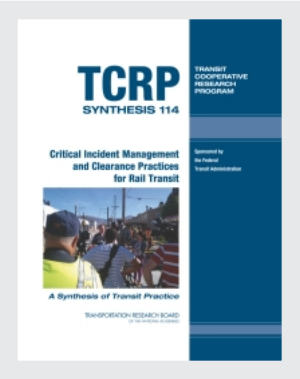

Critical Incident Management and Clearance Practices for Rail Transit

DETAILS

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TRANSIT COOPERATIVE RESEARCH PROGRAM

TCRP SYNTHESIS 114

Critical Incident Management and Clearance Practices for Rail Transit

A Synthesis of Transit Practice

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SUBJECT AREAS
Policy • Public Transportation • Safety and Human Factors

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TRANSPORTATION RESEARCH BOARD

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions,* published in 1987 and based on a study sponsored by the Federal Transit Administration (FTA). A report by the American Public Transportation Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

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The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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Cover figure: Keeping the media informed during live training. (*Courtesy*: Utah Transit Authority.)

FOREWORD

Transit administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the transit industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire transit community, the Transit Cooperative Research Program Oversight and Project Selection (TOPS) Committee authorized the Transportation Research Board to undertake a continuing study. This study, TCRP Project J-7, "Synthesis of Information Related to Transit Problems," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute a TCRP report series, *Synthesis of Transit Practice.*

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Donna L. Vlasak
Senior Program Officer
Transportation
Research Board

The report documents the current state of the practice on the approaches and frustrations that rail transit agencies have experienced regarding incident response. The synthesis summarizes the major issues faced by agencies in responding effectively and in identifying successful strategies and how post-incident evaluation affects response to the next incident. It can aid rail transit agencies in identifying solutions that work in the real world and also in providing a concise guide for communities and their responders.

A literature review and detailed survey responses from 51 of 61 agency/rail mode combinations, a response rate of 84% are provided. In addition, six case examples offer more detailed information.

Daniel K. Boyle, Daniel Boyle and Associates, Inc., San Diego, California, collected and synthesized the information and wrote the report, under the guidance of a panel of experts in the subject area. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

CRITICAL INCIDENT MANAGEMENT AND CLEARANCE PRACTICES FOR RAIL TRANSIT

SUMMARY

Rail networks are especially vulnerable to critical incidents owing to the lack of alternate routings. Rail agencies take their responsibility of transporting thousands of daily riders seriously, and also place a high priority on safety. When a critical incident occurs, sorting out these priorities is challenging. The loss of life or serious injury clearly requires a serious investigation to determine the cause of the incident. In such circumstances, it can appear heartless to focus on restoration of service, but rail customers still need to be transported, and many passengers may be on trains undamaged but affected by the incident. The challenge is to balance safety and the needs of incident investigation with customer impacts.

The purpose of this synthesis is to document the approaches and frustrations that rail transit agencies have experienced regarding incident response. The study summarizes major issues faced by agencies in responding effectively, identifies successful strategies, and considers how post-incident evaluation affects response to the next incident. The emphasis is on best-practice solutions that work in the real world.

Major findings of the synthesis include:

- A clear chain of command at the critical incident site is vital.
- An open emergency conference line is essential for sharing information during an incident.
- The relationships between the transit agency and local first responders affect critical incident management.
- Tension between the transit agency and local first responders often revolves around the priority given to restoring service.
- Education of transit agency personnel as well as first responders is important.
- The most useful guidance that could be offered to local jurisdictions, as summarized from survey responses, is dissemination of a thorough procedures manual addressing all aspects of rail incident investigation.
- Agencies with their own police forces report unexpected benefits.
- Strategies to move passengers during an incident include adjacent-track operation and bus bridges/shuttles.
- Providing information to passengers on board at the site is critical; and modern communications methods are increasingly valuable.
- Post-incident reviews are very useful.
- A proactive approach to training is very effective; and training that is engaging can be especially useful.

CHAPTER ONE

INTRODUCTION

PROJECT BACKGROUND AND OBJECTIVES

Rail transit operations are subject to incidents and accidents that may involve fatalities and result in major service disruptions. Incident response protocols within the local jurisdictions require trains to be held for the duration of law enforcement activities. In the event of rail fatalities, bodies might not be moved until the arrival of the coroner, which may result in long delays for passengers on the affected train and other traffic passing through the area due to blocked tracks, junctions, and grade crossings. Furthermore, passengers may be confined for hours until the train is released by law enforcement personnel.

Despite the impact critical incidents have on operations, rail passengers, and the public at large, little research exists to document these delays and to offer guidance on efficient incidence response strategies.

The input of transit agencies was important in defining the current state of the practice with regard to critical incident management and clearance practices. The survey plan involved a sample of 44 transit agencies operating 61 rail modes. Thirty-five (35) completed surveys were received from 34 agencies encompassing 51 of 61 agency/rail combinations, a response rate encompassing 84% of mode combinations.

The survey examines the following issues:

- Incident response coordination among multiple jurisdictions and stakeholders;
- Means to minimize impacts on affected passengers and facilitate timely communications;
- Strategies to limit service disruption to traffic on adjacent tracks in multiple-track territory;
- Issues unique to electrified territory;
- Issues and methods to ensure the safety of the non-railroad/non-transit personnel who need to access the right-of-way as part of incident cleanup;
- Procedures to accelerate the cleanup operation and allow a train to remain in service;
- Procedures to handle accident evidence/data collection;
- Challenges and constraints.

Survey results include transit agency assessments of the benefits of post-incident reviews, desired changes, guidance for local jurisdictions, and lessons learned.

TECHNICAL APPROACH

The approach to this synthesis included:

- A literature review, including a Transportation Research Information Database (TRID) search using several different keywords
- A survey of transit agencies, described in the following paragraphs
- Telephone interviews with representatives of six agencies selected as case examples.

The survey on critical incident management and clearance practices was designed to solicit information on major issues faced by agencies in responding effectively, successful strategies, and how post-incident evaluation affects response to the next incident. Once finalized by the panel, the survey was posted on line and tested. The pretest resulted in minor changes to the survey structure, logic, and flow.

After the adjustments, an e-mail with an attachment from the TCRP program manager explaining the importance of the survey and a link to the survey site was sent to a known contact at each agency. Follow-up e-mails were sent approximately four, six, seven, and eight weeks after the original contact to encourage response.

Thirty-five (35) completed surveys were received representing 34 agencies ranging in size from seven to more than 5,000 rail vehicles.

Table 1 presents the distribution of responding agencies by size. Almost 40% of responding agencies operate between 50 and 249 rail vehicles in peak service.

Table 2 shows the distribution of responding agencies by FTA region. There is reasonably balanced geographical

TABLE 1
TRANSIT AGENCIES BY SIZE

No. Vehicles Operated in Maximum Service	No. Agencies Responding	% Agencies Responding
Less than 50	11	32
50 to 249	13	38
250 or more	10	29
Total	34	100

Sources: National Transit Database 2012 Data, survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 2
SURVEY RESPONDENTS BY FTA REGION

FTA Region	No. Agencies Responding	% Agencies Responding
I	1	3
II	4	12
III	5	15
IV	3	9
V	4	12
VI	3	9
VII	0	0
VIII	2	6
IX	7	21
X	2	6
Non-U.S. (Canada)	3	9
Total	34	100.0

Sources: Federal Transit Agency; survey results.
Note: Percentages do not add to 100% due to rounding.

representation among survey respondents. Figure 1 is a map of FTA regions.

Figure 2 presents the distribution of survey respondents across the United States and Canada. Case example locations are shown by a large dot.

FIGURE 1 Map of FTA regions.
Source: Federal Transit Agency.

ORGANIZATION OF THIS REPORT

Following this introductory chapter, chapter two summarizes the findings of the literature review. Chapter three is the first of two chapters to present the results of the survey and includes findings on major impediments and actions that have been or would be useful.

Chapter four discusses the responding agencies' assessments of actions taken. This chapter summarizes agency assessment of barriers to success, potential improvements, guidance to local jurisdictions, and lessons learned.

Chapter five reports detailed findings from each of the six case examples, representing transit agencies of various sizes and rail modes across North America.

Chapter six summarizes the findings and presents conclusions from this synthesis project, and suggests areas for further study.

Appendix A identifies all transit agencies that participated in the survey. Appendix B includes the on-line survey. Appendix C, an extension of chapter two, reviews simulation and research studies related to critical incident management. Appendix D provides survey results.

FIGURE 2 Survey respondents and case examples. *Source*: Survey results and case examples.

CHAPTER TWO

LITERATURE REVIEW

This chapter summarizes findings from a literature review related to critical incident management and clearance practices for rail agencies. A Transportation Research Information Database (TRID) search was conducted to aid the literature review, using keywords such as "critical incident management," "rail incident management," "rail service restoration," "bus bridging," and "disruption recovery." Appendix C includes a review of simulation and research studies related to critical incident management.

The literature review informed the survey instrument used to gather input from transit agencies. Survey results and case example findings have been checked against findings in the literature for consistency. The conclusions chapter reflects the literature review as well as the survey and case examples. Further research needs have been developed based on unclear or conflicting information.

FEDERAL AND TCRP STUDIES

DHS (*1*) developed a National Incident Management System (NIMS) that provides a systematic, proactive approach to guide departments and agencies at all levels of government, nongovernmental organizations, and the private sector to work seamlessly to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity, in order to reduce the loss of life and property and harm to the environment. NIMS represents a core set of doctrines, concepts, principles, terminology, and organizational processes that enables effective, efficient, and collaborative incident management. NIMS uses a systematic approach to integrate the most effective existing processes and methods into a unified national framework for incident management, stressing communication and organization. A key component that has been adopted by many transit agencies and first responders is an Incident Command System (ICS) for coordinated and collaborative incident management. FHWA (*2*) has prepared a primer to introduce and describe ICS to transportation agencies and public safety personnel.

Emergencies and disasters, whether they occur at transit agencies or in the communities they serve, threaten public transportation's ability to provide practical assistance to transit personnel with responsibility for planning, managing, and recovering from emergencies and disasters. Definitions and characteristics of these events and their impact on organizations and systems are provided. Boyd et al. (*3*) explained the evolution of emergency management in the transit environment as well as specific emergency management tools. These guidelines provide a detailed discussion of transit and community activities necessary to support emergency preparedness, mitigation, response, and recovery efforts.

Pigora (*4*) developed a Transit Emergency Response Application (TERA) that accurately trains transit command-level decision-makers through simulation guided experiential learning. Simulated learning provides gradual and consistent guidance while using a blend of instructional strategies to aid learners in achieving expert performance. This application provides training and exercise for command-level roles in the transit agency's emergency operations center in relation to mitigating transit-specific emergencies and supporting state and local emergency management authorities in natural or manmade disaster incidents.

The Eno Transportation Foundation (*5*) prepared an overview of an international mission that investigated emergency preparedness programs in the public transportation systems in several Asian cities. It is based on individual reports provided by the team members, and it reflects the observations of the team members.

CRITICAL INCIDENT MANAGEMENT AND ALTERNATE SERVICE

Pender et al. 2013 (*6*) explored the manner in which passenger rail transit organizations plan for and manage unplanned service disruptions through an international survey of practices. The research reported here included semi-structured interviews of those staff responsible for service disruption management within 71 international transit agencies. Results suggested that 20% of agencies, most in urban contexts, had parallel transit modes that could be used by commuters whose service was disrupted. Most of these systems existed in inner-city contexts. The paper focused on common causes of unplanned disruptions. The most common response to line blockages was to deploy bus bridges/shuttles, transporting passengers by bus to stations beyond the incident site or to alternate train service, if available; whereas transfer of passengers to the next train was the most common approach to individual rolling stock failures. Most agencies used spare buses as bus bridge/shuttle vehicles, but rarely did agencies

have a strategic reserve of buses for this purpose. Responses to unplanned disruptions can be categorized according to duration, cause, time, and location, and the paper provides a typology of response mechanisms on the basis of such characteristics.

Pender et al. 2014 (*7*) presented a new method for assessing bus reserve location in order to best service unplanned passenger rail service disruptions. This is done by optimizing location in relation to travel time to rail replacement, the volume of rail replacement incidents, and the scale and spatial distribution of passengers affected. Strategically locating bus reserves according to criteria such as disruption likelihood can allow an agency to respond more quickly to disrupted demand. New methodologies highlight how ideal depot locations change in relation to location criteria including travel time to bus bridge/shuttle termini, likelihood of a disruption, and commuter volumes affected. When only travel time was investigated, the ideal depot location was centrally positioned, but when consideration was given to the likelihood of a disruption, the ideal depot location shifted to areas of increased occurrence. When impacts on potentially disrupted commuters were considered, in most cases the ideal depot location shifted in favor of areas of higher patronage demand. The methodology presented can improve responsiveness to unplanned passenger rail disruptions, although the paper notes that a separate depot facility specifically to house bus bridge/shuttle vehicles raises the issue of a separate independent bus fleet, given that in most cases such a fleet would not be productive when not required for bus bridge/shuttle purposes.

Pender et al. 2012 (*8*) explored the importance of providing track crossovers in addressing the issue of replacement bus services in response to unplanned rail service disruptions by using a case study in Melbourne, Australia. Crossovers determine the point from which rail replacement bus services can operate and thus are critical in determining the scale, costs, and benefits of rail disruption management. Theoretical modeling evaluated passenger and operator impacts of alternative crossover plans for disruptions on a suburban rail line in Melbourne. Results showed that an additional crossover reduced user rail disruption costs by 78% to 96%, while bus hire costs were reduced by 63% to 93%. Results suggested that only a few rail disruptions annually would make the provision of track crossovers financially viable on the basis of savings in rail replacement bus service costs. Research found that locating crossovers as close as possible to areas of major disruption provided the most benefits for users and operators. Sensitivity tests showed that even with significantly lower ridership and a lower frequency of disruption, the addition of crossovers was financially positive and generated substantial user benefits. All highlighted results are with respect to the one suburban rail line under analysis. Provision of additional track crossovers appears to be a highly positive means of reducing costs and improving services. However, research indicates that crossovers can cause disruption on some rail systems, and this factor needs to be considered in rail planning.

Line service disruptions, including infrastructure blockage and special social events, are commonplace in rapid transit systems with large deviations from planned operations. A robust network design may be too expensive to be operated on a daily basis because if there are no disruptions, a low utilization of the infrastructure may occur. Cardaso and Marín (*9*) propose a recoverable robust network design as an alternative to robust design in order to reduce the effect of disruptions and the cost of the recovery process. The recoverable robust design is defined considering several disrupted scenarios with their associated probabilities. Computational experiments demonstrate that the developed model reduces recovery and robustness costs.

Train delay incidents have major effects on transit service reliability and on customer satisfaction. Operators have long focused efforts on preventing such incidents. Barron et al. (*10*) used data from metro benchmarking groups to investigate the ways in which transit operators can better measure the full effects of incidents on train service and customers. The key benefit of such a passenger-focused approach is that it enables transit managers to direct resources for incident response and recovery better, as well as supporting the case for strategic investments. This research has shown that most operators measure and report only the frequency of incidents. Of the 22 metros interviewed, only two were able to provide detailed data to estimate the number of passengers affected by incidents. It is no coincidence that the only two metros able to provide detailed data are in fact two of the most reliable in the group.

