices, however, should be in accordance with the latest provisions of the Manual of Uniform Traffic Control Devices (MUTCD).

On the other hand, if the incident is anticipated to result in closure of the facility for an extended period, more robust measures should be taken to directly and indirectly alert motorists to the situation. In addition to the above measures, messages specific to the incident should be placed on the primary agency's internet web page showing estimated duration of closure, alternative available routing, and where additional information may be obtained. Moreover, the notification "zone" should be expanded even beyond the jurisdiction within which the incident has occurred. Organizations catering to travelers' needs such as automobile associations, tourism organizations, as well as major tourist attractions should be notified of the event and its anticipated duration. Equally important is the provision of regular updates to any and all media outlets and other groups desiring to, and able to, notify the public.

Frequently overlooked when a prolonged incident occurs are the needs of long-haul truckers and commercial bus touring companies. Many of these vehicles function on a "just-in-time" delivery basis. Timely knowledge of impediments to their travel schedules is extremely important from an economic standpoint. Often these vehicles, particularly those associated with a major company's fleet, are equipped with GPS satellite-based receivers. Hence, if major fleet operators could receive timely information regarding unanticipated travel restrictions, they might be able to locate their vehicles, notify them of the problem literally hundreds of miles away from the incident and re-route them to minimize delay in scheduled deliveries and arrivals. Again, updated information on a periodic basis is critical to motorists, freight haulers and long distance bus tour operators. Equally important is that the information provided be accurate as well as timely; hence, the need for frequent updates.

Incident Clearance

Secondary crashes from vehicle queuing as a result of primary incidents make up 14-18 % of all crashes. On freeways, these secondary crashes account for 18 % of all deaths.¹ Similarly, on controlled access facilities, where trip lengths generally are longer and drivers may become fatigued or mesmerized by the boredom of driving on a wide-open facility for great distances at high speeds, upstream warnings of *any* type may go unheeded, resulting in a vehicle that impacts a slowly moving or stopped queue of vehicles at seventy mile per hour or more. The result is frequently multiple deaths and injuries involving many vehicles. Often, these "secondary crashes" are far more severe than the initial incident. Therefore, it is imperative that incident managers make every reasonable effort, within the limits of safety at the primary incident, to clear the roadway and restore normal traffic flow as quickly as possible.

There are a number of ways to accomplish timely incident clearance. For example, once responders have completed their function at the scene, they should leave, thus removing one or more vehicles from the vicinity of the roadway. Also, if specialized equipment will be needed to clear the scene (e.g., large towing and recovery vehicles with rotating and extended booms) they should be summoned to the scene without delay so that their functions can begin as soon as the Incident Commander deems it appropriate.

If a fatality has occurred, and the law requires that a coroner must be present to pronounce death, the coroner should be called to the scene as one of the first acts in managing the incident. Some institutions have designated off-site persons as deputy coroners, having the legal authority to pronounce death based upon receipt of "life-defining" data from the scene provided by qualified personnel (e.g., paramedics).

Law enforcement reports need not always be completed while the officer's vehicle is located within a travel lane, or even on the shoulder of the road, with strobe lights and the light bar operating. Whenever possible, reports should be completed away from the scene assuming other clearance actions have been completed. It is generally acknowledged that the presence of a law enforcement vehicle on the shoulder of the roadway, with lights operating, has a significant impact on reducing roadway capacity; hence, traffic queues are cleared at a slower rate than would otherwise be possible. A number of law enforcement agencies have purchased hand-held computers with which enforcement personnel can quickly enter data and transmit it to a central location within seconds.

Field measurements of vehicle paths and final locations, as well as related data, are frequently recorded with a tape measure and cameras. This method of gathering evidence requires considerable time and may extend road closure or restricted flow of traffic with concomitant build up of the queue. Various studies on field measurements have produced varying results⁹; however, there currently exist alternative means of gathering the survey data electronically. Doing so *may* offer the opportunity to significantly reduce the duration of closure or restriction. Local responders should be aware of persons qualified to perform electronic total station survey, keep their telephone and pager numbers with other critical communication information, and consider their use, given the circumstances of any given incident. On-scene electronic field survey, in lieu of field measurements would seem to reduce the time to record measurements. However, because this method of gathering data requires specialized equipment and skilled operators, locating and transporting them to the scene may take longer than using more traditional means of data collection. Jurisdictional policy and the Incident Commander's judgment should prevail.

A simple method of alerting oncoming drivers to the presence of stopped or slowed queued traffic is to send a vehicle with a flashing light upstream along the shoulder of the roadway, and to maintain its position in advance of the end of the queue. Ideally, a message board would be mounted atop the vehicle indicating that approaching motorists should be prepared to stop.

Sometimes an overturned truck may block the entire roadway. Presumably, one of the first acts of the Incident Commander is to call *properly sized and equipped* towing and recovery vehicle(s) to the scene. Once it is determined that the contents of the overturned vehicle are not toxic and pose no health risk to responders or the environment, the Incident Commander may order the towing and recovery vehicle to literally push the vehicle to (or over) the side of the roadway. However, Incident Commanders and towing and recovery firms sometimes are reluctant to take such action, fearing litigation from the owner of the vehicle and its contents. In states where it does not already exist, "hold harmless" legislation should be enacted to protect decision makers. Destroying a cargo of goods, irrespective of their value, is virtually always preferable to waiting hours to remove large shipments via conventional means. Waiting traffic queues become longer as a function of delaying the removal process and the propensity for secondary crashes continues to grow with a high risk of secondary crashes.

Post-Incident Debriefings

When a major incident occurs, involving response by several regional agencies, the Incident Command System and Unified Command Structure should be utilized to assure that the incident is managed with the utmost efficiency. Usually, that is the case. However, no two incidents are exactly alike; thus, no two incident management scenarios are the same. Sometimes things go wrong. In such cases, responders know that some portion of the incident management system did not play out as expected. When this occurs, it is critically important that representatives from *every* responding agency (ideally, the individuals who were on-scene) convene and discuss every aspect of the event beginning with the pre-planning phase and continuing to the point where the Incident Commander declared the event was concluded.

These post-incident meetings should not be intended to place blame or find fault with an individual or responding agency. Their purpose is to dissect the event and attempt to determine what might have been done differently and what the consequences of alternative actions would

have been. In general, this is referred to as "lessons learned." Its sole purpose is to improve responses to future incidents.

The outcome of such a session may reveal that more specialized training is needed or that communications were unclear or misunderstood. An alternative sequencing of actions by the Incident Manager may be found to have been preferable. And sometimes, the conclusion will be that everyone did precisely the right thing at the right time and that were the incident to recur, nothing in the response would warrant change.

Incident Commanders sometimes conduct debriefings even after minor incidents. The goal is to determine if the event could have been managed more efficiently.

CHAPTER 6: VENUE INTERVIEWS

Personal interviews were conducted with incident managers and other responders having responsibility for managing incidents in each of the following locations and surrounding regions: Yellowstone National Park, Grand Teton National Park, Homestake Pass (MT), Monida Pass (MT and ID) and Teton Pass (ID and WY). In some cases, information gathered during the interviews was supplemented with information garnered from the surveys. Also, as interviews progressed with the various agencies, new issues frequently arose and were discussed and documented; hence there is some variance among the interview formats and information obtained.

Yellowstone National Park:

On April 22, 2002 the Deputy Chief Ranger for Yellowstone National Park (YNP) was interviewed; the Deputy Chief Ranger is responsible for managing all incidents occurring within the Park and, upon request, on selected roadways providing Park access.

• **Prevalent Incident Category:** YNP experiences a wide variety of incidents throughout the year ranging from "herd jams" to vehicle crashes, avalanches and extensive/frequent fires. Any and all of these incidents may result in the closure and/or restriction of normal traffic. Over five hundred vehicle crashes occur each year.¹¹ There exists a high avalanche potential at two passes, both of which are monitored during the avalanche season. When avalanche potential is considered an impending risk, the roadways are closed. YNP also precipitates avalanches on occasion with a 105 mm Howitzer. The Park uses remote weather stations and the Avalanche Forecast Center in Bozeman. Two rangers are specifically trained to monitor certain areas and, as mentioned previously, have available the means to create an avalanche under controlled conditions and without endangering the public.

Wildfires are the primary cause of extensive rerouting traffic and may result in evacuating portions of the Park; during 2001, YNP experienced thirty-seven wildfires. Park management of wild fires within the Park is routinely handled with Park personnel and equipment. The Park has a designated Fire Management Officer. YNP is the "host" dispatch system for Bozeman, Missoula and Boise.

• Incident Detection and Verification: The Park uses Global Positioning System (GPS) satellite-based technology and maintains a wild land fire management Geographic Information System (GIS) laboratory for use in projecting fire parameters. In case of very large fires, the Park has the on-call service of a professional meteorologist. Web-cameras are installed atop Mount Washington, at Old Faithful and at Mammoth. In addition the Park has 8-12 Road Weather Information System (RWIS) sites to assist in incident management. Most incidents are detected by wireless calls from Park Rangers. Most Park employees have access to radios when in government vehicles; many have portable radios. Over the last two years there has been an increase in cellular 911 calls; however, they are limited by topography and are not a significant source of information. In addition, motorists frequently drive to one of the Park's many concessionaires and use a landline to report incidents. All information is directed to YNP Headquarters at Mammoth.

- **Information Content:** Often, Park visitors are unsure of the location of incidents they come upon; however, dispatchers can usually coax them to observe visual cues, report on the seriousness of the incident, number of victims, extent of injuries and whether the incident involves wildlife. Based upon the report, YNP personnel are immediately dispatched to pinpoint the location and notify HQ if additional resources are needed. HAZMAT incidents are rare; however, if and when they do occur, Park personnel practice containment and, if warranted to protect the environment, will initiate cleanup.
- Formal Incident Management Response Plan: YNP has a formal Incident Management Plan containing all appropriate EMS protocols. There also exists a formal Wildfire Plan that all rangers carry in their vehicles. Appropriate responders are immediately dispatched to the scene of the incident as reported. Confirmation of the situation and need for additional resources, if any, is made.
- Intergovernmental Agreements (Mutual Aid): Worth noting is that under Title 16, U.S. C., Park personnel frequently assist surrounding small communities such as Gardiner, Cook City, Livingston, et al with incident management. Inter-Governmental Agreements (IGAs) exist between the Park and each of the communities. All of the smaller communities are made up of volunteer forces and often lack adequate resources to deal effectively with incidents. However, Livingston has some on-staff EMS personnel. When called upon to provide assistance, YNP generally does not "charge back" incurred costs. In some instances that require a larger investment of time and resources, a charge back may be negotiated. There are no formal agreements with the states bordering the Park re: incident management. The basis for the free IM service is the proximity of the Park and its resources vs. the distances involved if the states or larger communities were called upon. In addition YNP provides EMS and fire suppression along SR 89 and SR 191 under the same statute.
- **Incident Command:** YNP routinely utilizes the Incident Command System and Unified Command Structure. If the size or configuration of a fire warrants it, the Incident Manager can call in a Fire Overhead Team, the leader of which then becomes the Incident Commander upon arrival. Under these circumstances the Team Incident Commander has complete autonomy regarding management of the fire. With regard to moving Park visitors out of potentially dangerous areas the Park collaborates with its many concessionaires and operates a "phone down tree" alerting them to approaching problems that they pass on to visitors. Also, Park rangers have substantial capabilities to "sweep" any area of the Park and evacuate visitors.
- **On-Scene Incident Management:** The Park's ability to provide on-scene management of virtually any incident is truly impressive. Counting all EMTs, paramedics and advanced life support teams, the Park has about 80 qualified personnel to provide medical care. A year-round medical clinic is available at Mammoth. Visitors with serious, but non-life threatening, injuries are transported either to Livingston or Bozeman; lesser injuries are treated at the clinic. Severe trauma cases are airlifted either to Idaho Falls or Billings. Last year 47 Park visitors were airlifted to trauma centers. The Park has its own helicopter; when additional

aircraft are needed, both fixed wing and additional helicopters are available through LifeFlight. The Park owns and operates 6 or 7 ambulances. Each year between 8 and 14 deaths occur within the Park. All permanent Park rangers are trained in traffic control in accordance with the MUTCD. Last year 254 ambulance transports were made. In addition, the Park employs three coroners who handle all death pronouncements and notifications. Protocols are in place, which permit *remote pronouncements of deaths* once advanced life support personnel relay all procedures and results to the coroners. The Park is aware of, but does not have the resources required to purchase, the technology available for total station survey equipment.

- Incident Notification to Travelers: At present, Park personnel use portable Variable Message Signs and press releases to area TV and radio stations for incident notification. Highway Advisory Radio (HAR) is not used. If the incident (e.g., a fire) is expected to be of long duration, the Internet may be used to advise motorists of the situation. When the large DMS is deployed in the vicinity of Livingston, YNP will use it, in conjunction with MDT, to post messages of incidents in the Park. In addition, a portable DMS between the Park and Cody, WY will be used for the same purpose.
- Security and Terrorism: YNP has a plan for mass evacuation of the Park. It consists of using "call-down-trees" via concessionaires and rangers "sweeping" the Park to assure that everyone within the Park is alerted. The time to fully implement the plan and complete an evacuation, however, would be considerable.
- **Incident Debriefing:** Most debriefings are informal and usually take place at the scene among the responders. From time to time, dry runs of "what-if" scenarios are conducted. Park EMS personnel convene quarterly in a more formal context.

Monida Pass (I-15) and Vicinity:

On December 11, 2001 the Sheriff of Clark County (ID) was interviewed regarding incident management at and in the vicinity of Monida Pass carrying travelers along I-15. Monida Pass "straddles" the states of Idaho and Montana. This is a <u>very rural</u> area.

- **Prevalent Incident Category:** The vast majority of incidents involved: motor vehicle crashes, having to close the Interstate due to heavy snows (particularly on the Idaho side of the Pass), "whiteouts" and untenable roadway surface conditions. It's usually necessary to close Monida Pass 3 or 4 times a year due to heavy snow.
- Incident Detection and Verification: Most incidents occurring along I-15 within the vicinity of the Pass are reported by motorists using cellular telephones. All calls are received through the County 911 call center located in the same building as the Sheriff's office. During winter months, calls may first be received via radio from maintenance vehicles attempting to keep the Pass open. Other official radio calls (Sheriff's deputies and State Police) are also a source of incident occurrence. There exists an RWIS station with camera at the State line. The Sheriff and 911 dispatchers accept the information from all calls as accurate reports, particularly if a large number of cell phone calls are received. Given the remote nature of the Pass, and lack of proximity to EMS services and other responders, this protocol seems prudent; e.g., large towing and recovery vehicles and the "jaws of life" are housed fifty miles away.