Carrel et al. (*11*) examined the key role of service control—the task of implementing the timetable in daily operations on a metro line—as it influences the quality of the service provided to passengers. On the basis of insights gained from extended visits to a control center, the authors concluded that the reliability of the system is found to depend on many endogenous factors. These factors were not previously recognized in a comprehensive manner by either researchers or practitioners. Aside from the objectives of maintaining adequate levels of service from an operations perspective and minimizing the impact of schedule deviations on passengers, the management of crew and rolling stock, safety, and infrastructure capacity are major considerations in service control decisions. Given the uncertain environment in which service control operates, a strong preference was observed among controllers for manageable and robust control strategies. In one example, service controllers reacted to two similar disruptions with different recovery strategies, mainly because of crew management issues. This research demonstrates the importance of a comprehensive understanding of the objectives and constraints faced by service controllers in daily operations.

On July 7, 2005, the London Underground system was hit by a series of coordinated bombings. Barr (*12*) described

how the system recovered from the terrorist attacks. The goals of the consequence management team were to protect the business and determine how to get it going again. Priorities were care and welfare of the people involved, retention of evidence, and immediate engineering response and clearing of damage vehicles and infrastructure. To accomplish these goals, a series of top-level meetings were conducted regarding strategic coordination. Staff, customers, and the media were kept informed without the agency's making unrealistic promises on service restoration. Another key consideration was working with other providers to provide alternative service. Despite all of the difficulties, 80% of normal Underground operation was restored the day after the incident and service was restored on all sections of the line within one month.

De-Los-Santos et al. (*13*) examined passenger robustness measures for a rail transit network. A network is robust when it reacts well to disruptions on links or stations. In order to measure robustness, indexes relative to the overall travel time of a network when links fail are introduced for two different cases: without-bridge/shuttle interruptions and with-bridge/shuttle interruptions. In the first case, passengers either have to wait for the failure to be repaired or find an alternative route in the network, whereas in the second case a bus service between the affected stations is provided and only the failing link is disrupted. A computation of these indexes for the Madrid commuter system shows their applicability.

Given many cities' growing dependence on public rail transport, simple network disruptions can lead to widespread confusion and significant productivity loss to the society. Therefore, a systematic approach to developing efficient disruption response and minimizing the negative impacts is required. Jin et al. (*14*) developed a planning procedure to supplement a degraded urban mass rapid transit network through intelligent introduction of shuttle bus services in the disrupted area. The proposed method includes two important mechanisms: using column generation to identify all useful bus routes, including those which might not be intuitively found; and using a path-based multi-commodity flow formulation to select the most effective among these candidate bus routes. Finally, the method was applied to two disruption case studies using real-world data. The corresponding results confirmed the practicality of the proposed approach: The procedure can be carried out efficiently; introducing bus routes to the native bridge/shuttle services can easily yield significant improvement on commuters' travel delay; the distribution of commuters' travel delay is improved considerably with an optimized response; and many realistic operating constraints can be handled in planning process.

Any unexpected operational disruption in a metro network can lead to rapid degradation of the provided level of service by a city's public transportation system. Quick and efficient substitution of services is necessary to accommodate passengers, including the widely used practice of "bridging" metro stations using bus services. Despite its widespread application, bus bridging is largely done ad-hoc and not as part of an integrated optimization procedure. Kepaptsoglou et al. (*15*) present and discuss algorithms and models for designing bus bridge/shuttle routes and demonstrate their application in a real world scenario, from an extensive urban network.

Schmocker et al. (*16*) described research carried out by the Railway Technology Strategy Centre at Imperial College London in collaboration with the Community of Metros benchmarking group. The performances and service qualities of six metros (three European, two American, and one Asian) have been analyzed and compared. The focus of this research is not on incident prevention, but on strategies that can be implemented after an incident to restore service swiftly and to minimize delay. The research identifies the recovery strategies used by the six metros and summarizes advantages and disadvantages of these strategies. The influence of the type of delay on the choice of strategy is described. Similarly, the impact of constraints such as line length, service frequency, and passenger crowding on the effectiveness of each strategy is also discussed. It was found that it was generally sufficient to distinguish minor incidents, slow-moving delays, and major incidents. A case study shows that those metros with higher inbuilt flexibility can return more easily to normal service.

USE OF SOCIAL MEDIA

Pender et al. 2014 (*17*) explored the role that social media play in managing unplanned passenger rail disruptions. It incorporates an international survey of 86 agencies regarding current practice and a detailed case study on social media use in Melbourne, Australia. Research literature on social media in transit is limited; this paper presents the first analysis of their practical use during unplanned passenger rail disruptions. When disruptions occur there is a need to provide passengers with reliable, up-to-date information. Social media are useful during disruptions because they enable concise real-time information to be provided and passengers to make informed choices in sub-optimal situations. The international survey results suggest 86% of agencies now use Twitter and 33% use Facebook, while only 12% did not use social media. Twitter was prevalent in high-frequency networks, its real-time nature providing the most appeal. Social media benefited soon-to-travel commuters most, enabling proactive selection of alternative travel and non-travel options. Staff resourcing/skills were identified as an impediment to social media deployment. Rail agencies also believed that managing commuter expectations in the use of social media was a growing concern.

Chan and Schofer (*18*) presented a case study to examine how transit systems in the New York region used Twitter to communicate with customers during the service shutdown around Hurricane Sandy, an event that disrupted transit for weeks. As Sandy approached and passed through the New York region, transit agency Twitter accounts experienced large increases in "followers." Social media sites, particularly Twitter, allow agencies to transmit more information

with more control of content and timing than conventional communications channels. Furthermore, customers can communicate with public transit officials using the same service, providing situational reports and user feedback. Research to expand agencies' understanding of what riders value in social media is important to making the most effective use of them.

Social media have become essential sources of information before, during, and after disasters. Social networks such as Twitter, Facebook, and Tumblr—instantaneous, far-reaching, and interactive—have become the convergence point for a range of information sources, dialogues, and dynamic content. Kaufman (*19*) discusses the use of social media in disaster preparation, response, and recovery. Suggestions are made on how transportation agencies can best harness the power of this technology.

GENERAL ARTICLES AND STUDIES

Cotey (*20*) details impacts of Hurricane Sandy on rail agencies, discusses the recovery process, and details the high costs of implementing storm protection measures.

Jackson (*21*), a psychosocial care and traumatic incident response specialist, discusses how staff can be supported after a traumatic event. The British National Health Service (NHS) in 2009 issued "Psychosocial and Mental Health Care of Those Affected by Major Incidents and Disasters" to provide guidance for such incidents. The British rail industry can now update its current chain of care response to reflect the NHS guidance. The government guidance recommends a "psychosocial" approach to responding to the needs of people affected by traumatic incidents that focuses on their emotional, cognitive, social, and physical reactions and needs. Everyone who provides support for those involved in traumatic incidents, including rail incident care team staff, should do so using the principles and skills of "psychological first aid" and be trained accordingly.

Richmond (*22*) views critical incidents from the Emergency Medical Services (EMS) perspective. It notes that in the Madrid train attack in 2004, 1,000 passengers were transported to 15 hospitals; 270 arrived at a single hospital emergency room within three hours of the attack. Only 89 of the 270 could be admitted because of insufficient capacity. A survey of 34 level-1 trauma centers in the United States revealed that no center had the capacity to absorb more than 10% of a similar surge. Only New York and Chicago had a sufficient number of intensive care unit beds in all its level-1 trauma centers combined to absorb the number of critical care patients that arrived at one Madrid hospital. EMS resources would be stretched by the need for vehicles to travel farther distances to more remote hospitals, thus lengthening round-trip times and causing long waits at incident sites.

CHAPTER THREE

SURVEY RESULTS

This chapter presents survey results regarding coordination and communication with local jurisdictions; minimizing passenger impacts; limiting service disruptions on adjacent tracks; issues unique to electrified territory; safety of non-railroad/non-transit personnel; accelerating cleanup and keeping a train in service; accident data/evidence collection procedures; and challenges and constraints.

Thirty-five (35) completed surveys were received encompassing 51 of 61 agency/rail mode combinations, a response rate of 84% of all agency/rail mode combinations. The 34 responding agencies range in size from seven to more than 5,000 rail vehicles. Table 3 shows rail modes operated by the 34 responding agencies. Almost 60% of respondents operate light rail, 56% operate commuter rail, and 29% operate heavy rail. Almost half of all respondents characterized their service area as a mix of urban and suburban, as shown in Table 4.

COORDINATION AND COMMUNICATION WITH LOCAL JURISDICTIONS

Only five respondents operate in a single jurisdiction. All commuter rail respondents and most others operate in multiple jurisdictions. About one-quarter of all respondents (generally commuter rail agencies) operate in more than one state. Thus, almost all respondents need to coordinate and communicate with multiple jurisdictions.

Primary responsibility for managing a critical incident varies, as shown in Table 5. Most respondents reported that they notify local jurisdictions immediately; a few noted that local jurisdictions often know about the incident from a 911 call before the agency is made aware.

The transit agency's role in managing the critical incident varies, as Table 6 shows. Several agencies cited the NIMS unified command structure under which there is a single Incident Commander (IC). Transit agencies are almost equally likely to be in a support as in the lead role. Agencies coordinate service restoration, update and assist riders and the media, make the site safe for first responders, and generally manage the processes under their control.

Transit police were reported most often as having primary responsibility within the transit agency, but responsibility was typically spread among transit police, rail operations, and safety.

Agencies coordinate with local jurisdictions in varied ways. Table 7 indicates that the most common coordination occurs through joint training exercises. Many agencies noted that multiple means of coordination are undertaken.

Table 8 lists impediments to coordination with local jurisdictions, as reported by the transit agencies. Lack of time leads the list, especially for agencies operating in many jurisdictions. Respondents also cited high local turnover rates, leading to unfamiliarity with new first responders and a constant need to train them. Coordination/communication issues include understanding of the ICS and of protocols at the incident site, lack of clear responsibilities, misunderstanding of responsibilities, and reluctance to relinquish control at the scene.

Respondents suggested a number of useful actions to improve coordination with local jurisdictions. The most commonly cited action was to place a higher priority on ongoing communication and training exercises. Other suggestions include:

- Formal agreements/greater structure
- Added and/or dedicated training staff and funding
- Quarterly meetings to discuss roles and responsibilities
- Education on the different nature of rail incidents, emphasizing that "minutes matter" and the number of passengers affected
- Joint transportation-specific exercises involving front-line employees and officers on both sides
- Greater communication and consistency
- Working with training officers of fire and police commands
- Greater dialogue in advance of incidents to build trust
- Identification of central point of contact at local emergency management teams
- Establishment of a mandatory Emergency Response Council.

MINIMIZING PASSENGER IMPACTS

This section of the survey explored means to minimize impacts on two different sets of passengers: those on the scene and uninjured, and those elsewhere whose travel is affected by the incident.

TABLE 3
RAIL MODES OPERATED BY RESPONDING AGENCIES

Mode	No. Agencies Responding	% Agencies Responding
Light Rail	20	59
Commuter Rail	19	56
Rapid Transit/Heavy Rail	10	29
Total	34	100
Light Rail Only	9	26
Commuter Rail Only	9	26
Heavy Rail Only	3	9
All Three Modes	3	9
Light Rail and Heavy Rail	3	9
Commuter Rail and Light Rail	6	18
Commuter Rail and Heavy Rail	1	3

Source: Survey results.
Note: Percentages do not add to 100% because some agencies operate multiple modes.

TABLE 4
AGENCY OPERATING ENVIRONMENT

Operating Environment	No. Agencies Responding	% Agencies Responding
Mix of Urban and Suburban	16	47
Mix of Urban, Suburban, and Rural	10	29
Primarily Urban	7	21
Primarily Suburban	1	3
Total	34	100

Source: Survey results.

TABLE 5
PRIMARY RESPONSIBILITY FOR MANAGING A CRITICAL INCIDENT

Responsible Agency	No. Agencies Responding	% Agencies Responding
Local Municipality (city or county)	12	38
Transit Agency	8	25
Depends on Nature of the Incident	6	19
Unified Command under NIMS	3	9
Local First, Then Transit Agency	2	6
Conductor Is IC Until Relieved	1	3
Total	32	100

Source: Survey results.

TABLE 6
TRANSIT AGENCY ROLE IN MANAGING A CRITICAL INCIDENT

Agency Role	No. Agencies Responding	% Agencies Responding
Support/coordinate until first responders arrive	11	35
Follow NIMS structure	9	29
Lead role/take over for first responders	*8	26
Coordinate service restoration	6	19
Update/assist riders	6	19
Make site safe for first responders	2	6
Update media	2	6
Manage processes we control	2	6
Depends on complexity of incident	1	3
Evacuate people to designated evacuation centers	1	3
Total	31	100

Source: Survey results.
*Lead role if incident is on transit agency property for two respondents.
Note: Totals do not add to 100% due to multiple responses.

TABLE 7
ONGOING COORDINATION WITH LOCAL JURISDICTIONS

Means of Coordination	No. Agencies Responding	% Agencies Responding
Conduct joint training exercises	15	50
Meet on a regular basis to discuss critical incident management	7	23
Varies by jurisdiction	5	17
Meet on an ad hoc basis to discuss critical incident management	2	7
Communicate in other ways	1	3
Total	30	100

Source: Survey results.

TABLE 8
MAJOR IMPEDIMENTS TO COORDINATION WITH LOCAL JURISDICTIONS

Impediments	No. Agencies Responding	% Agencies Responding
Lack of time	9	30
High turnover rates at jurisdictions/unfamiliarity	8	27
Coordination/ communication issues	8	27
Varying levels of interest	2	7
Variation in/knowledge of each other's capabilities	2	7
Politics/internal policies	1	3
Dispatching emergency equipment to site	1	3
No impediments	4	13
Total	30	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 9
ACTIONS TAKEN WITH REGARD
TO UNINJURED PASSENGERS

Action	No. Agencies Responding	% Agencies Responding
Interview/take statements	11	38
Arrange alternate transportation	11	38
Attend to their needs/ stabilize/ensure safety	8	28
Provide information	6	21
Provide claim or witness or customer care cards	3	10
Evacuate if necessary	2	7
Ask them to keep calm, obey and assist crew	1	3
Provide water	1	3
Total	29	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

Table 9 shows actions taken with regard to uninjured passengers on the train. The most common actions are to interview or take statements from the passengers; and to arrange alternate transportation. Other frequently mentioned actions include attending to passengers' needs and ensuring their safety, and providing all available information.

Providing information to passengers on board at the site is critical. Announcements over the public address (PA) system—directly from the rail control center if that capability exists—and face-to-face announcements by staff walking through the train are the most common methods of providing information. Many agencies also send Twitter and e-mail notifications. One respondent noted that most passengers are using their cell phones on the train.

TABLE 10
TYPE OF INFORMATION COMMUNICATED
TO ON-BOARD PASSENGERS

Type of Information	No. Agencies Responding	% Agencies Responding
Instructions on what to do	30	100
Estimates of the potential delay	29	97
Instructions on what not to do	21	70
Description of the incident	17	57
Description of ongoing procedures in response to the incident	16	53
Other	6	20
Total	30	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

Table 10 shows the type of information communicated to on-board passengers. Respondents noted that description of the incident is neither detailed nor specific. "Other" responses include: evacuation plans, bus bridge/shuttle information, common sense guidance, and appreciation for their patience.