- Information Content: Monida Pass is located in an isolated area; during attempts to report an incident, people unfamiliar with the area frequently find it difficult, if not impossible, to convey an accurate location to the 911 dispatcher. Through years of experience and intimate knowledge of the region, 911 dispatchers are usually able to guide the caller to look for visual cues. In most cases, sufficient information can be obtained to dispatch appropriate personnel to the approximate location. Once the location is identified, the dispatcher requests information concerning: type and number of involved vehicles, number and apparent severity of injuries, whether a HAZMAT situation exists, whether the roadway is blocked, etc. Communications are a significant problem; often responders must use CB radios to communicate with the Idaho Transportation Department (ITD). The Sheriff has three full-time 911 dispatchers and two part-time ones. He believes his dispatchers would benefit from additional training.
- Formal Incident Management Response Plan: The County maintains an Incident Response Manual; the protocols within are considered official. Only the Sheriff's office has the authority to dispatch EMS and other responder services. If, from 911 calls, they infer an incident is serious, they dispatch jaws-of-life, heavy towing and recovery vehicles, without officer confirmation. Clark County has a Major Disaster Plan, and a Civil Defense Director, and carries out "dry runs" at least annually. Dry runs are oriented toward HAZMAT spills, and lately, *acts of terrorism* (connected to use of HAZMAT). The closest HAZMAT team is located 35 miles away. For major spills, they rely upon equipment from Pocatello.
- Intergovernmental Agreements: Not Discussed
- On Scene Incident Management: The Sheriff's Office uses an Incident Command System. Whoever arrives on-scene first is the de facto Incident Commander; however, once a law enforcement official arrives, they assume the role of Incident Commander. Actions highlighted by the Sheriff emphasized: establishment of traffic control, treatment/stabilization and transport of injured victims, and alerting hospitals and/or trauma centers regarding status of injured victims. If warranted the roadway is closed to traffic. Severe trauma victims are airlifted from the scene to Idaho Falls or Pocatello; flight time is 30-45 minutes. Airlift evacuation occurs about once a month. If a queue occurs on I-15, ITD usually sends a truck upstream to alert oncoming motorists. A quick clearance policy does *not* exist. The Sheriff sends his deputies for incident management training whenever possible.
- **Incident notification to travelers:** When incidents occur that are likely to take considerable time to clear, the ITD is contacted and information is broadcast on TV and radio. When possible, they do their best to advise motorists regarding alternative routing, but very few options exist.
- Security and Terrorism: Discussed briefly.
- **Incident Debriefing:** "In-house" debriefs are conducted after major incidents. The Sheriff is a strong proponent of assessing responder conduct throughout the incident.

Teton Pass (SR 22), Grand Teton National Park, Teton County and Vicinity:

On July 15 and 16, 2002, five different agency responders were interviewed. They included: the Regional WYDOT Maintenance Supervisor and members of his staff, a Law Enforcement Specialist from Grand Teton National Park, the Fire Marshal of Teton County, the Teton County Sheriff and the Division Supervisor of the Wyoming Highway Patrol. Collectively these responders have a great deal of experience with respect to managing incidents. Moreover, the type of incidents managed varies considerably. While the Grand Tetons can only be described as spectacular with regard to their beauty, their rugged topography presents many transportation and transportation related challenges with respect to safety of the traveling public and responders themselves.

• **Prevalent Incident Category:** There are three predominant incident types that occur routinely along SR 22 and within the immediate vicinity of the mountains and valley (Jackson Hole). They are avalanches, vehicle crashes and cardio-pulmonary events experienced by visitors to the area. To a somewhat lesser extent, wildfires always have the potential to occur. In addition, there is seismic activity associated with the area, and the potential exists for major earthquake activity.

Although having only secondary responsibility for managing incidents involving motor vehicle crashes upon request by Incident Commanders, WYDOT takes a very proactive and impressive approach to avalanche management. Also, WYDOT shares statutory authority with the Wyoming Highway Patrol for closing State-owned facilities.

SR 22 carries east-west traffic through Teton Pass. Several times a year, the Pass must be closed due to the potential for avalanches or because motor vehicle crashes have occurred and traffic must be diverted. Motorists unfamiliar with the steep grades (10%) carrying SR 22 over Teton Pass are thought to be a primary cause of many crashes, as they fail to use chains or tires with appropriate tread for winter conditions. The Pass can be closed via gates at the base of the mountains. The western gate can be operated remotely from the District Office shop; the eastern gate is closed manually, although consideration is being given to automating its closure.

With regard to managing avalanches, WYDOT uses a very proactive approach. The main tools are four GazEx Explorers located in the start zones of the Glory Bowl and the Twin Slides pates. WYDOT also uses a MA102 Howitzer and is presently installing two Avalanche Blasters.

For protection on the MP 151 Slide on US 26, 89, 189, and 191 WYDOT has installed 50 Snow Sails (wind disruptors).

Clearing avalanches is not without its hazards. At one or more locations, second and third slides in rapid succession are not uncommon, thus putting maintenance crews in harms way. To minimize the risk of injury, WYDOT has placed an Avalanche Warning System that, when hit by an avalanche, sounds a screeching alarm, thus giving crews approximately ten seconds to move away from the path.

• **Incident Detection and Verification:** Virtually all incidents are detected as a result of other travelers calling 911 on their cellphones. All 911 calls are routed through the County dispatch center. For example even if a 911 call for assistance were made

within Grand Teton National Park, the call would first come to the County dispatch center. Occasionally, however, Highway Patrol, Sheriff's Deputies or Grand Teton National Park Rangers will happen upon the scene of an incident and use either their radios or satellite phones. Due to the often vast distances emergency vehicles must travel in response to a 911 call, dispatchers will immediately send whatever equipment might be needed, based solely on the caller's description of the incident.

- **Information Content:** Unless they are trained medical personnel, callers using 911 to report an incident can only convey their impressions of the incident circumstances. Often they are emotionally traumatized by injuries they have witnessed and frequently do not know where they are, particularly at night. Fortunately, 911 dispatchers are well trained in calming callers, coaxing them to look for visual cues which the dispatcher might recognize and can often get a good idea where the incident is located and the extent of injuries, number of involved vehicles, if trucks are involved, etc.
- Formal Incident Management Response Plan: There exists a formal Incident Management Response Plan for the entire region. A formal Incident Management Plan also exists within Grand Teton National Park. Of note is that the Teton Fire Department and the EMS people train together and perform exercises in various types of emergency scenarios such as care of trauma victims, swift water rescue, etc. Most search and rescue is done under the aegis of the Park Rangers.
- Intergovernmental Agreements (Mutual Aid): Several agreements are in place that allow various responders to loan personnel and equipment to each other. Interagency agreements are in place where appropriate (e.g., WY Bridger Range, Teton Park, US Forest Service, etc.). Also there are agreements in place that allow local agencies to borrow personnel and/or equipment from each other. The County Sheriff will assist the Highway Patrol if requested. WYDOT has an IGA with UDOT regarding crossing the state line for the purpose of plowing and sanding and is in the process of developing one with ITD. As one local emergency response official put it, "we're beyond interagency agreements; we are completely interdependent on each other."¹²

An interesting aspect to IGAs is that the Teton County Sheriff has deputized all Grand Teton National Park Rangers. The reason for this is that there are "islands" of private land within the Park where Park Rangers would otherwise have no authority. The Park is too far from the Sheriff's HQ to enable an effective and timely response. Thus the Park Rangers function as an extension of the Sheriff's capabilities. With regard to wildfires, WYDOT has an IGA with the National Forest Service (NFS). Up to 50 people are available upon request of the NFS to support frontline firefighters (e.g., to transport water, create roads for equipment access, etc.). At least one person in each WYDOT District has had training in being a first responder, some HAZMAT training, first-aid and Level One Avalanche School.

• **Incident Command**: Teton County EMS organizations and Grand Teton National Park use an Incident Command System and a Unified Command Structure. From the various interviews it is very clear that these concepts are institutionalized. Area responders are aware that management of an incident may be fluid and that the unexpected often occurs rapidly without warning. Under unique circumstances the Incident Commander may temporarily relinquish his authority to another official. In addition, the Incident Commander's responsibilities are not always considered complete when the site has been cleared and the normal flow of traffic resumes. If, for example, electrical power had been knocked out or if deaths have occurred, the Incident Commander must assure that others responsible for post-crash functions complete their responsibilities.