Agencies identified several impediments to minimizing passenger impacts. Table 11 lists key concerns. The number of reported impediments is testimony to the complexity of managing critical incidents.

Table 12 shows actions that have been or would be useful in minimizing passenger impacts. Clear, detailed communication is at the top of the list. "Other" responses include: early notification of incidents, clearing the scene as quickly as possible, provision of some type of alternate service, improved ability to access difficult-to-reach areas, and expedited response from the medical examiner's office.

TABLE 11
MAJOR IMPEDIMENTS TO MINIMIZING PASSENGER IMPACTS
FOR ON-BOARD PASSENGERS

Impediment	No. Agencies Responding	% Agencies Responding
Ensuring consistent, accurate information	6	19
Establishing alternate service	6	19
Passenger issues (reassuring/keeping calm/ preventing self-evacuation)	5	16
Time estimate for/obtaining train release	5	16
Train location: bridge/tunnel/remote	4	13
Response time/time of day/traffic	4	13
Limited space/limited access to right of way	3	14
Limited communication system/limited reception	2	9
Total	31	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 12
ACTIONS TO MINIMIZE PASSENGER IMPACTS FOR ON-BOARD PASSENGERS

Action	No. Agencies Responding	% Agencies Responding
Clear, detailed communication	12	41
Faster response in getting more staff on-site	6	21
Availability of equipment for alternate service	5	17
More education of first responders	4	14
Use of social media for faster communication	2	7
Advance agreement on procedures	2	7
Other	5	17
Total	29	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

Of course, riders on the affected train are not the only passengers affected by the incident. Agencies need to communicate estimates of potential delay and availability of alternate service for other passengers whose travel is affected by the critical incident. Table 13 shows the numerous means used by agencies to communicate with these passengers. Station announcements and Twitter and other social media lead all methods, reflecting a mix of old and new techniques in customer communication. Text alerts/e-mail, news releases/media updates, and the agency website are other important channels. All respondents inform affected passengers of service alternatives, and 90% provide estimates of delay.

The goal is always to communicate information to passengers as soon as possible, but this can depend on the nature and severity of the incident. Several agencies noted that responding to a critical incident with customer information takes more time because of the need to estimate the delay and set up alternate service. One agency estimated that riders are informed within 10 to 20 minutes, given the chain of the information flow and the need to script and vet the message.

Respondents were asked about the types of alternate service arranged for or deployed. Table 14 indicates that bus bridges/shuttles around the critical incident site, adjacent-track operation, and alternate bus routes are the most frequently mentioned alternate services. "Other" responses include: substitute express bus service and cross-honoring agency passes; and a comment that the type of alternate service depends on scene, location, and time of day.

The survey asked about factors affecting the choice of alternate service to provide (Table 15). Expected duration,

TABLE 13
ACTIONS TAKEN TO COMMUNICATE WITH OTHER AFFECTED PASSENGERS

Action	No. Agencies Responding	% Agencies Responding
Twitter/social media	15	48
Station announcements	15	48
Text alerts/e-mail	13	42
Media updates	13	42
Agency website	10	32
On-board announcements	5	16
Message boards at stations	2	6
Alerts to connecting buses/agencies	2	6
Prompt info by whatever means	1	3
Total	31	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 14
TYPES OF ALTERNATE SERVICE

Alternate Service	No. Agencies Responding	% Agencies Responding
Bus bridge/shuttle around critical incident site	29	94
Alternate bus routes	25	81
Adjacent-track operation	24	77
Alternate rail lines within the agency	11	35
Bus bridge/shuttle to another transit service	9	29
Rail lines operated by other agencies	6	19
Other	3	10
Total	31	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 15
FACTORS AFFECTING THE CHOICE OF ALTERNATE SERVICE

Factor	No. Agencies Responding	% Agencies Responding
Expected duration	30	97
Location	29	94
Time of day/day of week	27	87
Availability of vehicles/ personnel	25	81
Cause of the critical incident	16	52
Other (weather)	1	3
None of the above	1	3
Total	31	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

location, time of day, and availability of vehicles and personnel are important factors. One agency explained that the focus for a short delay is clearing the incident and restoring service, possibly through adjacent-track operation, while bus bridges/shuttles are used for longer delays.

Major impediments to minimizing impacts to passengers whose travel is affected by the critical incident are shown in Table 16. If a critical incident occurs in the peak period, buses and drivers may not be available to set up a bus bridge/shuttle. Communication was also mentioned often; one respondent noted that some non-agency websites give inaccurate information, requiring the agency to respond sooner than it would like and before it has a complete picture.

Clear, detailed communication led all actions that have been or would be useful in minimizing impacts for passengers whose travel is affected. Agencies gave a variety of responses, including:

- Pre-established protocols and arrangements with other operators;
- Adequate staff to manage the incident;
- Flexibility to shift employees from other assignments;
- Assigning public relations and communications staff in the rail control room;
- Use of media relations staff to monitor tweets and other social media;
- Allowing operations staff to activate emergency protocols without approval from senior management; and
- Alternate service plan for each station to pre-identify shuttle locations.

LIMITING SERVICE DISRUPTIONS ON ADJACENT TRACKS

Almost 90% of respondents reported operating on multiple tracks as a general rule; hence, actions to limit service disruptions on adjacent tracks are important in maintaining rail service. Agencies work with first responders and train dispatchers to expedite the ability to use an adjacent track. This can involve speed restrictions and the presence of rail personnel to supervise train movements near the incident location. Most respondents reported that the decision to operate on adjacent tracks is not within their control. Factors affecting this decision include judgment of the local jurisdiction or first responders, safety of investigatory personnel on the scene, debris fields, recovery of remains, freight railroad control of adjacent tracks, and clearance of fire and emergency vehicles from the tracks.

The survey asked if first responders viewed limiting service disruptions on adjacent tracks as important. Table 17 indicates that attitudes vary among local jurisdictions.

TABLE 16
MAJOR IMPEDIMENTS TO MINIMIZING IMPACTS FOR PASSENGERS WHOSE TRAVEL IS AFFECTED

Impediment	No. Agencies Responding	% Agencies Responding
No available drivers/buses	8	27
Inconsistent/ineffective/loss of communication	7	23
Lack of sufficient capacity elsewhere in the system	4	13
Location of incident	4	13
Obtaining good, reliable information	4	13
Lack of track capacity	3	10
Establishing alternate service and informing customers	3	10
Severity of incident	2	7
Inability to mitigate the problem quickly	2	7
Total	30	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 17
FIRST RESPONDERS' VIEWS OF THE IMPORTANCE OF LIMITING SERVICE DISRUPTIONS ON ADJACENT TRACKS

First Responder Attitude	No. Agencies Responding	% Agencies Responding
Depends on the jurisdiction	12	40
Important	8	27
Important but not a high priority	6	20
Not important	4	13
Total	30	100

Source: Survey results.
Note: Totals do not add to 100% due to rounding.

Impediments to limiting service disruptions on adjacent tracks are reported in Table 18. The level of familiarity with rail among first responders or their willingness to release the scene was mentioned most often. "Other" impediments reported include: overhead catenary issues, speed restrictions, track ownership, level of traffic on adjacent track, and specific location.

Agencies proposed a variety of actions to limit service disruptions, most frequently improved coordination, including joint training with first responders. Good command and incident control and having the right agency personnel on site were cited by multiple agencies. Additional crossovers would always help adjacent-track operation.

ISSUES UNIQUE TO ELECTRIFIED TERRITORY

Almost 90% of responding agencies operate trains in electrified territory. As Table 19 shows, half of the responding transit agencies have primary responsibility for the decision to shut down power to allow first responders safe access to the train. In many cases, the decision is made jointly depending upon the incident. One agency reported that it has the responsibility but will always comply with a request from local jurisdictions.

Within the agency, the rail control center is typically responsible for the decision to turn power off and to restore it. The

TABLE 18
MAJOR IMPEDIMENTS TO LIMITING SERVICE DISRUPTIONS ON ADJACENT TRACKS

Impediment	No. Agencies Responding	% Agencies Responding
First responders—level of familiarity with rail or willingness to release the scene	8	36
Safety	5	23
Scope of the incident	5	23
Track/crossover/station configuration	3	14
Extent of material on adjacent track	2	11
Other	5	23
Total	22	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 19
PRIMARY RESPONSIBILITY FOR THE DECISION TO SHUT DOWN POWER

Responsibility	No. Agencies Responding	% Agencies Responding
Agency	14	52
Local Municipality/First Responders	2	7
Varies/Other	11	41
Total	27	100

Source: Survey results.

TABLE 20
PRIMARY RESPONSIBILITY FOR THE DECISION TO RESTORE POWER

Responsibility	No. Agencies Responding	% Agencies Responding
Agency	16	62
Local Municipality/First Responders	2	8
Varies/Other	8	31
Total	26	100

Source: Survey results.
Note: Totals do not add to 100% due to rounding.

power or maintenance of way department is sometimes responsible, depending on how the organization is structured.

Table 20 shows that the transit agency is most likely to be responsible for deciding to restore power. The "Varies/Other" category includes: the IC, unified command, whoever requested that power be removed, and Amtrak.

Many issues were cited as unique to critical incidents in electrified territory. The major issues can be summarized as: the uncertainty of first responders unfamiliar with rail power systems; the time-consuming nature of certain power removal procedures on some systems; and personnel safety (one agency stated that personnel are trained to treat everything as "live").

Continued training that addresses issues around electrification was most often mentioned as the most useful action. Respondents also stressed clear rules and work practices in high-voltage areas, awareness, and communication.

SAFETY OF NON-RAILROAD/NON-TRANSIT PERSONNEL

Safety training is part of ongoing coordination with first responders and local jurisdictions, as shown in Table 21. Most agencies provide an abbreviated version of agency training, but about one-quarter of agencies provide the same training to first responders that they give employees. In most agencies, the safety department is responsible for safety training.

Table 22 shows that participation in safety training varies by jurisdiction. Only 31% of responding agencies report that safety training is mandatory for all first responders.

Table 23 summarizes actions taken by agencies to ensure the safety of non-transit personnel. As noted previously, safety training is mandatory at only one-quarter of agencies. "Other" actions include: worker protection training, limited access to incident scene, operational/equipment familiarization, speed

TABLE 21
SAFETY TRAINING FOR OUTSIDE PERSONNEL

Safety Training Offered	No. Agencies Responding	% Agencies Responding
Abbreviated version focused on their particular tasks	21	70
Same as for agency personnel	7	23
None	2	7
Total	30	100

Source: Survey results.

TABLE 22
PARTICIPATION IN SAFETY TRAINING

Participation	No. Agencies Responding	% Agencies Responding
Varies by Jurisdiction	19	66
Mandatory for All First Responders	9	31
Not Sure	1	3
Total	29	100

Source: Survey results.

TABLE 23
AGENCY ACTIONS TO ENSURE SAFETY OF NON-AGENCY PERSONNEL

Action	No. Agencies Responding	% Agencies Responding
Non-mandatory training offered	11	39
Mandatory training	6	21
Active escort for all or for untrained	3	11
Safety personnel on-site at every incident	3	11
Interagency exercises with post-review focused on safety issues	2	7
Strict right-of-way rules	2	10
Other	5	18
Total	28	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

control at incident sites, and a dedicated transit employee serving as primary liaison to first responders for training and other needs.

The most effective action to improve safety of non-transit personnel is training. Ideas included improving agency liaison with the IC and with other agencies and on-track safety training. Anything that improves awareness of the issues and understanding of the rail system will benefit the safety of all.

Agencies mentioned a variety of impediments to ensuring safety of non-transit personnel included. The number of emergency responders and varying level of commitment to rail safety training was mentioned most often, followed by level of familiarity with the dangers of rail, lack of staff to properly manage the incident, and the difficulty of retaining what they learn.

The final question in this section asked agencies for the most useful guidance they would offer to local jurisdictions. Several good ideas were included in the summary categories in Table 24. Within the training category, for example, the following ideas were offered:

- Provide familiarization training so that your first responders are aware of hazards specific to rail transit.
- Engage with the transit agency to establish relevant training, including "train the trainer" programs.
- Request specific training for all first responders.
- Train with the transit agency annually.
- Establish minimum training requirements and commit to meeting them.
- Conduct annual simulations of an actual emergency and debrief afterwards.

"Working relationships" rely on continual contact and communication. An interesting aspect of strengthening these relationships involves asking first responders what they need from the transit agency.

TABLE 24
AGENCY GUIDANCE TO LOCAL JURISDICTIONS REGARDING SAFETY

Guidance	No. Agencies Responding	% Agencies Responding
Training	16	67
Working relationships/ongoing contact (tell us what you need)	8	33
Familiarization re hazards specific to rail	5	21
Regular joint training exercises	5	21
Procedures	3	13
Commitment to minimum training requirements	2	8
Communication	2	8
Total	24	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 25
ACTIONS TO ACCELERATE CLEANUP AT SITE

Action	No. Agencies Responding	% Agencies Responding
Needed personnel on site	12	43
Use of outside contractors for cleanup	8	29
Good command and control	4	14
Prompt inspection of rail vehicles	2	7
Plan to restore service/headways	2	7
Other	7	25
Total	28	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

In the procedures category, guidance includes:

- Stay off the rail, wait for trained personnel.
- When in doubt, ask agency personnel.
- Communicate with us on the way to a critical incident for updates on injuries and location of injured persons.

ACCELERATING CLEANUP OPERATIONS AND KEEPING A TRAIN IN SERVICE

Maintaining or quickly restoring rail service is second only to safety among rail agency goals in managing critical incidents. Table 25 presents actions taken by agencies to accelerate cleanup at the critical incident site. Ensuring that needed personnel are at the site as soon as possible ensures that cleanup operations can start promptly once the site is released. Some agencies use outside contractors for cleanup, whereas others use internal staff. Good command and control at the site facilitates good communications. "Other" responses include offering gentle reminders to release trains; cleaning the train after it has been moved to the yard; making prior arrangements with first responders and the medical examiner's office; keeping the public informed; staging assets at the site; training; and assisting first responders wherever needed. One agency stated that it did not accelerate cleanup.

The majority of agencies (70%) take back control of the site when police and fire have completed their operations or when the IC releases the site, as shown in Table 26.

The survey asked agencies about strategies to allow a train to remain in service. Table 27 shows that many agencies allow the train to continue in service (sometimes with a relief operator) after a thorough on-site inspection or under other circumstances. Adjacent-track operation allows all trains to remain in service. Four agencies indicate that the train will be taken to the yard and will not remain in service.

The most common impediment to accelerated cleanup and service restoration is the ongoing investigation by a local jurisdiction at the incident site. Respondents also reported damage to infrastructure and vehicles, procedural requirements, manpower availability, and low priority given to service restoration as impediments.

Almost half of the responding agencies cited actions taken with local jurisdictions as most useful to accelerate cleanup and return trains to service. These actions include education,

TABLE 26
TIMING OF AGENCY RESUMING CONTROL OF THE INCIDENT SITE

Timing	No. Agencies Responding	% Agencies Responding
Police/fire complete operations or IC releases site	22	79
After injured are removed and track is clear	3	11
Varies by incident	2	7
When coroner/medical examiner completes investigation, if there is a fatality	2	7
When loss of life or major property damage is no longer an issue	1	5
Agency never relinquishes control of site	1	5
Total	28	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 27
STRATEGIES TO ALLOW TRAIN TO REMAIN IN SERVICE

Strategy	No. Agencies Responding	% Agencies Responding
May remain in service	10	50
Train will not remain in service	5	25
Adjacent-track operation to allow all trains to remain in service	3	15
Varies by incident	2	10
Total	20	100

Source: Survey results.

collaborative working relationships, and formal agreements. Others noted the need for quick access to the scene, clear internal responsibilities, and cross-training of agency personnel. One agency noted that service hour rules become an issue in long delays and can affect the ability to use the train crew on the next day because of requirements regarding recovery time.