• **On-Scene Incident Management:** Area ambulances are located at the local hospital but are dispatched as a result of 911 calls to Teton County dispatchers. Each ambulance is equipped with a satellite phone but use cellphones where there is coverage. There are cellphone repeaters at several locations, and ambulances carry mobile repeaters. Law enforcement officers are always Incident Commanders at crash scenes; Sheriff's Deputies respond to incidents on all highways except State facilities. The Teton County Sheriff commented that they respond Code 3 (sirens and flashing lights) only when necessary. All HAZMAT spills are coordinated by the State Police; however, WYDOT may be called to the scene to assist in containment and/or minor non-toxic cleanup.

Teton County contracts to have a private helicopter on call during four (winter) months of the year with a guaranteed one-hour response (to the scene) time. Severe trauma cases are first stabilized and then transported by air to Idaho Falls. All EMTs and paramedics are volunteers and are provided through the local hospital. All County Sheriff deputies have had field training in incident management. With regard to towing and recovery, the County works off a rotating list; however, as with other agencies, when a vehicle with rotation and extended boom capabilities is needed, they are immediately called to the scene. The opinion was expressed that towing and recovery personnel would benefit from additional training.

Both Teton County and WYDOT practice a quick clearance policy, the latter primarily on Interstate routes. Although not yet codified, WYDOT is attempting to have the Wyoming State Legislature enact "hold-harmless" legislation. The WYDOT Director is working with the Wyoming Highway Patrol Administrator and the State's Risk Manager to build support for this initiative. Secondary crashes and "just-in-time" delivery are just two of the reasons cited. Commenting with regard to recurring problems on I-80 across Wyoming, one change already agreed upon is establishing a time limit for removing crash wreckage from the scene. "If a wrecker has not arrived at the scene within that time limit, probably an hour or an hour and a half, we would use our equipment to push the wreckage off the highway" the WYDOT Director stated.¹³

In addition, WYDOT intends to deploy more DMSs and add flashing lights to HAR signs to attract motorists' attention to adverse traffic conditions. A recent newspaper article referred to the fact that "it might take hours before a Highway Patrol Officer arrives at the scene of an accident..."¹³

With regard to motor vehicle crashes, the Teton County Sheriff's Deputies function as the Incident Commander on non-State routes; on State routes, the Wyoming Highway Patrol performs the same function. If the Highway Patrol requests assistance, the Sheriff provides it. Based upon the interviews conducted, most agreed that the region enjoyed excellent working relationships among the responders, most of whom are volunteers. If a crash occurs within Teton Park their policy is to have the most qualified person on-scene function as the Incident Commander. Park Rangers provide traffic control.

Regarding on-scene communications, the Highway Patrol and WYDOT share one common frequency; similarly, the Teton County Sheriff and the Highway Patrol can communicate directly. However, there exists no common frequency by which the WYDOT responders can communicate directly with the Sheriff's deputies. Most counties in the greater Teton area have mobile command centers.

Within the Park the terrain is quite flat; hence cellphone coverage is very good. The Park uses one stationary repeater and one mobile booster repeater. They also use two satellite phones. In all, there are eleven satellite phones available in the area.

- Incident Notification to Travelers: WYDOT currently has deployed five large overhead DMSs in the area and plans on deploying additional ones. When a State facility (usually an Interstate) is closed, the DMSs are activated with appropriate messages. No portable DMSs are in the inventory; however, signboards displaying chevrons are available. Highway Advisory Radio is also used to alert travelers to important travel information. *The HAR messages are broadcast in both English and Spanish*. Information also is provided to local radio stations and posted on their website. WYDOT is in the process of hiring a Public Information Officer in each of its Districts.
- Security and Terrorism: The Teton Fire Department has recently published an <u>Emergency Response Operational Guidelines</u>, a concise and durable booklet that will be carried in every cab or glove box of every area responder. They do not limit their view of exposure to terrorist acts as being only from outside. The Fire Marshal commented he worried just as much about terrorist actions originating from within the area.
- **Incident Debriefing:** Incident debriefings are conducted, but it appears that they are somewhat agency specific. WYDOT commented that they were never invited to incident debriefings by other agencies. The Sheriff's Department conducts debriefings after major incidents, but without towing and recovery responders. The Park personnel hold debriefings when a severe incident occurs.
- On a related note, the Fire Department *conducts mandatory mental health* debriefings (critical incident stress debriefings). They are conducted in clinical context (i.e., not operational) with mental health professionals as warranted. Interestingly, the Park does the same thing, although attendance is not mandatory.

Homestake Pass (I-90) and Vicinity

On December 13, 2001 and August 29, 2002 interviews were conducted with Montana Department of Transportation Maintenance staff and the Butte – Silverbow County Fire Marshall respectively. A great deal of useful information regarding current incident management practices was gathered.

- **Prevalent Incident Category:** The most prevalent incidents at, and in the vicinity of, Homestake Pass are vehicle crashes and road closures due to drifting, blowing and heavy accumulations of snow.
- **Incident Detection and Verification** Virtually all incident detection is via 911 calls from motorists; in addition, notification of some incidents may be reported and verified by the Montana Highway Patrol, the County Sheriff or MDT maintenance personnel if they are first to happen upon the incident scene.

All 911 calls go directly to the Butte – Silverbow Fire Department dispatch center. Even though 911 callers may be unaware of their exact location or be unable to provide reliable information, dispatchers (of which there are nine) deploy whatever equipment and personnel are needed based upon information provided by the caller. I-90 of course has mile markers, and the Pass is east of the city of Butte. The dispatcher usually can determine the general location of the incident and the number of vehicles involved in the collision, whether there appear to be serious injuries and whether a potential HAZMAT situation exists. When the first responder arrives, verification of incident characteristics and needed resources are updated. When MDT personnel are required at the scene they receive notice of incidents via fax, phone or wireless call from the 911 dispatcher.

- Formal Incident Management Response Plan: A formal incident management response plan exists for the region including Homestake Pass. It is kept in a small binder and can readily fit in the glove box of any vehicle. The Butte Silverbow Fire Marshall has the sole authority (through the dispatcher) to deploy resources to the incident scene.
- **Intergovernmental Agreements:** Informal agreements exist with the airport management, MDT and the Highway Patrol. There is no need for an agreement with the Sheriff's office, as the Fire Department is "under" the County law enforcement function.
- **Incident Command:** The Fire Department utilizes an Incident Command System and a Uniform Command Structure. Usually, the ranking Fire Department person onscene person serves as the Incident Commander. However, depending on the on-site circumstances, the assignment of Incident Commander may (and often does) change. Interestingly, the Butte-Silverbow Fire Department functions as the Incident Commander for on-airport events; airport Crash Fire and Rescue (CFR) personnel perform operational functions under the direction of the Incident Commander.
- **On-Scene Incident Management:** On-scene safety is the highest priority. At any incident where traffic begins to queue, the Incident Commander immediately directs a vehicle be sent "upstream" to alert oncoming traffic that the roadway may be closed or otherwise restricted. Unique to the findings of this study, *towing and recovery firms are charged with the responsibility for cleanup of non-toxic HAZMAT spills and for establishment of on-scene traffic control.* The Fire Department, in cases where toxic HAZMAT situations exist, has an "on-call" contract with a firm in Helena to perform the cleanup. In these cases, the Fire Department establishes a perimeter to protect the public and responders.

MDT's role at crash sites is somewhat limited; i.e., they may be requested to assist in the cleanup of non-toxic HAZMAT spills, provide upstream warning to approaching motorists that slowed or stopped traffic lies ahead, and generally monitor traffic queues. With regard to road closures, weather related or otherwise, MDT has the sole authority to close state and interstate facilities. When a facility is closed for weather related conditions, MDT personnel travel the area of closure in both directions to assure that no motorists are "trapped" within the confines of the closure.

Vehicular crash victims are generally treated at local hospitals if their injuries are non-life threatening. Individuals with severe trauma are first stabilized at St. James hospital in Butte, having been ground transported by a private ambulance service, and then flown to trauma centers in either Great Falls, Missoula or Billings.