Table 28 presents the most frequently recommended guidance to local jurisdictions regarding site cleanup and restoration of service. Common themes include joint training and education; the importance of establishing relationships; demonstrated understanding of local jurisdiction concerns; acceptance of the agency's help; and clear lines of authority.

PROCEDURES TO HANDLE EVIDENCE/ ACCIDENT DATA COLLECTION

Handling and preservation of evidence is a priority for local responders. Table 29 summarizes procedures regarding accident evidence. The agency police department has responsibility for evidence in many cases, while in others, local police assume this responsibility. Most agencies have standard operating procedures regarding evidence.

Responses to the question of who "owns" the evidence indicate that, in most cases, the transit agency has ownership. Table 30 shows several variations.

Table 31 presents impediments to handling accident evidence and data collection after a critical incident. Poor management, including challenges to the transfer of command and general confusion at the incident site; and the need for proper procedures and trained personnel were mentioned most often. "Other" impediments reported include: protocols regarding third party review of evidence; passengers refusing to be interviewed; employee tampering (rare, but not unknown); weather; the sheer quantity of evidence; the need to provide information to all agencies involved; the lack of a working computer to download video/event recorder; and local agencies' insistence on waiting for the medical examiner.

Respondents described useful actions for future handling of accident evidence and data collection. As shown in Table 32,

TABLE 28
AGENCY GUIDANCE TO LOCAL JURISDICTIONS REGARDING ACCELERATING CLEANUP OPERATION

Guidance	No. Agencies Responding	% Agencies Responding
Cooperative education and training	4	17
Get to know/work closely with each other	4	17
Accept our help/let us be your technical advisor	4	17
Assure local jurisdictions that agency will do its part (safety, evidence preservation, room to work)	3	13
Recognize the importance of resuming service	3	13
Clear lines of authority through NIMS	2	8
Plan ahead/preparation	2	8
Clearer MOUs that are common knowledge throughout your organization	2	8
Agreements in place to expedite clean-up	2	8
Understanding that clean-up cannot occur until investigation is over	2	8
Total	24	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 29
PROCEDURES REGARDING ACCIDENT EVIDENCE

Procedure	No. Agencies Responding	% Agencies Responding
Agency police department controls	8	28
Agency standard operating procedures (SOP) followed	7	24
Local law enforcement controls	6	21
Agency provides video as needed	4	14
Federal Rail Administration (FRA)/NTSB/State SOP followed	4	14
Agency Safety Department controls	3	10
Local police for criminal investigations, agency Safety Department for others	2	7
Agency department reports become part of the investigation	2	7
Total	29	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 30
OWNERSHIP OF ACCIDENT EVIDENCE

Owner	No. Agencies Responding	% Agencies Responding
Transit agency	16	53
Local law enforcement	5	17
It depends	4	13
Agency, unless municipality takes possession	2	7
Local law enforcement except if not crime or enforcement-related	1	3
Agency owns unless there is a fatality	1	3
Each collects own evidence/keeps own records	1	3
Total	30	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 31
IMPEDIMENTS TO HANDLING ACCIDENT EVIDENCE AND DATA COLLECTION

Impediment	No. Agencies Responding	% Agencies Responding
Poor management/transfer of command/confusion at incident site	4	17
Need for proper procedures/trained personnel	4	17
None	4	17
Evidence storage	3	13
Responders contaminating evidence	2	9
Lack of access control at site	2	9
Chain of custody	2	9
Trains being moved before data is collected	2	9
Other	8	35
Total	23	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

TABLE 32
ACTIONS FOR FUTURE HANDLING OF ACCIDENT EVIDENCE AND DATA COLLECTION

Action	No. Agencies Responding	% Agencies Responding
Well-trained personnel with proper equipment	6	29
Preserving evidence/single custodian/timeline	4	19
Proper procedures/investigative training	4	19
Command and control	3	14
Early securing and control of incident site	3	14
Using your police if you have your own force	2	10
Prompt review of video evidence	2	10
Other	5	24
Total	21	100

Source: Survey results.
Note: Totals do not add to 100% due to multiple responses.

training, proper equipment, preservation of evidence, proper procedures/investigative training, and command and control on site are among the key actions. "Other" suggestions include protocols regarding release of passengers; awareness of what has to be collected at the scene; a centralized system to gather all information; coordination among safety, claims, and transit police; and letting police do their job.

The most useful guidance that could be offered to local jurisdictions, as summarized from survey responses, is the dissemination of a procedural manual addressing all aspects of rail incident investigation, followed up with training using realistic table-top and field simulations of high-profile incidents.

CHALLENGES

Respondents rated various potential challenges to critical incident management and clearance practices. Table 33 displays the results. No element was rated as a major challenge

TABLE 33
RATINGS OF POTENTIAL CHALLENGES

Potential Challenge	Major Challenge	Minor Challenge	Not a Challenge	No. Agencies Responding
Educating first responders re constraints for rail	33%	48%	18%	33
Response coordination among multiple jurisdictions	30%	48%	21%	33
Remote location of incident	30%	42%	27%	33
Communication with passengers	21%	52%	28%	33
Presence of uninjured passengers on the train	21%	36%	42%	33
Unavoidable procedural delays	19%	63%	19%	32
Clear chain of command at the scene	18%	48%	33%	33
Electrification/power issues	18%	30%	52%	33
Ability to decide on/implement alternate service	15%	48%	36%	33
Insufficient training for agency personnel	15%	30%	55%	33
Avoidable procedural delays	12%	64%	24%	33
Insufficient training for non-agency personnel	12%	61%	28%	33
Other	10%	20%	70%	10

Source: Survey results.
Note: Percentages do not necessarily add to 100% across rows due to rounding.

by more than one-third of the respondents. Educating first responders regarding constraints for rail, response coordination among multiple jurisdictions, and remote location of an incident were each mentioned by 30% of respondents as a major challenge.

Respondents also answered an open-ended request to describe the major challenge affecting critical incident management and clearance practices. Table 34 summarizes the responses; examples of specific responses follow.

Referring to the challenges of coordination and communication of alternative services, one agency representative responded that "dense operation, constrained operator and vehicle resources, and significant traffic congestion make alternate service slow to set up and inefficient. Communicating complex and irregular substitute service requires trained staff often not available and/or poorly coordinated."

Another responded that the challenge is training—"Not in the sense of providing [it], but with logistics and work force availability. Training consumes enormous resources in workforce availability, and can critically impact operations. Our transit agency serves a statewide area, and travels through multiple counties, cities, townships, villages, and so forth. Reaching such a large network is very difficult. We have partnered with the [Federal Railroad Administration] who conducts an open forum training to Fire and EMS agencies which helps."

A third responded that "The rail system is built through some heavily wooded portions of a very densely populated area. Response time can be steep because of heavy traffic in main and arterial routes and compounded by the time taken to properly locate and reach the rail equipment."

A fourth respondent commented that "Getting some agencies to understand that the incident typically does not need to be labeled a 'crime scene,' that in the majority of cases, traffic can resume at a reduced (sometimes 'walking') speed on an adjacent track with a railroad supervisor on the scene to coordinate train movements. Everything does not need to be shut down and remain shut down until all of their 'evidence' has been obtained."

TABLE 34
MAJOR CHALLENGE FOR CRITICAL INCIDENT MANAGEMENT AND CLEARANCE PRACTICES

Challenge	No. Agencies Responding	% Agencies Responding
Communication with passengers	5	19
Sheer number of emergency response agencies to train within service area	4	15
Procedural/other differences among local jurisdictions	4	15
Lack of understanding of rail accidents and the need to restore service expeditiously for riders remaining on the train	3	12
Agency response time due to heavy traffic and remote location of incident	2	8
Electrification/power issues	2	8
Any blockage of main line for more than 30 minutes peak or 60 minutes off-peak	1	4
Decision-making at the scene	1	4
State regulations regarding accident investigations	1	4
Location of major bridge structures	1	4
Ability to evacuate in the event of a major flood	1	4
None to speak of	1	4
Total Responding Agencies	26	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

CHAPTER FOUR

AGENCY ASSESSMENT OF CRITICAL INCIDENT MANAGEMENT AND CLEARANCE PRACTICES

The previous chapter addressed survey results related to specific concerns regarding critical incident management; this chapter's focus is on agencies' evaluations of their management of critical incidents. Specific topics include post-incident reviews and any changes made as a result of these reviews, and lessons learned that would be of interest to other transit agencies.

POST-INCIDENT REVIEWS

Table 35 shows rail agencies' policies on post-incident reviews for critical incidents. More than two-thirds of respondents (68%) always conduct a post-incident review, and another 24% reported usually conducting such reviews.

Table 36 presents the benefits of post-incident reviews (in response to an open-ended question). The most frequently cited benefit involved incorporation of lessons learned in emergency plans. Other improvements from post-incident reviews targeted operational and vehicle changes, including service recovery techniques; adding a crossover near a high-risk location and changes to vehicles to assist first responders; updating procedures and communication with customers; and internal and external coordination.

Table 37 summarizes what respondents believe was the single most beneficial change to procedures as a result of post-incident review. Multiple agencies pointed to procedural improvements (for incident management, service restoration, incident investigation, emergency communication, and information collection); better communication systems (upgraded, compatible radio systems for agency or county); management of the scene; safety procedures; and improved information flow. The table shows all responses.

The survey asked whether agencies review and incorporate findings from post-incident reviews elsewhere and if so, the benefits of this practice. Table 38 shows that 60% of responding agencies use post-incident reviews elsewhere, NTSB findings, and APTA peer reviews to re-confirm existing procedures and to incorporate lessons learned. Two respondents specifically mentioned changes to roadway worker protection rules as the result of an incident elsewhere.

Respondents were asked, "If you could change ONE aspect in the process of critical incident management and clearance practices, what would you change?" Table 39 summarizes results, most notably agencies' strong desire to place increased priority on service restoration as well as the necessity for a clear chain of command at the incident scene. "Other" responses to this point included:

- Mandatory attendance of all agency and non-agency personnel involved at the debriefing;
- Decision-making as close to the field as possible;
- Emphasis on what went well and what needs improvement without finger-pointing;
- Pre-planning and better communication at the incident site;
- Identification of root cause and changes to procedures;
- A better way to communicate recommendations to rail operators;
- Elimination of critical incidents;
- Improvements to the radio system; and
- Clarification of accident reconstruction methods.

LESSONS LEARNED

Survey respondents shared lessons learned in two ways: suggested guidance for local jurisdictions, and lessons learned that would benefit other rail agencies. Suggested guidance for local jurisdictions is presented in Table 40 and emphasizes training, familiarity, communication, and restoration of service.

Responses are presented by category here. Comments are reported as expressed by agency respondents.

Seek Training from Transit Agencies

- Get basic training on our operations.
- Take advantage of emergency preparedness training offered by the agency. This training can be modified to better suit your needs.
- Seek out training from rail operators in your jurisdiction. Ensure that you get to know and periodically touch base with your contacts to review joint procedures. Conduct joint exercises.
- Take advantage of the classroom training and drills offered by our agency. Participation in education and simulations provides insight into the challenges of responding to an incident on railroad property and equipment. It also enables us to "test" procedures and make adjustments to ensure appropriate response in the event of an actual incident.

TABLE 35
CONDUCT OF POST-INCIDENT REVIEWS FOR CRITICAL INCIDENTS

Post-Incident Reviews	No. Agencies Responding	% Agencies Responding
Always	23	68
Usually	8	24
Sometimes	2	6
Rarely	1	3
Never	0	0
Total Responding Agencies	34	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

- Seek training with qualified and knowledgeable people from the transit agency.
- Participate in agency system familiarization and ongoing refresher training opportunities.
- Cross-train with transit first responders.
- Partake in all training opportunities.
- What assistance/training do your officers need to respond to rail incidents?
- Get involved and stay involved with our training exercises. Recognize that rail is much more than public transportation—we can easily become an ambulance service, a command post, an emergency shelter, an emergency response personnel transporter, etc.
- Incorporate transit first responders in your planning and training activities.

Get To Know Our First Responders Before an Incident

- This process (training) helps build an open line of communication and provides a better understanding of each organization's structure including roles/responsibilities.
- Communication is the key.
- Get to know your transit emergency response counterparts as they support Emergency Support Function (ESF)-1.
- Keep open communications.
- Know our local responders before an incident if possible. Have relationships with transit police and rail operations leaders so you can call their cell phone if things are not going as planned.

Understand the Importance of Quickly Restoring Service

- How important it is to quickly reinstate service. Overcrowding on the system when it's shut down can lead to unintended problems and possibly other incidents.
- Clear the incidents as quickly and safely as possible and return to partial and/or full rail service. During emergencies, restoring at least some type of service on the rail line mitigates problems involving crowd management on the surface by local jurisdictions.
- Getting responding agencies to agree to basic philosophical principles, such as a piece of a broken cell phone or someone's sneaker lying between the rails does not constitute the type of evidence that would require that track to be shut down; an understanding on their part that however tragic the event may be, the needs of thousands of people trying to get home from work should outweigh, or at least be on a par with, the needs of a police investigation where the circumstances are usually fairly clear.
- Work with the train crew to get the train back moving as soon as possible.
- Train movement can occur without compromising safety of responders so the train can stop within one-half the sight distance as they pass through the area to permit traffic flow as well as continued safe conduction of the investigation.

TABLE 36
BENEFITS OF POST-INCIDENT REVIEWS

Benefit	No. Agencies Responding	% Agencies Responding
Incorporate lessons learned in plans	10	29
Operations/vehicle changes	8	24
Updating procedures (applicable and clearly written)	7	21
Communication with customers	6	18
Improved coordination (internal/external)	4	12
Objective analysis of root causes	3	9
Agency response	2	6
Tracking actions to improve	2	6
Training/safety	2	6
Informal: facilitate discussions	2	6
Do not always lead to changes	2	6
Store water on trains for customers	1	3
Total Responding Agencies	34	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

TABLE 37
MOST BENEFICIAL CHANGE RESULTING FROM POST-INCIDENT REVIEWS

Change	No. Agencies Responding	% Agencies Responding
Stronger, less ambiguous, and more consistent procedures	8	27
Improved flow of information	3	10
Upgraded communication systems	2	7
Utilization of Integrated Command Structure	2	7
Improved scene management	2	7
Improved safety, including checklist of safety-critical procedures	2	7
Timeliness of agency response/reducing delays	2	7
A stronger overall process	1	3
Re-education on all levels for updated procedures	1	3
Requesting bus bridge/shuttle as first call due to time involved	1	3
Shift in agency police focus with service restoration as higher priority	1	3
Identification of first responders needing additional training/education	1	3
Improved communication with customers	1	3
Multi-disciplinary approach seeking input from all departments	1	3
Safe haven policies for rolling stock/equipment	1	3
No changes to date	1	3
Total	30	100

Source: Survey results.
Note: Percentages do not add to 100% due to rounding.

TABLE 38
USE OF POST-INCIDENT REVIEWS FROM OTHER AGENCIES

Review Post-Incident Reviews from Other Agencies	No. Agencies Responding	% Agencies Responding	Benefit
Yes	20	69	Re-confirm viability of existing procedures Incorporate lessons learned Changes to roadway worker protection rules Review of derailment to ensure we do not duplicate cause Purchase bridge plates to allow passenger movement between adjacent trains Use as case studies in training Availability of spare equipment Incident management Time and cost savings Review NTSB findings Occasionally, more often incorporate lessons learned by APTA peer reviews
No	9	31	
Total Responding Agencies	29	100	

Source: Survey results.

TABLE 39
ONE CHANGE TO THE PROCESS OF CRITICAL INCIDENT MANAGEMENT AND CLEARANCE PRACTICES

Action	No. Agencies Responding	% Agencies Responding
Establish clear chain of command/importance of coordination at the site	5	22
Expedite resumption of revenue service	5	22
Expedite the response of the local medical examiner's/county coroner's offices to an incident that involves a fatality.	2	9
Encourage consistency in who responds	2	9
Other	9	39
Total Responding Agencies	23	100

Source: Survey results.

TABLE 40
GUIDANCE FOR LOCAL JURISDICTIONS

Guidance	No. Agencies Responding	% Agencies Responding
Seek training from transit agency	11	37
Get to know our first responders before an incident	5	17
Understand the importance of quickly restoring service	5	17
Learn about rail: hazards, rolling stock, alignment	4	13
Work with us as a primary partner to establish expectations and norms, to debrief every incident, and to rely on our specialized knowledge	4	13
Stay in communication during the incident	3	10
Other	5	17
Total Responding Agencies	30	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Learn About Rail

- Be aware of overhead power lines, track conditions (tripping hazards) and train movements on adjacent tracks.
- Understand the rail transit environment in order to recognize and understand the hazards inherent in the transit operating environment.
- Alignment familiarization.
- Operational and rolling stock familiarization.

Work with Us as a Primary Partner

- Identify all the key stakeholders for types of incidents that could occur on the rail system and engage them in a collaborative process to ensure that overall goals are understood, what the key needs are of the various stakeholders, establish expectations and behavioral norms for incident handling, and train key personnel to be prepared. Debrief every incident for lessons learned and try and incorporate when possible into established SOPs.
- Depend upon our subject matter experts in an emergency if it deals with our system. Don't think you know the train better than we do.
- Work with "transit" as a primary partner instead of as a secondary partner.
- Use the train crew to your benefit.

Stay in Communication During the Incident

- Stay in communication during the incident (Incident Command). We do a very good job of responding, assessing, and setting up initial response. Problems develop as the incident evolves and during the service restoration process. Single leadership for us and each responding agency with sustained coordination throughout the incident is key.
- Communication is key.
- How does your police/fire agency identify the Incident Commander? The transit agency lead should know whom to contact at a scene.

Other Comments

- The incident most likely to occur is not the mass casualty event. There needs to be more preparation for the smaller incidents that lead to more soft tissue injuries.

- Be uniform in your responses to rail incidents (as much as possible).
- Have a procedure document that has been well vetted, then update as needed and train with that document.
- Trying to ascertain a good estimate of how long it will take to clear the scene so that alternative arrangements can be made if appropriate.

Lessons learned that would be helpful for other transit agencies are shown in Table 41. ICS, communication, relationships with local first responders, and regular review and update of procedures were all mentioned by 20% of respondents.

Responses are presented by category here. Comments are reported as expressed by agency respondents.

Regular Review and Update of Procedures

- Evaluate rules and procedures on a regular basis and update accordingly. Even the most effective procedures may have to be revisited over time. The agency recently revised an SOP related to fire, smoke, and alarms at or between stations. In short, the procedure outlines roles, responsibilities, ensures safe operations but minimizes the impact to operations. Initially, technology is used to check for signs of smoke or fire followed by on-site inspection.
- Be as specific as possible when it comes to procedures. Plans and policies can be broad, but the more specific procedures can be the better. With our CBD [Central Business District] shut down plan, we say which switches will work, where each line will turn around and where employees will be deployed to assist customers. These are specific and measurable during an exercise as well.
- A closed loop process with new lessons is required. You get the lesson learned, implement, check for implementation, and then follow up six months or a year later to see how that implementation is going. Is it still in place? Has it worked? Is it meeting the agency's needs?
- Establishing a foundation of standard operating procedures, conducting after-action reviews, and providing training to employees and the emergency responder community facilitate the appropriate response and recovery from Critical Incidents.
- Update Service Interruption Plans annually on a cycle that coincides with changes made in the service.
- Procedures for the following: a. incident management; b. service restoration; c. incident investigation; d. emergency communication; e. information collection.

TABLE 41
LESSONS LEARNED FOR OTHER TRANSIT AGENCIES

Lessons Learned	No. Agencies Responding	% Agencies Responding
Review and update of rules and procedures on a regular basis; be as specific as possible in procedures	6	22
Well-planned, ongoing, hands-on training with local first responders	6	22
Good Incident Command System (ICS) with single person in charge	5	19
Frequent and effective communication with all stakeholders	5	19
Relationships with local first responders prior to incident	5	19
Balance of first responder priorities and service restoration	3	11
Joint debriefing after every incident	2	7
Other	6	22
Total Responding Agencies	27	100

Source: Survey results.
Note: Multiple responses allowed; percentages do not add to 100%.

Well-Planned, Ongoing, Hands-On Training with Local First Responders

- Emergency response agencies are constantly changing personnel; offer equipment and classroom training at least annually.
- Train together for possible emergencies.
- Emergency drills and exercises are excellent to facilitate the coordination. Training pamphlets and videos distributed to local police enhances education.
- Joint exercise drills, exercises, and tabletops should be well planned and executed on regular basis.
- For a new rail line, first-responder training incorporated hands-on training. Recent first-responder training incorporated train-the-trainer, recorded (DVD) trainings so fire fighters could do refresher training in their firehouses without direct agency trainer involvement, year-round.
- Providing training to employees and the emergency responder community facilitates the appropriate response and recovery from Critical Incidents.

Incident Command System

- Assign one person to be in overall charge. He/she can delegate, indeed must, but assign one person.
- Good incident command structure is key.
- The essential nature of setting up a unified incident command post so that one course of direction can be relayed to all personnel in the field.
- We also use the incident command system for every major event which makes every major event an exercise of sorts. Filling out forms and personnel knowing their roles—it has helped our organizational structure during prolonged events such as the recent ice storm. This lesson learned we have shared with many transit agencies.
- Procedures for incident management.

Communication with Stakeholders

- Communication with other stakeholders is key.
- Find opportunities to engage the communities where you operate. Communicate often and effectively with these communities on issues that may impact them or their residents.
- Communication.
- Our focus has been to be inclusive and seek out input from the community and have incorporated those findings into our procedures and training.
- Communication with the First Responders is critical.

Relationships with Local First Responders Prior to Incident

- Develop relationships prior to an event.
- Maintain open and productive dialogue with the first responder agencies and OEMs. Do not assume that everyone knows what everyone is responsible to do.
- Establish good working partnerships with local jurisdictional emergency management agencies, police and fire departments on transit-related incidents.
- Develop partnerships with the external agencies (i.e., fire, EMS, police). An emergency is no place to exchange business cards.
- Emergency drills and exercises are excellent to facilitate the coordination.

Balance of First Responder Priorities and Service Restoration

- Although not always transit priorities, scene preservation and witness retention become important in the after incident investigation both for the transit agency and law enforcement. For our agency, procedures to allow service restoration priorities to work with investigative needs are helpful with ongoing coordination between agencies.
- There was a homeless encampment outside of one of our tunnels that was burning trash to keep warm. The prevailing winds blew the smoke into the tunnel and caused an evacuation. When the fire department could not locate the source they wanted to walk the tunnel. It was rush hour and thousands of passengers were stuck. If 20 fire fighters started walking the tunnel, it might take hours to reassemble them all. Instead, the agency proposed riding in an out-of-service rail vehicle as a much better way to find the source. The fire department was happy that it was suggested and that we could make it happen. They rode on the vehicle and found the source of the smoke thereby saving at least one hour or more.
- Be as diplomatic as possible with local responders so as not to delay the clearing of the scene any longer than necessary.

Joint Debriefing

- Conducting after-action reviews facilitates the appropriate response and recovery from Critical Incidents.
- Debrief after ever incident. Include all local emergency responders. Often helpful to have internal debriefing in addition. You can discuss operational issues such as passenger communication and bus bridges/shuttles without boring the police and fire staff.

Other Comments

- If your system is operating through or adjacent to other public transit systems/modes—take time before incidents to establish a relationship and discuss possible mutual aid type needs and possible responses. Examples include accepting your fare media on their system without having to go through a lengthy approval process (our teams are empowered at the operating control center to make these types of decisions without senior management approval), alternative service such as bus bridges/shuttles that can be activated on short notice, etc.
- Instruct conductors not to grant permission for riders to cross the tracks unless specific permission is granted from the dispatcher. This practice is not the result of an issue but an effort to avoid an incident. Station Agents and Security staff (that are not uniformed officers) can only tell people not to cross with the crossing arms down, but they cannot physically stop people once they start crossing.
- Timely and direct communication is needed between Station Agents, Conductors, and Security. Implementation of the 800 MHz radio system greatly improves this internal communications.
- Create checklists within the Service Interruption Plan for Duty Officers to use in order to keep track of the chronology of events and key information.
- Our biggest "successes" are usually the result of getting to the scene quickly, quickly assessing who is in charge of the investigation, and then try and develop a rapport with that individual to the extent that they can be convinced that trains can be brought through the area slowly and safely in a manner that does not put his personnel in danger.
- Dedicate sufficient staff to support critical incident response.

CHAPTER FIVE

CASE EXAMPLES

Synthesis survey results provided an overview of critical incident management and clearance procedures. More than 85% of responding agencies offered to serve as a case example: Following a review of the survey results, six agencies were chosen. Personnel directly involved with these programs agreed to be interviewed by telephone. The case examples provide additional details on processes, major themes, lessons learned, and keys to success.

The selection process for case examples had several criteria: (1) include transit agencies of various sizes in different parts of North America; (2) include agencies operating different rail modes; (3) include agencies that reported detailed and interesting observations in the survey.

Figure 2 in chapter one showed the location of the case example cities. The six case example cities and agencies are:

- Miami, Florida: Miami–Dade Transit
- Chicago, Illinois: Metra (NorthEast Illinois Regional Commuter Railroad Corporation)
- Seattle, Washington: Sound Transit
- Salt Lake City, Utah: Utah Transit Authority
- Houston, Texas: Houston METRO
- Philadelphia, Pennsylvania: Southeastern Pennsylvania Transportation Authority.

The introduction to each case example includes a basic description of the system, with data provided by the agency and/or taken from FY 2012 National Transit Database (NTD) reports. The interviews explored issues raised by the survey responses in greater depth.

MIAMI–DADE TRANSIT, MIAMI, FLORIDA

Miami–Dade Transit (MDT) is the public transportation operator in Dade County, Florida. MDT operates bus, heavy rail, and Metromover service in 10 jurisdictions within Dade County. Service area population is 2.50 million. MDT operates 76 heavy rail vehicles in maximum service. Annual heavy rail ridership was 18.7 million in 2012.

Process and Major Themes

When an incident occurs, first responders notify Rail Traffic Control (RTC). Pushing the Emergency Trip Station button on the station platform cuts power to the track segment within the station and first responders call by means of the emergency dedicated line to RTC. Depending on the type of incident, RTC will cut power to other track segments and call high-ranking personnel on the communication tree. They will determine the appropriate response, which may involve the Safety and Security, Operations, and Maintenance Departments, and the agency director. MDT follows NIMS procedures, under which a command post is set up at the scene with fire/rescue, police, and MDT personnel. The heavy rail system operates on an elevated guideway with third-rail power, and anyone entering the guideway in the course of an investigation must call on and call off.

MDT has a very good working relationship with emergency responders. Working together, they ensure that the incident site is safe, needed resources are provided, and the scene is processed expeditiously. If safe to do so, MDT will institute adjacent-track operation around the incident site or will establish a bus bridge/shuttle. The bus operations department does not necessarily like taking buses off routes to establish a bus bridge/shuttle, but does it well. Fire/rescue and police will release control of the scene to MDT when their investigation is completed. After conducting vehicle and track checks, MDT will run the train light to a pocket track or to the yard.

MDT always conducts a post-incident review, known as a "hot wash." This allows a more objective analysis of the incident using confirmed data. Communications during the incident are reviewed to identify what went well and what could be improved. MDT also reviews incidents at other agencies. Most recently, a review of a worker fatality at another transit agency resulted in changes to MDT's Roadway Worker Protection rules aimed at improving safety for track workers and others.

MDT conducts training for local first responders. The training focuses on familiarization with MDT railcars and operating environment. During training activities, the issue of electrified third rail is always a main topic of conversation and explanation with all first responders. When new rail cars are being ordered, MDT reaches out to first responders to get their input on design changes and to conduct new

training once the cars are ready to be placed into service. Local agencies often request training for rookie crews. MDT invites them to train at its Palmetto Yard, where staff shows first responders how to board a railcar. At the yard, MDT can "smoke up" a train to provide a real-world environment in which to practice rescue efforts. These training classes are popular with first responders, and word of mouth spreads regarding their usefulness. In addition, all contractors working on MDT property must have safety training and must be escorted by agency personnel.

MDT does not have its own police force, but many staff members are former police officers at agencies in Dade County; and a history of working together has forged close relationships. MDT chairs a Fire Life Safety technical committee that reviews any development or construction taking place adjacent to the rail guideway. This joint involvement and the training exercises build relationships with local first responders.

Following NIMS protocol, an Incident Control Center (ICC) is set up at the site. Emails sent by means of the communications tree always include the location of the ICC. Every effort is made to restrict access to the site to those who need to be there, following an old police adage that once you step over the tape into the crime scene, your name will be taken.

MDT's PA system is used if operational after the incident. If it is damaged, then bullhorns convey information at the site. MDT has adopted the use of social media to communicate more rapidly. MDT also maintains contact with local media outlets.

Changes/Lessons Learned

If MDT could change one aspect of the process of critical incident management, it would eliminate critical incidents. Since this is almost impossible, MDT works closely with local first responders and other stakeholders, including steps to keep its customers informed during an incident. Communication is the most important element after safety.

The primary lesson learned that can apply to other transit agencies is the importance of a sound incident command structure and communication with other stakeholders.

Keys to Success

In terms of communication with local jurisdictions and emergency responders, keys to success include:

- A proactive approach, reaching out to local first responders and inviting them in for training. As noted earlier, the benefits of MDT training spread through all the jurisdictions by word of mouth. Local police and fire chiefs request drills that are realistic and taxing. The drills establish familiarity with the system and result in an efficient incident management process.
- Familiarity with first responders prior to an incident. First responders request training sessions for new employees and wholeheartedly embrace the challenging nature of the training. An added benefit to MDT is that the training exercises build relationships between MDT personnel and first responders, which may be as important as familiarity with the system in ensuring successful management of critical incidents.
- Many MDT staff members are former police officers at agencies in Dade County and have a history of working together.