Large towing and recovery vehicles and extraction equipment are not brought to the scene until the Incident Commander requests them, unless the caller's information causes the dispatcher to deploy them immediately. There exist two large towing and recovery (rotators and extended booms) vehicles within Butte. In addition, the Fire Department has the "jaws of life" and other extraction equipment. Two backup power systems are also available at all times.

The Fire Department has a mobile command center. Communications is not considered a major problem, although the nature of the terrain often makes cellphone use ineffective. The Fire Department vehicles have 16 separate channels; thus the MHP, MDT, the private ground transport ambulance, St. James Hospital and the Fire Department can communicate on-scene and off-scene. Satellite phones have not been purchased due to their high cost. Whether or not to practice ad hoc quick clearance is "the Highway Patrol's call."

- Incident Notification to Travelers: MDT notifies the traveling public of en-route incidents by means of DMSs, HAR and local electronic media. However, DMSs are not always activated when crashes occur on I-90. MDT also has a significant number of RWIS sites, several with cameras (unfortunately, no cameras are located in the Homestake Pass area). The public can gain real time access to conditions at several RWIS sites via MDT's website. The Fire Department provides information to electronic media. At this point, they do not post highway closures or travel restrictions on their website. Alternate routing plans have not been developed.
- Security and Terrorism: The Fire Department has begun training for emergencies involving Weapons of Mass Destruction (WMD); at this point they have secured \$15,000 for a variety of equipment such as respirators, decontamination equipment, specialized clothing, etc.
- **Incident Debriefing:** MDT conducts post-incident debriefing regarding how well it carried out its responsibilities at an incident. These meetings often lead to operational improvements. However they do not participate in multi-agency debriefings, but they would like to. The Fire Department also holds post-incident debriefings, but only after "major incidents." The Fire Department conducts stress reduction sessions, particularly after severe incidents, that are "very well attended." Outside healthcare professionals are brought in to conduct these sessions.

In addition, the Fire Department has an impressive, ongoing training program. Logs of each responder's training are kept to ensure that cross training is comprehensive. One page from a logbook, randomly selected, *showed 31.5 hours of training for a responder during one month*. Training is available from 45 categories. In addition, *every piece of their equipment is checked every day to assure its proper operation*.

CHAPTER 7: MESSAGE SETS—NOTIFYING THE PUBLIC

One of the most essential components of incident management is notifying the public that an incident has occurred. By providing accurate and timely information to motorists, they may make a decision whether to travel in the vicinity of the incident. Some of the more important and obvious elements of the information provided would include a description of the incident, its location, anticipated duration until normal flow of traffic will be restored, alternative routes available, and assurance that updates will be made periodically. The exact content of the information will depend on what media type is used.

There exist several outlet media for informing the public of an incident and/or roadway conditions. Some of the more common ones are AM and FM radio, television, Highway Advisory Radio (HAR), Dynamic Message Signs (DMS), 511, Highway Closure and Restriction System (HCRS in Arizona), kiosks at truck stops/rest areas/information centers, and the Internet. Each of these systems has its own advantages and disadvantages; however, taken as a whole, they have the potential to provide the traveling public with a great deal of accurate and timely information.

The key to successfully providing useful information to travelers lies in effectively matching the message to the media outlet used. For example, an AM or FM radio station is free to provide listeners with a continuous stream of travel related information for as long and as frequently as it wishes. At the opposite end of the spectrum are DMSs that must convey concise, easily understood messages in the few seconds available for viewing by motorists.

The following discussion describes the primary characteristics of the two media outlets most related to this study: Highway Advisory Radio (HAR) and Dynamic Message Signs (DMS). Also addressed are the types of messages appropriate to each, the limitations of message sets, and what are generally considered to be the most appropriate conditions under which each message is used.

It is worth noting that there are several "schools of thought" as to what constitutes a "correct" message. For example, an actual DMS message reads CRASH AHEAD (top line) RIGHT LANE CLOSED (middle line) MERGE LEFT (bottom line). Arguably, it is redundant to direct motorists to MERGE LEFT after informing them that the RIGHT LANE (is) CLOSED. Most motorists could be expected to reach their own conclusion to MERGE LEFT without the use of limited and valuable space on a DMS.

Whether posting messages on HAR or DMSs, the following information sequence should always be used: the ACTIVITY, its EFFECT and the *recommended* ACTION. There exists substantial literature on message sets and their applicability. Often they are categorized as either "routine" or "non-routine." In keeping with the focus of this study, i.e., on unplanned events (to the exclusion of planned events), only message sets for non-routine events are discussed in this document. "Non-routine events include *weather, crashes, roadway and unusual conditions*. Weather incidents include any weather that adversely affects travel. Crashes include any incident that involves vehicular collisions that adversely affects travel. Roadway incidents are situations that result in adverse (roadway) surface conditions that affect travel. Unusual conditions are adverse situations that do not fall into any other of the non-routine categories."¹⁵

Highway Advisory Radio (HAR)

HAR may broadcast either a "canned" travel message at a pre-determined interval, or a "tailored" message specific to an unplanned event, roadway or other condition on a specific AM or FM frequency. Signs indicating the applicable radio frequency are located along the roadway within the reception range of the radio signal. Amber lights are (or should be) located above and below the sign. When there is information the road agency wishes to provide the public, the amber lights alternatively flash, alerting motorists that important travel information is currently available. Even though the HAR system is owned and operated by a state agency, local agency messages of an emergency nature on a non-state facility usually are accommodated.

When in use for non-routine events, HAR messages should include a description of the activity occurring (e.g., CRASH AHEAD X MILES), the most likely effect on traveling motorists (e.g., REDUCED SPEEDS AHEAD) and any *suggested* action by motorists (e.g., USE CAUTION). Additionally, the message should be preceded by: agency identification, day and time of day, radio call sign, direction of targeted traffic, location of the event by milepost or distance from an obvious landmark and any regulations and/or detours in effect.

When not in use to provide travel advisories or other important travel related information, HAR systems continue to broadcast basic information such as the name of the agency providing information and, in some cases, current roadway conditions at locations known to be problematic (e.g. Bozeman Pass, east of Bozeman, MT).

HAR radio signals are deliberately not strong, as they are intended to benefit travelers within the vicinity of unique locations that often experience adverse driving conditions. On the other hand, there is no reason why they cannot be used to alert travelers to incidents or other travel conditions many miles from the broadcast range.

Typical message sets used for HAR non-routine events might include severe crosswind warnings in the vicinity of a community or other landmark, snow-packed and/or icy conditions at mountain passes, construction and/or maintenance activities keyed to mile markers, lane restrictions, road closures and any other information the agency believes would be of benefit to the traveling public. HAR has the additional benefit of alerting motorists to planned construction and/or maintenance operations. In any event, extraneous information should never be included in an HAR message.

There exists a great deal of flexibility in composing HAR message sets to fit the specific circumstances motorists will encounter. Once motorists select the appropriate radio frequency, they are free to listen to detailed information without being distracted from the driving task. DMS message sets, on the other hand, must be concise, specific, and easily understandable. Motorists usually have only a few seconds to perceive, process and react to the DMS message.

Dynamic Message Signs (DMS)

Arguably, the most important aspect of DMSs is that they should be used only when conditions warrant. Often they are not. Accurate and timely displays of posted messages are essential to maximizing their credibility to motorists and minimizing the potential for litigation based upon allegations that the signs either were not used or that they were used inappropriately. Appropriate use includes removing the posted message promptly when it is no longer needed.