MDT has learned keys to successful communication with passengers, including:

- More informed passengers are happier. MDT makes continuous announcements during a critical incident, from Rail Control through station PA systems and from conductors on the trains. These announcements are in real time, not pre-recorded; and provide as much information as possible without compromising security. If adjacent-track operation is implemented, affected stations are advised repeatedly.
- Social media provide new ways to communicate in real time. Customers can subscribe to rider alerts through the MDT website and will receive emails regarding delays and station closings. MDT also posts this information on its website. MDT's Public Information Officer coordinates with the county information center, which operates the 311 telephone service, and with designated transit staff.
- Technology does not fully replace a human face. Passengers appreciate on-site personnel who can provide information and answer questions. MDT uses bus operations supervisors along with rail supervisors at affected stations to explain adjacent-track or bus bridge/shuttle operations.

Successful management of critical rail incidents results from prior experiences with catastrophic incidents. Key elements include:

- The management team's meeting on a regular basis to discuss these experiences, review the agency rulebook, and change anything that needs changing. The "hot wash" is useful for establishing the incident timeline and why certain things happened.
- An established chain of command at the ICC that also limits the number of people involved.
- Open lines of communication with emergency responders, developed through training and familiarity.
- Contact with other rail agencies to compare notes and draw lessons from a wider base of experience.

METRA, CHICAGO, ILLINOIS

Metra, formally known as the Northeast Illinois Regional Commuter Railroad Corporation, operates commuter rail in approximately 100 jurisdictions in the greater Chicago area. Service area population is 7.26 million. Metra operates 1,048 commuter rail vehicles in maximum service. Annual commuter rail ridership was 74.2 million in 2012.

Process and Major Themes

When an incident occurs, the engineer notifies the train dispatcher. The Canadian Pacific (CP) railroad has dispatching responsibilities on most Metra lines. The CP dispatcher contacts Metra's Yardmaster, who is responsible for all communications within the agency and will then inform the Trainmasters and Metra police. CP also calls Metra police and police in the community where the incident takes place. Once on-site, Metra personnel will determine which jurisdiction is in charge. The protocol is that the first group to respond takes charge. This may be Metra, county, local, or state police. Metra police ask upon arrival for control of the investigation. This request is sometimes granted and sometimes not. Metra checks with the train crew and arranges relief if needed.

Metra rail staff communicate to the agency in charge the need to get the train system up and running again, and will assure them that no people will be placed in harm's way and that trains can operate safely while the investigation continues. The on-site Metra Transportation Department officials are in communication with the trains and will establish a reduced or "walking" speed for trains on an adjacent track with a rail supervisor on the scene to coordinate train movements, if permission to resume service is granted. There is a broad spectrum of thought from community to community on when to allow service restoration at an incident site. Permission is more likely to be granted if local agency personnel are familiar and have worked with Metra.

In the past, Metra police were often least likely to restore service, claiming the need to follow specific incident investigation protocols. Post-incident discussions approximately seven years ago achieved a basic philosophical change focused on restoring service as quickly as possible, and this has assisted Metra immeasurably. Metra's preference is to get its police on scene as quickly as possible and for its force to request jurisdiction over the remaining investigation.

If the train is mechanically operational, Metra will try to keep it in service. Sometimes passengers are transferred to other trains (often using the ADA lifts to connect the vestibules of train cars on adjacent tracks) while the train involved in the incident is held. In the latter case, the train will proceed directly to the tie-up yard once released.

It should be clearly understood that safety is always the top priority. Frustrating situations that have occurred over the years involve responders' refusing to allow service on an adjacent track owing to the presence of minor evidence and/or insisting on interviewing every train passenger on board before allowing a train to continue in operation.

Obtaining the most effective, most reliable information is crucial in terms of communicating with and minimizing impacts to passengers. Metra communicates with its passengers by means of on-board announcements and e-mail service alerts. The agency was criticized during the harsh winter of 2013–14 for not communicating well with its customers regarding service delays, so passenger communication is a high priority at this time.

Metra uses bus bridges/shuttles, but timing of the incident affects the ability to get a bus bridge/shuttle up and running. In peak hours, PACE (the suburban bus agency) often does not have spare buses available or cannot get them to the incident location quickly due to traffic. Metra is more likely to rely on bus bridges/shuttles for incidents that occur in non-peak periods.

Changes/Lessons Learned

If Metra could change one aspect of the process of critical incident management, it would work to make all first responders comfortable and confident that no one's life is in danger when train service is restored. The incident scene is hectic, and it is difficult to communicate that service can be restored safely when first responders are focused on their duties.

Metra contracts with a cleaning service to pick up everything at an incident site after first responders finish their work. The cleaning service personnel are paid by the hour and are not always in a hurry to finish. Metra personnel typically handle this situation by firmly insisting that cleanup be completed expeditiously, but a different protocol may be worth considering.

There are almost always informal discussions after each incident among agency managers who were on site regarding

what went right and what went wrong. These are often useful during the next incident, but the information is not necessarily recorded formally.

Keys to Success

In terms of communication with local jurisdictions and emergency responders:

- Get to know local responders. Those familiar with Metra are generally more willing to cooperate in getting trains moving again.
- Build trust and confidence that no one will be put in harm's way by restoration of service. It would be helpful to have a formal study or information to present to local first responders regarding how service can be safely restored.
- Build understanding that incident sites typically do not need to be treated in the same way as a crime scene. Installing cameras on all Metra locomotives and cab cars has helped in this case, as first responders can forego certain measurements and complete their work more quickly with the knowledge that video will be available.

As noted earlier, communication with passengers is a high priority for Metra after a difficult winter. Areas of emphasis include:

- Telling people what you know. This goes a long way toward making the situation palatable for customers.
- Change operating procedures with the customer in mind. Metra's old approach was to stack up trains as they approached the incident site and release them when it was safe to do so. The new procedures call for stopping trains at stations, allowing customers to get off if they have other means of getting home available. If the delay is significant, Metra may not even send a scheduled train into service.
- Having correct and up-to-date information available for customers. Metra customer service personnel on site have learned to listen to conversations to determine what is going on, since in the heat of the moment it can be hard for the Yardmaster or Trainmaster to stop and explain. The goal moving forward is to disseminate accurate information as quickly as possible.
- Maximize use of technology. All trains are equipped with GPS units. The GPS operator has the capability to make on-board announcements from his/her office, a capability that was not disclosed to Metra during installation. Metra is now testing this system for more widespread use in various situations, including critical incidents.

Metra's biggest "successes" in management of critical rail incidents are the result of arriving at the scene expeditiously, quickly assessing who is leading the investigation, and developing a rapport with that individual to create confidence that train service can be restored through the area slowly and safely without endangering first responders or other personnel. Focusing on the big picture is possible only when safety is assured.

SOUND TRANSIT, SEATTLE, WASHINGTON

Sound Transit operates commuter rail service in three counties (Pierce, King, and Snohomish) of Washington State, light rail between the SeaTac Airport and downtown Seattle, and commuter bus service. Service area population is 2.78 million. Sound Transit operates 56 commuter rail vehicles and 26 light rail vehicles in maximum service. Annual commuter rail ridership was 3.0 million and annual light rail ridership was 9.7 million in 2013. This case example addresses commuter rail service only.

Process and Major Themes

In an emergency, the dispatchers notify both the emergency responders of the local jurisdiction and the local Burlington Northern Santa Fe (BNSF) Passenger Operations Superintendent, who in turn notifies the Commuter Rail Duty Officer. The duty officer puts out an e-mail to the Command Post address list that includes dozens of agency staff that need to know and also phones Customer Service, Safety, and Media staff directly. At the site, the emergency responders have primary responsibility for managing critical incidents.

Sound Transit relies on bus bridges/shuttles to provide alternate service. The agency contracts with the three county bus agencies in its service area to operate the Sound Transit express bus service and looks to these agencies to accommodate the ad hoc need of bus bridges/shuttles. The general rule is "Whatever is available," and on occasion private charter buses are used if the partnering transit agencies cannot accommodate the request. The decision to provide alternate service depends upon the timing and expected duration of the incident. The goal is to get passengers to their destinations as quickly as possible.

Communication to passengers on the train is primarily by train conductors using the on-board PA system. Station agents use portable wireless microphones tuned to the station

PA system to inform passengers at affected stations and supplement information available on the electronic variable message signs. The Media Relations Officer is the contact with local media.

The challenge in today's environment is keeping the information current. Sound Transit uses "gov.dot" alerts that send live information out to customers who subscribe to the e-mail service. The agency also tweets information and monitors Twitter to respond to questions and correct any misleading information.

A new 800 MHz radio system similar to those used by local jurisdictions has enhanced communication with first responders. The working relationships with the local jurisdictions are good. Sound Transit noted that the establishment of its own police force about five years ago resulted in improved communication at the scene of an incident. Police understand other police and know how to convey needed information, particularly with regard to the differences between rail and motor vehicle incidents and the need to restore service expeditiously whenever possible.

Training exercises are another means to solidify relationships with local jurisdictions. The federal government mandates bi-annual training exercises, and Sound Transit has conducted these annually with many jurisdictions (see Figure 3). These are an excellent way to acquaint local first responders with equipment and safety issues unique to rail and also provide agency personnel with a clearer understanding of first responder issues. The training exercises clarify how rail incidents are different from traffic accidents and must be treated differently.

The most important benefit of training exercises may be the ability to make personal contact with the first responders who will be in charge of managing future incidents. The agency notes that this prior contact has smoothed working relationships in the chaos of an incident site.

FIGURE 3 Sound Transit North-Line training exercise.

Changes/Lessons Learned

If Sound Transit could change one aspect of the process of critical incident management on commuter rail, it would make clear to emergency responders the different nature of rail transit from highway traffic. Rail does not have alternate routes that passengers can use to detour around the incident site, which can lead to the passengers being "captive" of the process until released by the law enforcement of the local jurisdiction.

The most useful guidance for local jurisdictions is the need for a well-vetted procedural document that serves as the basis for training and is updated as needed.

Lessons learned that can be applied by other transit agencies include:

- Timely and direct communication is needed among station agents, conductors, and security personnel. Implementation of the 800 MHz radio system greatly improved internal communications during incidents.
- Update Service Interruption Plans annually on a cycle that coincides with service changes.
- Create checklists within the Service Interruption Plan for duty officers to use to track the chronology of events and key information.
- Instruct conductors not to grant permission to cross the tracks unless specific permission is granted from the dispatcher.

Keys to Success

In terms of communication with local jurisdictions and emergency responders:

- Provide material for their education and use this material as the basis for training exercises;
- Ensure that the information and training are relevant in their world;
- Encourage security and police personnel to sit down with their counterparts on a regular basis.

In terms of communication with passengers, the three keys are:

- Timely information
- Personnel standing by to provide this information and answer questions
- Use of all available technology.

Successful management of critical rail incidents is based on two pillars: training and communication. This allows the sharing of vital information and development of personal contacts so that the first meeting between agency managers and emergency responders is not at an incident site. Face-to-face interaction and knowing the right person to call are means to make the process work.

UTAH TRANSIT AUTHORITY,
SALT LAKE CITY, UTAH

Utah Transit Authority (UTA) is the public transportation provider in Salt Lake City, Utah. UTA operates multiple modes, including light rail in 25 jurisdictions and commuter rail in six counties and 85 jurisdictions. Service area population is 2.17 million. UTA operates 82 light rail vehicles and 36 commuter rail vehicles in maximum service. Annual light rail ridership was 17.4 million and annual commuter rail ridership was 1.9 million in 2012.

Process and Major Themes

When an incident occurs, the vehicle operator calls into dispatch. Dispatch calls the UTA police dispatch and the UTA police contact the local jurisdiction. The ICS follows the NIMS format: The operator is in charge at the scene until the rail supervisors arrive and the rail supervisor or the Rail Chief assumes responsibility until the UTA police arrive to serve as the IC. When local fire/rescue and police units arrive, they have primary responsibility and serve as the overall IC. The level of coordination between police and fire/rescue units and the ability to establish an ICS varies by jurisdiction.

All communication with UTA goes through the UTA IC. Life is the top priority, followed by safety (of passengers, vehicles, and the scene) and service.

UTA's police force tends to be proactive with a clearer focus on the transit system and the rail riders. Local police units share the life and safety priorities but they often treat the incident site as a crime scene and lean in the direction of shutting service down. UTA sees a clear benefit in having its own police force. Many UTA police officers are retired from other police agencies in the region, and there is a greater understanding and sense of "sharing the same language" between UTA and local police units. The UTA police chief meets with local police chiefs on a regular basis.

UTA uses the train intercom system to provide information to passengers. Typically UTA requests that passengers remain on the train as the first responders stabilize the scene, but riders know how to get off and do not necessarily comply.

There are obvious differences between incidents on light rail and those on commuter rail:

- Light rail operates in an urban/suburban environment, whereas portions of the commuter rail system are not readily accessible. Bus bridges/shuttles are a much more common response for light rail.

FIGURE 4 UTA S-line Streetcar training exercise: Jacking and blocking a train to extract a mannequin.

- The commuter rail right of way is mostly ballasted and the rail cars are high-floor, which combine to make offloading passengers much more difficult. Acknowledging that commuter rail passengers are more likely to remain on the train after an incident, UTA has food and water stored on all its commuter rail trains.
- The commuter rail network spans 90 miles from north to south and is primarily single-track. The distance involved makes coordination with local police units more important.
- Staff turnover among local first responders and the rarity of incidents emphasize the need for ongoing training on commuter rail.

Training exercises with local police and first responders are invaluable. UTA believes it can never provide enough training, especially with personnel turnover at local agencies. Training also creates opportunities for personal contact so that UTA police already know their counterparts who respond to critical incidents. Figure 4 shows the S-Line Streetcar training exercise in November 2013 prior to opening. Figure 5 is from the May 2014 FrontRunner commuter rail exercise, with the NTSB and other transit agencies in attendance.

FIGURE 5 UTA FrontRunner training exercise.

UTA recently received a DHS grant to provide extensive in-house security training based on NIMS and the ICS. All UTA police take the 40-hour course. All managers and supervisors take the four-hour course. All operators and mechanics (including bus) and all new employees take the one-hour course.

Changes/Lessons Learned

If UTA could change one aspect of the process of critical incident management, it would make every road-rail intersection grade-separated. The most effective way to respond is not to have an incident, but as this is not possible, UTA conducts at least two joint training exercises annually on each line. FTA uses UTA's event planning and incident protocol as a best practice. These exercises strengthen coordination with local police and fire/rescue units.

A second preventive step is a thorough evaluation of each traffic/pedestrian/bicycle crossing at each proposed intersection before the rail line is built. This evaluation considers site-specific issues such as level of activity and the interface of the rail signal system with traffic control. There is a basic design model, but it can be adapted to local circumstances.

Ongoing dialogue and familiarization training with first responders is very beneficial. UTA distributes a DVD/DVR with information on its rail cars and systems to all local responders and invites them to the rail yard for hands-on training. The UTA Police Chief attends the Valley Alliance of Police Chiefs meetings.

Another change would be to clarify accident reconstruction methods. These now vary from "mark and drive" quick measurements to a full LIDAR (light radar) survey of crossings.

Lessons learned that can be applied by other transit agencies include the importance of:

- Coordination and education with schools, city councils, and others;
- Threat and vulnerability assessments that include the local agencies;
- Community input to avoid an "us versus you" mindset;
- Extensive use of media (billboards, television, radio) to reinforce the safety message; and
- Following these preventive measures, ongoing emergency drills and exercises to facilitate coordination with first responders.

Keys to Success

In terms of communication with local jurisdictions and emergency responders:

- Continual, ongoing contact and training opportunities;
- Proactive liaisons with local jurisdictions to understand concerns and explain steps taken to meet those concerns;
- Interlocal agreements or Memoranda of Understanding (MOU) that establish dedicated points of contact and provide a basis for future exercises and training.

Communication with passengers can be the toughest area because the explosion of social media challenges UTA to be out in front in its communications. Keys to success include:

- Using social media. Each control room (light rail and commuter rail) has a person responsible for monitoring Twitter, tweeting information, and updating UTA's Facebook page when an incident occurs.
- Stationing people on-site. Not all riders use social media or carry a cell phone. Bullhorns continue to be useful even in today's communication age. Each commuter rail train has a "train host" who is in contact with the control center by means of radio and walks through the train informing riders of the situation. Personal contact is valued by riders.
- Consolidating and clarifying who provides information. The lead controller in the control room and the IC on site control the information. A Public Information Officer (PIO) on site provides information to the media. All command staff are trained to step into this role if a PIO cannot reach the site quickly.

Successful management of critical rail incidents relies on command and coordination. The NIMS process with local and UTA ICs works well in the field. UTA also uses bright colors to distinguish UTA police. At an incident site, the UTA IC wears a yellow hat and the Rail Chief wears an orange hat (see Figure 6). Each UTA police officer carries a yellow hat and each rail supervisor carries an orange hat. The hats can be seen above the crowd, clarifying the UTA command structure to the local IC, and providing a sense of control at the site.

HOUSTON METRO, HOUSTON, TEXAS

Houston METRO operates multiple modes, including light rail in the City of Houston. The light rail system recently expanded and additional expansions will occur over the next two years. Service area population is 3.53 million. METRO operates 18 light rail vehicles in maximum service. Annual light rail ridership was 11.3 million in 2012.

Process and Major Themes

METRO is the newest rail system among all case examples, making it an interesting study in how to establish critical incident management procedures. Initially, the Rail Safety

FIGURE 6 UTA Yellow IC hat and Orange Rail chief hat.

Officer reported to rail management. Soon after the opening of the light rail line, this position was moved into a new, independent Department of Public Safety (DPS), encompassing transit police and safety. This combination resulted in lots of synergies in the accident investigation process.

Initially in 2004, METRO signed an MOU with the Houston Police Department stating that METRO police would lead the investigation of all non-fatal incidents and that Houston Police would lead fatality investigations. As METRO police gained experience, the MOU was revised. DPS is the lead agency in incident management for all incidents. Houston police help with traffic control at the incident site.

The combination of police and safety within a single department created an interesting partnership owing to differences in priorities and approaches. Monthly meetings at the senior management level, joint training, and clear procedures created a highly functional team whose members understand each other's needs and work together seamlessly. At an incident site, the transit police conduct their investigation; once they finish, Safety releases the train back into operation. DPS understands that Rail Operations is always concerned with restoring service. Rail and safety supervisors are trained to mark the scene and continue the train in service if there are no injuries and no serious damage; the driver is then interviewed at the end of the trip or at the yard. There was some pushback and considerable discussion when this approach was proposed, but this practice is routine now. METRO notes that it would have been much more difficult to establish this practice with an outside police force.

The biggest challenge to restoring service is the tendency of the Fire Department (FD) to park its vehicles on the track. This is not unique to transit: The clearing of response vehicles is also an issue in vehicular accidents. METRO has established good relations with the FD. In a recent high-profile train-bus crash, DPS worked with the IC of the FD to set up adjacent-track operation at walking speed. In this case, the IC was the Downtown District chief and was very familiar with the rail system. Farther out on the rail line, with a different fire company with less familiarity responding, the request for adjacent-track operation would have been rejected due to the need of first responders to cross the tracks. METRO has also found that a request to restore service is more likely to be granted if it comes from a uniformed officer instead of from rail operations. Rail personnel have learned the benefits of deferring to METRO police to make the request.

DPS works with the Fire Department (which includes EMS) at Fire Life Safety meetings, at joint training exercises, and at post-incident reviews. The FD Administrative Chief attends the post-incident reviews, but the crew that responded often cannot attend as a result of scheduling conflicts. DPS scheduled the most recent post-incident review to be able to debrief with the responding crew and reports that their presence was very helpful.

Communication difficulties can arise between DPS and FD. At an incident where a train filled with smoke pulled into a station, FD requested that all power be turned off. DPS turned off all power to the train, lowering the pan from the catenary, but the catenary itself was still powered. The first responders in this case were not completely familiar with power issues and were upset that DPS had not complied fully with their request. Once the District Chief arrived on the scene, the misunderstanding was cleared up.

There can also be challenges with respect to waiting for the coroner to arrive on the scene. In a recent incident, emergency responders moved a body from the track onto the platform because they detected signs of life. METRO initiated adjacent-track operation using welding screens to separate the tracks and taking steps to insure the privacy of the deceased while awaiting the coroner's arrival.

DPS goes to fire stations to conduct training. All rescue crews within the light rail service area have also attended

FIGURE 7 Pre-opening drill on the Houston METRO North Line Extension.

training at the rail yard to familiarize themselves with the rail vehicle and to practice lifting the vehicle on the track.

The recent North Line extension includes the first elevated track segment and station. Prior to opening, DPS conducted on-site training over a period of four days for all four rescue shifts (see Figure 7). The response was much better than expected, with 50 to 60 first responders in attendance and 20 fire trucks lined up on the street below on each day.

Changes/Lessons Learned

The first responders to a recent incident attempted to lift the train using incorrect procedures. At the debriefing, DPS learned that there is an international symbol to indicate a lift point, and has now placed "lift point" decals at three places on all rail vehicles (see Figure 8).

Another debriefing highlighted the issue of identifying the person in command at the incident scene. METRO guidelines call for its IC to be identified with a unique vest. At this incident, FD reported that there were 35 METRO employees wearing bright vests. Procedures were revised to direct the first rail supervisor on site to don a bright orange vest and serve as the single point of contact with FD responders. In Figure 7, the orange vest is clearly identifiable. For bigger incidents, a unified command structure is used.

FIGURE 8 Example of lift point decals (center) on Houston METRO rail vehicles.

Keys to Success

In terms of communication with local jurisdictions and emergency responders:

- Face to face contact before the incident is essential. There is a saying: Don't hand out business cards at the incident site.
- Establishing a relationship with all first responders is difficult. In Houston, the multiple work shifts of first responders presented a challenge. The recent experience with training for the North Line opening highlighted the benefits of "training on their time."
- Understand first responder priorities. Fire Department training emphasizes the following steps:
  - Get to the scene and establish control;
  - Take care of the injured;
  - Put out the fire.

  It is crucial to recognize that restoration of train service is absent from this list. First responders will focus on what they have been trained to do.
- Uniformed transit personnel are the most effective choice to request service restoration.

In terms of communication with passengers, areas of emphasis include:

- If not injured, passengers on the train want to get to their destinations and will leave before first responders arrive. Try to collect information from them before they leave.
- Passengers delayed by the incident need information. PA announcements and use of social media help, but passengers respond best to a human presence. METRO sends someone to all station platforms when there is a significant delay and will use bus and rail supervisors and industrial safety officers for this duty. Bus bridges/shuttles can operate one block away from the station, depending on location, and passengers need to know where to go. As the system expands, DPS will face more of a challenge to staff every platform during a critical incident.

Houston METRO's successes that are applicable to other agencies include:

- Keeping a train in service after an incident with no injuries and only minor damage. It took a lot of internal discussion to agree on this procedure, but it is now standard practice. Without an agency police force, it would never have happened.

- A management structure that combines transit police and safety in a single department. This is very helpful, though not absolutely necessary. As noted earlier, the incident investigation and management process is much smoother as a result.
- Inclusion of the risk management/claims function within the DPS. Before adopting this structure, the METRO response to an incident would include police, safety, and claims and they would each ask the same questions of passengers. Claims personnel have instructed safety officers regarding what information they need, resulting in a streamlined information-gathering effort at the incident.
- Post-incident review after significant events. To be most effective, the review needs to involve all parties: rail controller, rail supervisor, safety, transit police, firefighters, and EMS personnel. These reviews, focused on "how it went" and avoiding finger-pointing, has been very helpful in improved understanding of roles and challenges. At times, DPS has invited customer service and media office representatives so that they have a better understanding of what goes on in the field.
- Structure of the control center. Bus, rail, and police are all in a single control center. This facilitates communication during the critical incident.

SOUTHEASTERN PENNSYLVANIA TRANSPORTATION AUTHORITY, PHILADELPHIA, PENNSYLVANIA

SEPTA operates multiple modes, including light rail, heavy rail, and commuter rail, in a five-county area around the city of Philadelphia. Service area population is 3.32 million. SEPTA operates 285 heavy rail vehicles, 327 commuter rail vehicles, and 126 street car rail vehicles in maximum service. Annual ridership in 2012 was 102.8 million on heavy rail, 36.9 million on commuter rail, and 26.1 million on street car rail.

Process and Major Themes

SEPTA has supervisors for each mode operated. A rail supervisor is typically the first to reach the scene of an incident and takes all appropriate action, including finding out who is injured, calling for help, tending to the train operator and other employees, implementing alternate service, coordinating with SEPTA's Control Center and Safety Department, and conducting the investigation. The rail supervisor serves as the IC in a minor SEPTA-only incident or until first responders arrive in a major incident. SEPTA and local jurisdictions follow the ICS in all critical incidents, with the local fire or police department assuming overall command and SEPTA working in a supporting role to stop trains, shut off power, meet any other request, and provide needed resources.

SEPTA reports that the most beneficial change to procedures has been the utilization of the ICS and its ability to better communicate with first responders. This has allowed the agency to manage incidents more effectively and communicate better with first responders.

SEPTA's response to a critical incident includes bus bridges/shuttles, adjacent track operation, and rerouting to parallel streets, depending on the rail mode affected and the location and severity of the incident. SEPTA uses its own buses to implement bus bridges/shuttles and will stop train service at interlocking locations on either side of the incident and set up a bus bridge/shuttle between the two locations. The SEPTA Control Center coordinates provision of alternate service and works with the ICS through the rail supervisor at the scene.

The rail cars used in streetcar operation can only be operated from one end and so cannot cross over to the adjacent track and return in the opposite direction. There are side tracks, however, that can access alternate streets. Streetcars loop one-way east through a tunnel to City Hall and then continue westbound back onto the street. An incident in the tunnel halts all streetcar service underground, but a loop track at the mouth of the tunnel allows service to continue. There is also a diversion route to the parallel subway service.

The east-west subway/elevated line (Market-Frankford) has two tracks with 13 interlockings. The Control Center can set up adjacent track operation remotely. If both tracks are affected, trains stub-end at interlockings and SEPTA sets up a bus bridge/shuttle. The north-south subway line (Broad Street) is mostly four-track, with local and express service.

There are two lines in suburban Delaware County that are in "dark territory" where the train operator operates by means of line of sight and wayside signals. An incident along either of these lines requires a supervisor to control train operation at the scene.

SEPTA conducts an annual full-scale exercise on its commuter and rail transit lines, and every drill identifies areas of improvement. Training is easier with paid first responders, but there are many volunteer fire departments among the 180 within SEPTA's service area. The volunteer fire departments have higher turnover rates, and SEPTA has learned to avoid holiday weeks and popular vacation periods in scheduling training exercises.

Changes/Lessons Learned

In a recent training exercise, a local FD tried to extract a passenger through an emergency window that was partially obstructed by a stanchion bar. As a result of feedback from

the fire department and in coordination with its own engineering department, SEPTA removed the stanchion bars from that location on 112 light rail vehicles.

SEPTA has also implemented changes to procedures as a result of requests from first responders. For example, the Philadelphia Fire Department requested that a SEPTA employee always be present at the command post. In the past, rail supervisors would assume that the situation was under control and would leave the scene to tend to other duties. SEPTA changed its operating procedures to ensure that the rail supervisor stays at the FD command post and instructed its supervisors to call another supervisor to the scene if something else needs to be done (e.g., tend to the operator or set up a bus bridge/shuttle).

The incident most likely to occur is not the mass casualty event. More attention and preparation are needed for the smaller incidents that lead to more soft tissue injuries.

First responders are extremely cautious of electrified territory and will take extra steps to ensure power is off regardless of verbal confirmation. First responders would often include a person who would sit near the third rail with testers to monitor power. After consulting with peer agencies, SEPTA invested in a dozen WSAD (Warning Strobe and Alarm Device) units that attach to the third rail and set off a visual and aural alarm if power is energized. After witnessing the WSAD units in action, the Philadelphia FD purchased 12 additional devices.

A major lesson learned is to maintain open and productive dialogue with the first responder agencies and offices of emergency management in the counties. Transit agencies should not assume that everyone knows what everyone else is expected to do.

Keys to Success

In terms of communication with local jurisdictions and emergency responders:

- The fire departments want to be as expeditious and efficient as possible in resolving the incident and restoring service. SEPTA sees its role as learning what the firefighters need and providing it for them.
- Several members of SEPTA's response team are volunteer firefighters and "speak the language." There is mutual respect among firefighters, and SEPTA often uses these employees to conduct the training exercises.
- SEPTA has its own police force. In an incident several years ago, a rift developed between local police and the train engineer during a post-incident interview. To avoid a recurrence, the SEPTA Chief of Police arranged for SEPTA to be invited to a chiefs of police seminar to explain who SEPTA is and what it does; what SEPTA brings to the table in terms of subject matter expertise; and how SEPTA can assist local police and share information gathered from event recorders and cameras on the trains. The presentation was very well received, and there have been no issues since.
- First responders are open to learning more about SEPTA and its role in critical incident management. SEPTA's advice is to take every opportunity to speak to groups like this, who will appreciate the effort.
- The new SEPTA Chief of Police has very good relationships with local police agencies, and emphasizes:
  - Ongoing communication;
  - Identification and resolution of areas of contention; and
  - Clear understanding of responsibilities. SEPTA has responsibility for conducting critical incident investigations and will fully cooperate with investigations conducted by the local police.

In terms of communication with passengers, SEPTA emphasized that:

- Social media has changed passenger communication for the better. SEPTA offers a Twitter feed for every mode and every route. Its social media team monitors networks and its customer service department seeks out opportunities for two-way communication with riders.
- SEPTA participates in Pennsylvania's PAready.gov network. Customers can select SEPTA by mode to receive updates from this source.
- Communication teams are stationed at the Control Center to send out one-way announcements and can make announcements through the PA system in stations. Electronic messaging is also available on all trains and at many stations.
- SEPTA has been pleasantly surprised at how interested its customers are in communicating with the agency and notes that it is not all bad: Customers take a very balanced approach in their communications.

SEPTA's successes that are applicable to other agencies include:

- Inter-departmental communication. The transportation, maintenance, and safety departments, and the Control Center function as a single unit, breaking down the walls between the departments. There is constant communication during a major incident, and the departments trust each other. It helps that the safety department is independent of operations.
- Clear responsibilities. In incidents where other Authorities Having Jurisdiction are not involved, SEPTA has clear incident management responsibilities. SEPTA's transportation managers are responsible to manage all non-criminal incidents. SEPTA's Police Department manages all criminal incidents.