DMS message displays should be consistent with the specifications established in the <u>Uniformed</u> <u>Manual of Traffic Control Devices</u> (MUTCD). The Manual states that DMSs "should not be used to display messages other than regulatory, warning, and guidance related to traffic control."¹⁶

The MUTCD also requires that messages be in capital letters and have a desirable letter size of 450 mm (18 in) or a minimum letter size of 265 mm (10.6 in). Signs should be limited to no more than three lines with no more than 20 characters per line. No more than two displays should be used within any message cycle. Each display should convey a single thought. The entire message cycle should be readable at least twice by drivers traveling at the posted speed limit, the off-peak 85th percentile speed, or the operating speed.

The standard for DMSs is as follows: Messages shall be centered within each line of legend. If more than one DMS is visible to motorists, then only one sign shall display a sequential message at a given time. The three line DMS must be limited to not more than two messages. Techniques of message display such as fading, exploding, dissolving or moving messages should not be used. DMSs may be permanently installed (usually, but not always, on controlled access facilities) or portable. Large, permanently installed DMSs, when activated, generally contain three lines of illuminated text of such size that they can be read and reacted to by approaching motorists. Messages posted on permanent DMSs usually are composed off-site from a Transportation Operations Center (TOC); however, it is possible to post messages in the field using a laptop computer.

The primary advantage of permanent DMSs is that all travelers can view them simultaneously; also, they can be viewed from greater distances. Their primary disadvantage is their high capital cost (\$250,000 or more) as well as their operating costs.

Portable DMSs are brought to a location for a variety of reasons. For example, a permanent DMS may be located too far from an incident or adverse travel conditions. Consequently, the message "retention" by motorists would be lost by the time a reaction was called for. In other cases, it may be desirable to relocate the message periodically. For example, if the message is intended to alert approaching motorists that traffic may be slowed or stopped ahead, the message should "travel" in advance of the queued traffic. Message portability, the ability to change messages immediately on-site as conditions warrant and the comparatively low capital and operating costs of small DMSs are significant advantages of their use.

The primary disadvantage of portable DMSs is that they are not visible to motorists well in advance of their location, nor do many motorists view them simultaneously. Both of these deficiencies are directly related to their horizontal and vertical position. An additional disadvantage is that much less space is available on the sign to post the message.

In general, the message parameters applicable to HAR also apply to DMSs; i.e., messages should include a description of the activity occurring (e.g., CRASH AHEAD X MILES), the most likely effect on traveling motorists (e.g., REDUCED SPEEDS AHEAD) and any *suggested* action by motorists (e.g., USE CAUTION). Typical DMS messages would advise motorists of lane closures or restrictions, construction or maintenance activities, incidents, severe crosswinds and other important travel information.

Regardless of which type of DMS is utilized, the message must be concise, accurate, easily understood, conspicuous, updated as circumstances warrant and appear only for the duration of the condition conveyed by the message.

Most agencies providing information using DMSs or HAR will not direct motorists to take specific action. The reason behind opting for passive messages is the potential for incurring liability if traffic is *directed* to take a specific action. For example, if a DMS message were to state: "SLOW TO 30 MPH" and a compliant motorist did so, only to be rammed from behind by a vehicle traveling 70 MPH, the agency posting the message would most likely be exposed to litigation. A more passive approach of advising of reduced visibility and urging caution by motorists satisfies the agency's responsibility of alerting motorists to potential danger, but *obligates motorists to use there own judgment regarding their responses to the posted message*.

Ideally, adjacent states would have similar policies and protocols with respect to posting messages on HAR or DMSs. To the extent that policies and practices differ, they impede development of agreements between agencies regarding posting a DMS or broadcasting an HAR message about an incident only two miles away in an adjacent state. Idaho and Wyoming have entered into an agreement for Teton Pass. This practice should become wide spread. Adjacent states could convene and draw up a list of messages acceptable to each state and, upon approval by each state's legal counsel, document the common message library in an Intergovernmental Agreement (IGA). In addition, the IGA would address the concept of operations, hold harmless clauses, communications, and other issues, resulting in a multi-state agreement that would serve the public interest well.

511

When deployed, the new traveler information number 511 will provide motorists with traffic, weather, major incident locations, construction/maintenance and other travel related information intended to enhance travel safety. As use of the number continues to grow, full deployment in many states may add "available service" information such as lodging, recreational activities, parking availability (and pricing) at major tourism venues, and other information targeted for the convenience of motorists. Montana deployed its 511 system in January 2003; it provides safety related travel information on Interstate, other primary and major secondary State routes.

CHAPTER 8: PRIMARY RECOMMENDATIONS

Categorized below are some of the more important recommendations resulting from the project. Table 2 on page 42 contains a more comprehensive summary of *all* recommendations, indexed by the incident management component(s) to which they are most applicable.

Minimizing Incident Duration

Factors affecting incident duration are almost endless. For example, prevalent travel and weather conditions, as well as vast distances between emergency response facilities, impede a rapid response to most incidents. These factors, and similar ones, for the most part, are beyond responders' control. Therefore, the following discussion is focused on factors cited earlier which are *within* control of responders and their jurisdictions and which, when implemented, are most likely to minimize duration of incidents.

Several practices to minimize incident duration can be implemented *prior* to an incident occurring. Frequent and realistic training exercises should be conducted involving all organizations likely to be called to an incident. Borrowing a term from the lexicon of Intelligent Transportation Systems, this is the "concept of operations", or "who is responsible for what" at an incident scene. These exercises should be evaluated immediately upon completion. If they are carried out on a regular schedule, with varying parameters, trust among responders builds and they vastly improve their ability to perform efficiently. In addition, equipment likely to be needed at an incident scene should be tested and properly maintained to minimize the chance it will fail when in use. Moreover, everyone should know its location and several individuals should be proficient in its operation.

Another extremely important factor in minimizing incident duration is often referred to as "between the white lines." In other words, as soon as possible (i.e., after injured victims are extracted from vehicles and prepared for transport) every responding vehicle should either be removed from the traveled way to the shoulder or, preferably, leave the scene immediately once its function is completed. No emergency vehicle should ever remain on scene longer than absolutely necessary. Accident reports need not always be prepared in hardcopy form while the law enforcement official (in a vehicle) occupies the shoulder of the roadway. More and more jurisdictions are purchasing hand-held computers for rapidly reporting data, which can subsequently be downloaded off-site at a convenient time. Thus the efficiency and effectiveness of on-scene incident management is directly related to incident duration.

Ideally, each responder and piece of equipment should arrive on-scene when needed and depart when no longer needed. For example, if it is judged by the Incident Commander that a large "rotator / extended boom" towing and recovery vehicle will be needed, and the nearest unit is 75 miles away, the unit should be called for immediately, not as an afterthought. If the Incident Commander observes that more personnel have responded to the incident than are required to safely manage it, those extra personnel should be thanked for responding and released.

If death has occurred as a result of an incident, and the law requires pronouncement of such by a Coroner, clearing an incident can be delayed for hours by locating the Coroner and transporting him or her to the scene. At least one venue (and perhaps others) has implemented a policy of orally and/or electronically transmitting key vital statistics from the scene by paramedics to a

Coroner at a remote location who, upon examination and analysis of the data, can legally pronounce death, thus permitting removal of the victim from the scene.

When a 911 call is received (the overwhelming means by which incidents are detected within the study area), dispatchers obtain as much information from the caller as possible. Then a decision must be made as to what equipment and personnel resources should be deployed to the scene. Even though the information obtained from the caller may be inaccurate, time is saved if all equipment and responders conceivably needed are dispatched rather than waiting for the first responder to confirm the need. Fortunately, all agencies interviewed follow this policy. Doing otherwise could result in the loss of valuable time if a critical piece of equipment is treated as an afterthought.

Although somewhat controversial, total-station-survey may be performed rapidly and electronically and can be later downloaded at a convenient time. Controversy stems from the opinion that the equipment must be operated by a skilled person so that the data will "stand up in court" and that it often takes more time to locate and transport such a person to the scene than if the data were collected by conventional means.

Communication "problems" often have a direct and negative impact on incident duration. It is often problematic for responders from different organizations to easily communicate electronically with each other on-scene, let alone with their headquarters. The GYRITS study area is characterized by mountainous terrain, often making cellphones and/or radios useless. While expensive, satellite phones are effective at virtually any location. The Teton County (WY) area has about a dozen "satphones" and users are extremely pleased with their performance. As their use increases, costs will decrease significantly and more and more responders will find them affordable. Currently, their initial cost is about \$500 and use rates vary between \$2.00 and \$4.00 per minute.

The duration of an incident includes the time to totally clear the scene and restore normal traffic flow. Notifying the traveling public of the incident becomes very important for a number of reasons. First, if the public knows of the incident prior to approaching its vicinity, they can opt for another route or not to travel at that time. Thus, the length of the queue may be lessened by prompt initial and frequently updated notification. Second, the shorter the queue, the faster normal traffic flow is restored, and therefore the propensity for secondary crashes is reduced. Third, even though availability of alternative routes in rural and mountainous terrain is sparse, some effort should be made (particularly in the vicinity of "problem" locations) to pre-plan alternative routing. If alternative routing can be developed, it should be, regardless of increased distance. Then, when an incident occurs, the pre-planned alternative routing can be suggested to the traveling public via electronic media. Unfortunately, based upon study interviews, inadequate attention appears to be directed to this component of incident management.

Institutionalizing Responder Safety

From statistics cited earlier, it should be clear that safety of responders is a major problem not only at the scene of the incident, but also en-route to the incident.

Code 3 Response:

Several responders interviewed indicated they always preferred <u>not to</u> travel Code 3 (sirens and flashing lights and usually substantially above the posted speed limit) and did so only when they

considered it worth the inherent risk to themselves and to the traveling public. This sentiment has been expressed in other literature and anecdotally too. There have been studies done indicating that little, if any, response time is saved via Code 3 responses.

Use of Emergency Lights On-Scene:

There exists a general understanding of the term "strobe lights" or "strobes" as EMS personnel often refer them to. For use in this document they are emergency vehicle lights with an exceptionally short flash time. They are very bright and frequently mounted at several locations on emergency vehicles. When motorists approach the scene of an incident where emergency vehicles have already arrived, they are often faced with a blinding display of bright, multicolored flashing lights randomly located surrounding the scene. Motorists are visually distracted from the driving task; their vision is drawn toward the bright flash, which is usually in the peripheral part of their vision. There is medical evidence¹⁰ to substantiate that motorists are inclined to steer their vehicles toward the strongest visual stimuli, i.e., the emergency vehicles. This phenomenon is compounded at night where it is estimated that divers can lose their "night vision" for 15 seconds or more. If illegal or prescribed drugs or alcohol impair the driver, night vision can be lost for thirty seconds or more. In other words motorists may approach or pass the incident scene literally driving blind. It is no wonder that there is an alarming increase in onscene injuries and death to law enforcement, towing and recovery personnel and other responders. Preoccupation of any responder with the task at hand may result in temporary inattention to passing traffic, the result proving lethal to responders. Also of note, there appears to be an alarming increase in the number of towing and recovery industry responders suffering serious injuries and death as a result of the above factors.

Some state law enforcement agencies (e.g., California Highway Patrol) have adopted a warning light policy of using a flashing light of longer duration, so as not to add to the risk responders already incur.

Positive Traffic Control:

At any incident there are many actions going on simultaneously. Obviously, establishing traffic control (whether closing the facility or restricting travel) is one of the first and most important functions to be performed. Positive traffic control has several components. First is determining which agency has the primary responsibility for this function. It varies widely among the GYRITS states. Of particular importance is that the individuals having this responsibility be properly trained and equipped in accordance with the specifications of the current edition of the Manual of Uniform Traffic Control Devices (MUTCD) and that temporary traffic control features (tapers, frequency of placement of cones, signs, flagging, etc.) also be in accordance with the provisions of the Manual. Failure to train, equip and act in accordance with the MUTCD can lead to litigation and injury to responders.

It is also important that the sole responsibility of one or more responders should be to observe the entire scene with respect to approaching traffic, and to the extent possible, make eye contact with drivers. Doing so will offer the first clue if a motorist is approaching or passing the scene in an unsafe manner. In addition, if an approaching vehicle begins to encroach upon the protected area, the individual with the "observation" responsibility should be able to immediately warn other responders of the imminent danger (i.e. with a loud device of some sort).

The Big Picture:

If management of an incident is extremely complex and severe, the Incident Commander may want to assign a responder to provide "advisory oversight". This person's role would be to always think about and observe the "big picture" of what is occurring on a continuous basis. Even the most proficient Incident Commander may be drawn into the detail of a particular function and may, on occasion, find it helpful to have a backup person who is always taking in the whole view of what is transpiring.

Quick Clearance:

Several responders interviewed were unfamiliar with this term; others had varied interpretations as to what it meant. Others knew precisely what it meant but were wary of implementing it. Yet others both understand and practice it.

For purposes of this study, Quick Clearance is a procedure for moving something (e.g., an overturned truck carrying non-toxic cargo, totally or partially blocking the roadway), if it is the only remaining impediment to restoration of normal traffic. In this case, the Incident Commander orders it moved to the shoulder of the roadway (if one exists) or over the side of an embankment if that is the only means by which it can be relocated from the traveled way.

Where Quick Clearance is practiced, it is carried out in a variety of ways. Some states have enacted "hold-harmless" legislation, thus protecting jurisdictions and their responders from litigation, absent gross negligence and / or willful misconduct. Some agencies have not codified it in state statutes, but practice it as a matter of "policy." Other agencies deal with the issue on a case-by-case basis, while others do not practice it at all.

There does seem to be a trend toward hold-harmless legislation. When enacted, Incident Commanders are more likely to practice it without fear of personal liability. The result will be that normal traffic flow will be restored much more quickly and the opportunity for secondary crashes will be reduced significantly.

Terrorism and Weapons of Mass Destruction

Perhaps because the tragic events of September 11, 2001 occurred in urban areas, many people likely think of potential future terrorist actions as occurring in similar locations. That may well prove to be the case; however, there may still be significant implications for rural jurisdictions. For example, if a Weapon of Mass Destruction was unleashed in an urban area of the states within the GYRITS study, it is likely that the vast majority of the populace would flee to what they perceived to be (rightly or wrongly) the safe haven of rural areas. Such a mass exodus would be chaotic; existing transportation facilities would be unable to accommodate the traffic volumes. People might arm themselves. It is likely that unbridled panic would prevail and hoards of people would seek refuge in less populated rural communities. Local officials, regardless of efforts to anticipate and prepare for such an event, would quickly be overwhelmed. Food supplies would quickly run out; shelter would become unavailable. Orders and/or advisories from officials likely would succumb to rumors, and violence most likely would occur. All persons interviewed agreed that such a scenario was not unrealistic and that they would be unable to cope with it. Consensus: the ultimate incident to manage!

Virtually all officials interviewed, however, pointed out that their jurisdictions had considered the possibility of such an event and had already allocated some resources to deal with it. But without outside assistance (perhaps even with it) the situation would be difficult for a sustained period. One local official even commented that he was more concerned about the possibility of a major terrorist act originating from within his community with virtually the same results.

Adequacy of Resources

Without exception, every official interviewed during this study cited a lack of adequate resources as problematic to carrying out their responsibilities. Some cited the need for additional training; others are looking ahead to the issue of homeland security and want to acquire specialized training and appropriate equipment. Inadequate communication capabilities, both on and off-scene, were frequently mentioned as a high priority need for additional funds.

It should be remembered that the structure of most *rural* responding agencies is centered on some paid personnel, but the vast majority of responders are volunteers. Unlike their *urban* counterparts, most of whom are paid employees of highly organized departments with larger and flexible budgets, funds available to rural agencies are much tighter and every dollar must be spent only on the highest priority items. Some volunteer responding agencies enlist the support of their communities through fund-raising events to augment official budget allocations. It would be unique in a large or medium-sized urban area to witness a bake-sale being held to raise sufficient monies for essential safety equipment or training of personnel.

Liability

Liability is best addressed in term of its source. No document of this type could possibly cite every conceivable action by responders that might result in litigation. However, there are a few areas, some of which have already been touched upon, that can be highlighted for consideration.

Incident responders may be held liable if they do not follow existing protocols and guidelines such as those contained in the MUTCD.

Mentioned earlier was the issue of quick clearance. It is axiomatic that the incident scene should be cleared as soon as possible and normal traffic flow restored without *unnecessary* delay. How long should the Incident Commander wait, once the opportunity exists, to order a large truck with a cargo of expensive computers pushed over the edge of an embankment with virtual certainty of total loss of the cargo? In most cases, unfortunately, it must be a judgment call by the Incident Commander; he or she must weigh the possibility of a lawsuit from loss of the cargo against the possibility of a severe secondary crash if he fails to act at the first opportunity. *No Incident Commander should have to carry that burden!* Rather, each state should establish "hold-harmless" laws and provide guidelines derived from those laws, so that the Incident Commander may make what he or she considers to be the decision in the best interest of public safety without being second-guessed by others.

Information Sharing and Interagency Agreements

Successful use of both the Unified Command Structure and Incident Command Process depend heavily upon the unrestricted sharing of information: pre-incident, during incident management and post-incident. It is not always essential to embody the bases for sharing information in some written form such as Inter-agency Agreements IGAs) or Memoranda of Understanding (MOUs). However, there are circumstances where some level of formal documentation spelling out relationships is helpful, even necessary. Emergency service providers may be subject to state or local regulations that restrict their participation, involvement or response to incidents outside their jurisdiction. Coordination and integration of functional, technical and operational needs and requirements of emergency service providers in traffic management situations, institutional structures and operational protocols all impact the Concept of Operations, i.e., who is responsible for doing what during incident management.

For example, the interviews revealed that involvement of State Departments of Transportation, as part of incident management, is in most cases minimal. This is unfortunate because State DOTs have very competent personnel widely dispersed throughout the transportation network, quick access to a wide array of useful equipment, are well-trained responders in establishing temporary traffic control, and can readily call upon the assistance of other State agencies as needed. Incident managers would benefit from active State DOT involvement. They should be involved in joint training exercises, cross training and debriefings after major incidents.

Table 2 contains a summary of all recommendations resulting from this study. Each recommendation is related to applicable components of incident management.

Table 2. Summary of Recommendations

Summary of Recommendations	Pre- Incident Planning	Incident Detection, Verification, and Response	On-Site Incident Management	Notifying the Traveling Public	Incident Clearance	Post- Incident Debriefings
Provide cross-training; i.e. many responders are proficient in several skill areas.	~		~		~	~
Establish trust and build solid working relationships with responders in other agencies.	~		~		~	~
Conduct realistic multi-agency Incident Management training for worst case scenarios on semi- annual basis.	~	~	~	~	~	~
Keep training current and keep up-to-date records of which responders have been trained for equipment/skills.	~					~
Frequent testing of all equipment; location of special equipment should be known to all responders.	~					
All responders qualified to operate special equipment should have 24 hour access to it.	~		~			
Practice Incident Command System and a Unified Command Structure even on routine incidents.	~		~			
Wherever possible, designate alternative routing and provide it to all responders; load-rate bridges for trucks.	~			~		
Establish Interagency Agreements or Memoranda of Understanding for operating outside own jurisdiction.	~		~		~	
As a minimum, establish and document a hold-harmless policy re: clearing roadway; enact legislation if possible.	~		~		~	
HAZMAT Manuals, Policies and Procedure manuals, and critical telephone #s should be with every vehicle & responder.	~	~	~		~	
All responders should be familiar with and adhere to provisions of the Manual of Uniform Traffic Control Devices (MUTCD) Millennium Edition.	~		~			
Any informal agreements for crossing jurisdictional boundaries should be documented.	~					
To the extent possible, incident "problem areas" should be monitored (e.g., avalanches) and remediated.	~		~	~		
Enhance on-scene and off-scene communication through purchase and use of satellite phones.	~		~			

Summary of Recommendations	Pre- Incident Planning	Incident Detection, Verification, and Response	On-Site Incident Management	Notifying the Traveling Public	Incident Clearance	Post- Incident Debriefing
Develop evacuation plans in the event that Weapons of Mass Destruction (WMD) are used in area.	~			~		
Install GPS units on all emergency vehicles and maintenance vehicles; install Computer Aided Dispatch.	~	~				
Jurisdictions should fund emergency service providers so that they have the equipment and resources necessary to manage incidents.	~	~	~		~	
Agencies should share appropriate IM information with each other	~	~	~	~	~	~
Regional emergency response agencies should include state DOTs in training, debriefings and responses to incidents; these agencies have a great deal of equipment, training and are widely dispersed throughout each state, thus making personnel and equipment available early in the response	~	~	~	~	~	~
Upon receipt of 911call, resources consistent with information provided should be dispatched immediately.		~				
Incident Command System should be flexible and provide for (temporary) change in Incident Command.			~			
There should be positive and uninterrupted attention paid to passing traffic throughout incident management.			~			
At least one responder should be assigned the sole responsibility of maintaining eye contact w/ passing motorists. That responder should be able to alert others if a motorist encroaches in the protected zone.			~			
All responders should avoid preoccupation with tasks at hand.			~			
Avoid improper and unnecessary placement of emergency (and other) vehicles so as to allow traffic to pass scene if possible.			~		~	
As soon as incident facts are known, public should be notified so they can avoid the scene.			~	~		
Avoid on-scene use of multi-vehicle strobe lights, particularly at night.			~			

Summary of Recommendations	Pre- Incident Planning	Incident Detection, Verification and Response	On-Site Incident Management	Notifying the Traveling Public	Incident Clearance	Post- Incident Debriefing
When each responder has completed their responsibilities, he/she should leave the incident scene so as to facilitate restoration of normal traffic flow.			~		~	
To minimize the potential for secondary collisions, deploy a vehicle at, or in advance of, the end of the queue.			~	~	~	
Consider the certification of off-site pronouncement of death(s) by a Coroner based upon "vital signs" information from the scene.					~	
When conditions allow, prepare reports off-site and with a PDA.					~	
When practicable, consider the use of "total station (electronic) survey" to record on-scene information.					~	
After normal traffic flow is restored, responders should convene and discuss what might have been done differently to improve how the incident was managed (lessons learned).						~
When appropriate, respond and transport without sirens and flashing lights to enhance responder safety.		×				
Offer professional counseling to relieve stress of responders, particularly after serious incidents resulting in death(s).	~					~

CHAPTER 9: SUMMARY

The *Incident Management Response Guide* was developed as a resource for first responders and other emergency service providers. It contains many recommendations, the majority of which came from responders interviewed for this study and from conference proceedings attended by hundreds of their colleagues from around the nation. Most of the recommendations are procedural and require no outlay of fiscal or other resources. However, their implementation may require institutional change. It is for each responder to judge what works best in his or her organization.

Throughout the document, safety of the traveling public, and responders themselves, has shaped the narrative. In essence, much of this document was prepared for responders – by responders. In that context it represents a sharing of important practices which, if adopted, should meet the stated primary objective: "reduce the pain and suffering of incident victims …and contribute greatly to the safety of emergency service providers who themselves risk injury and death during incident management."

Virtually every conversation with incident management professionals reflected awareness of, and concern for, the need for continual improvement within their own venue. The presentations and small focus group discussions at national incident management meetings revealed that problems needing attention in large metropolitan areas mirrored those in the study area, but on a smaller scale.

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