CHAPTER SIX

CONCLUSIONS AND SUGGESTIONS FOR FUTURE STUDY

This chapter summarizes key findings, presents conclusions from this synthesis project, and offers areas for future study. Findings from the literature review, survey responses, and particularly the case examples helped pinpoint successful strategies and ongoing challenges regarding critical incident management and clearance practices.

The further research suggested offered here would address a greater detail of analysis regarding means of obtaining information, use of the Incident Command System (ICS) from National Incident Management System (NIMS), first responders' views of rail transit, bus bridging and other service alternatives, and transferability of results.

KEY FINDINGS

Findings Regarding Critical Incident Management and Clearance Practices

- Almost all respondent face the challenge of coordinating and communicating with multiple jurisdictions. Primary responsibility for managing a critical incident varies. Transit agencies are somewhat more likely to be in a support than in the lead role. The most common coordination with local jurisdictions occurs through joint training exercises. Lack of training time leads the list of impediments, especially for agencies operating in many jurisdictions. Respondents also cited high local turnover rates, leading to a constant need to get to know and train new first responders.
- Agencies strive to minimize impacts on passengers at the scene but uninjured, and those elsewhere whose travel is affected by the incident. Providing information to on-board passengers is critical. Announcements over the public address system (directly from the rail control center if that capability exists) and face-to-face announcements by staff walking through the train are the most common means of providing information. Twitter and e-mail notifications are also sent by many agencies. Instructions on what to do and estimates of the expected delay are the most important topics for on-board passengers. Ensuring consistent, accurate information, arranging alternate service, and calming and reassuring passengers are among the impediments to minimizing impacts.
- Agencies also need to communicate with, and provide alternate service for, other passengers whose travel is affected by the critical incident. Station announcements and Twitter and other social media lead all actions, reflecting a mix of old and new techniques in customer communication. Text alerts/e-mail, news releases/media updates, and the agency website are other important means to get information out to passengers. All respondents inform affected passengers of service alternatives, and 90% provide estimates of delay. Bus bridges/shuttles around the critical incident site, adjacent-track operation, and alternate bus routes are the most frequently mentioned alternate services. Expected duration, location, time of day, and availability of vehicles and personnel are important factors in selecting the most appropriate alternate service. The focus for a short delay is clearing the incident and restoring service, possibly through adjacent-track operation, while bus bridges/shuttles are used for longer delays. Major impediments to minimizing impacts to passengers whose travel is affected by the critical incident are the unavailability of drivers and/or buses to set up a bus bridge/shuttle and inconsistent or unclear communications.
- Actions to limit service disruptions on adjacent tracks are important in maintaining rail service. The general sense of respondents is that adjacent-track operation is the preferable service response to a critical incident if it is possible. Agencies work with first responders and train dispatchers to expedite the ability to use an adjacent track, often at sharply reduced or "walking" speeds under the supervision of on-site rail personnel. Most agencies report that the decision to operate on adjacent tracks is not in their control. First responders do not necessarily view limiting service disruptions on adjacent tracks as important, according to survey respondents. The primary impediment to limiting service disruptions on adjacent tracks is lack of familiarity with rail among first responders, which leads to reluctance to approve service restoration. Improved coordination including joint training with first responders was the most often cited action to overcome this impediment.
- Almost 90% of responding agencies operate trains in electrified territory. Half of the responding transit agencies have primary responsibility for the decision to shut down power to allow first responders safe access to the train. Within the agency, the rail control center is typically responsible for the decision to turn power off and to restore power. The transit agency is also more likely to

make the decision to restore power. Major issues unique to electrified territory include the uncertainty of first responders unfamiliar with rail power systems, safety, and the time-consuming nature of power removal procedures at some systems. Continued training that addresses issues around electrification was most often mentioned as the most useful action. Respondents also stressed clear rules and work practices in high-voltage areas.

- Safety training is an important part of ongoing coordination with first responders and local jurisdictions. Most agencies provide an abbreviated version of agency training for non-transit personnel. Only 31% of responding agencies report that safety training is mandatory for all first responders. Impediments to ensuring safety of non-transit personnel include the number of emergency responders and varying levels of commitment to rail safety training, level of familiarity with the dangers of rail, lack of agency staff to properly manage the incident, and the difficulty of retaining what is learned. Ideas to improve safety of non-transit personnel included taking the training to the agencies, on-track training, and improving agency liaison with the Incident Commander (IC) and other agencies. Guidance to local jurisdictions focused on training and building working relationship, with several detailed ideas offered.
- Maintaining or quickly restoring rail service is second only to safety among rail agency goals in managing critical incidents. Among actions taken by agencies to accelerate cleanup at the critical incident site is the staging of assets and personnel on-site to ensure that cleanup operations can start promptly once the site is released. The majority of agencies take back control of the site when police and fire have completed their operations or when the IC releases the site. Many agencies allow the train to continue in service (sometimes with a relief operator) after on-site inspection. The most common impediment to accelerated cleanup and service restoration is the ongoing investigation by a local jurisdiction at the incident site. Respondents also reported damage to infrastructure and vehicles and a variety of other factors. The most promising actions to accelerate cleanup and return trains to service include education, formal agreements with local jurisdictions, and collaborative working relationships. Common themes in guidance offered to local jurisdictions include joint training and education, the importance of establishing relationships, demonstrated understanding of local jurisdiction concerns, and clear lines of authority.
- Handling and preservation of evidence is of high importance to local responders. The agency police department has responsibility for evidence in many cases, while in other cases local police assume this responsibility. Responses to the question of who "owns" the evidence indicate that in most cases, the transit agency has ownership. Respondents cited poor management at the incident site and the need for proper procedures and trained personnel as the primary impediments to handling accident evidence and data collection after a critical incident. Useful actions for future incidents include training, proper equipment, preservation of evidence, proper procedures/investigative training, and command and control on site.
- Among the other challenges listed as affecting agencies' ability to manage critical incidents were educating first responders regarding constraints for rail, response coordination among multiple jurisdictions, and remote location of an incident—each identified by 30% of respondents as a major challenge.

Agency Assessment of Critical Incident Management

- A majority of agencies, 68%, always conduct post-incident reviews after a critical incident; an additional 24% reported that post-incident reviews are usually done.
- Respondents cite incorporation of lessons learned in emergency plans and changes to operations and/or vehicles among the benefits of post-incident reviews. These include service recovery techniques, adding a crossover near a high-risk location, and changes to vehicles to assist first responders. Other benefits include updated procedures, improvements to customer communication, and both internal and external coordination.
- A variety of answers were offered regarding the most beneficial change arising from post-incident reviews. Stronger, less ambiguous, and more consistent procedures led the list, but there was no consensus.
- Sixty-nine percent (69%) of responding agencies use post-incident reviews at other agencies, NTSB findings, and APTA peer reviews to re-confirm existing procedures and to incorporate lessons learned. Two respondents specifically mentioned changes to roadway worker protection rules as the result of an incident elsewhere.

The importance of a clear chain of command at the incident scene and a strong desire to place a higher priority on service restoration led all responses to the question: "If you could change ONE aspect in the process of critical incident management and clearance practices, what would you change?"

Guidance for Local Jurisdictions

Survey respondents offering guidance for local jurisdictions regarding management of critical incidents emphasized training, familiarity, and communications.

- Take advantage of emergency preparedness training offered by transit agencies. This training can be modified to better suit your needs. This process helps build an open line of communication and provides a better understanding of each organization's structure including roles/responsibilities.

- Get to know transit first responders before an incident occurs. Establish a relationship with transit police and rail operations leaders so you can call their cell phones if things are not going as planned.
- Understand the importance of quickly restoring service. There are thousands of riders trying to get to work or home who can be forgotten in the course of conducting an investigation. Also, overcrowding while the system is shut down can lead to unintended problems and possibly other incidents.
- Learn about rail and the rail transit environment in order to recognize and understand the hazards inherent in the transit operating environment. Familiarize your first responders with rail alignment, rolling stock, and operation.
- Work with the transit agency as a primary partner. Use the train crew to your benefit, and rely on our expertise in an emergency on our system.
- Problems can develop as the incident evolves and during the service restoration process. Sustained coordination throughout the incident is critical.

Lessons Learned from Survey Respondents

Survey respondents shared lessons learned that would benefit other rail agencies.

- Revisit and evaluate rules and procedures on a regular basis and update accordingly. One agency recently revised its standard operating procedure related to fire, smoke, and alarms at or between stations. Its new procedure outlines roles and responsibilities and ensures safe operations but minimizes the impact on operations.
- Establish and maintain good working partnerships with local jurisdictional emergency management agencies, police, and fire departments on transit-related incidents. Emergency drills and exercises are an excellent way to facilitate coordination with local first responders.
- Assign one person to be in overall charge. The importance of setting up a unified incident command post so that one course of direction can be relayed to all personnel in the field cannot be overstated. Under the NIMS structure, the IC is the person in overall charge.
- Find opportunities to engage the communities where you operate. Communicate often and effectively with these communities on issues that may impact them or their residents.
- Hands-on training with local first responders is irreplaceable as a means of teaching and of fostering cooperation.
- Establish a procedure that balances first responder priorities and the need to restore service. Although not always transit priorities, scene preservation and witness retention become important in the post-incident investigation both for the transit agency and law enforcement.
- Debrief after every incident with all local emergency responders and also with internal staff only. The internal briefing allows the opportunity to discuss operational issues such as passenger communication and bus bridging that may not be of interest to the police and fire staff.

Lessons Learned from Case Examples

Lessons from the MDT (Miami, Florida) case example include:

- Take a proactive approach to training. Reaching out to first responders and inviting them in for training is very effective.
- Provide training that is engaging and fun. Local police and fire chiefs request drills that are realistic and taxing. First responders enjoy these types of exercises, and spread the word to other jurisdictions.
- Emphasize building relationships between agency personnel and first responders. This may be as important as familiarity with the system in ensuring successful management of critical incidents.
- Remember that more informed passengers are happier. MDT makes continuous announcements in real time (not pre-recorded) and provides as much information as possible without compromising security.
- Rely on social media for new ways to communicate with customers in real time.
- Establish chain of command for critical incidents. NIMS procedures, under which a command post is set up at the scene with fire/rescue, police, and agency personnel, simplifies incident management.
- Emphasize open lines of communication with emergency responders.
- Conduct post-incident reviews and make any needed changes in procedures.

The Metra (Chicago, Illinois) case example demonstrates the tension that can exist between a rail agency and first responders over prompt restoration of service. Lessons from Metra's experience include:

- Build trust and confidence that the transit agency understands first responders' concerns and priorities.
- Build understanding that incident sites typically do not need to be treated in the same way as a crime scene. Installing cameras on all Metra locomotives and cab cars has helped in this effort, since first responders know that video will be available.
- Encourage a focus on the big picture, which is possible only when safety is assured.
- Change operating procedures with the customer in mind. Metra's new procedures call for stopping trains at stations, allowing customers to get off if they have other means of getting home available. If the delay is significant, Metra may not even send the train out into service.
- Work to make all first responders comfortable and confident that no one's life is in danger when train service is restored. The incident scene is hectic, and it is difficult to communicate that service can be restored safely when first responders are focused on their duties.

Lessons from the Sound Transit (Seattle, Washington) case example include:

- Successful management of critical rail incidents is based on two pillars: training and communication. This allows the sharing of vital information and development of personal contacts so that the first meeting between agency managers and emergency responders is not at an incident site. Face-to-face interaction and knowing the right person to call are means to make the process work.
- Use all available technology to communicate with passengers.
- Ensure that the information and training provided to local first responders are relevant in their world.
- Develop a well-vetted procedural document that serves as the basis for training and is updated as needed.
- Enable timely and direct communication among station agents, conductors, and security personnel.
- Stress the different nature of rail transit as opposed to highway traffic to emergency responders.

Lessons from the UTA (Salt Lake City, Utah) case example are:

- Use social media. Each control room (light rail and commuter rail) has a person responsible for monitoring Twitter, tweeting information, and updating UTA's Facebook page when an incident occurs.
- Provide an on-site presence during critical incidents. Personal contact is valued by riders.
- Develop proactive liaisons with cities to understand concerns and explain steps taken to meet those concerns. Successful management of critical rail incidents relies on command and coordination.
- Use bright clothing to distinguish agency police, first responders, and incident commanders to clarify the command structure and provide a sense of control at the site.
- Rely on the agency's own police force to communicate with first responders. There is a shared culture among police.

Lessons from the Houston Metro case example are:

- Reach out to first responders. The recent experience with training for the North Line opening highlighted the benefits of "training on their time."
- Understand first responder priorities.
- Make sure that passengers delayed by the incident get the information they need. Passengers respond best to a human presence, especially when there is a significant delay.
- Conduct post-incident reviews after significant events and involve all parties. As a result of one review, procedures were revised to direct the first rail supervisor on site to don a bright orange vest so as to be readily identified by responders.
- Combine transit police, safety, and claims in a single department. This makes the incident investigation and management process much smoother.

Lessons from the SEPTA (Philadelphia, PA) case example are:

- Ensure inter-departmental communication. The transportation, maintenance, and safety departments and the Control Center function as a single unit, breaking down the walls between the departments.
- Establish clear responsibilities at the incident site.
- Open dialogue with local first responder agencies and offices of emergency management concerning the agency and its role in critical incident management. Feedback from first responders has resulted in changes to SEPTA procedures.
- Use social media along with traditional communication tools. SEPTA's social media team monitors networks and its customer service department seeks out opportunities for two-way communication with riders.
- Use SEPTA employees who are also volunteer firefighters and "speak the language" to conduct training exercises.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE STUDY

- A clear chain of command at the critical incident site is vital. The NIMS's ICS establishes a clear organizational structure.
- An open emergency conference line is vital for sharing information during an incident. Incident sites tend to be chaotic. An emergency conference line insures that all have access to current information.
- The relationships between the transit agency and local first responders affect critical incident management in obvious and subtle ways. The ideal is a strong working relationship based on joint training and prior experience. This is more difficult to achieve for commuter rail agencies whose service area encompasses hundreds of local first responder agencies. Because critical incidents are rare, many localities may go years without one; in these cases, familiarity with rail will be very low and working relationships are difficult to establish and maintain.
- Tension between the transit agency and local first responders often revolves around the priority given to restoring service. All parties agree that safety comes first, but there is often a difference of opinion about whether it is safe to restore service on an adjacent track while the investigation is still active. The investigation vs. restoration debate goes on within transit agencies as well. Responses to the survey from safety departments were different in tone and substance from responses from operations departments. The phrasing of requests to restore service can help to resolve this tension: An emphasis on moving

people (e.g., getting passengers trapped on subsequent trains to their final destination) is more effective than an emphasis on moving trains.
- Education of transit agency personnel as well as first responders is important. Training agency personnel to understand first responders' priorities, policies, and procedures is as important as training first responders about rail. As first responders gain greater familiarity with the rail system, they are more likely to understand the importance of restoring service. This speaks to the importance of thorough, realistic joint training exercises and post-incident review. Two comments from the study stand out: references to the need to "make all first responders comfortable and confident that no one's life is in danger when train service is restored" and the benefit of "procedures to allow service restoration priorities to work with investigative needs . . . with ongoing coordination between agencies."
- The most useful guidance that could be offered to local jurisdictions, as summarized from survey responses, is the dissemination of a procedures manual addressing all aspects of rail incident investigation, supported by realistic table top and field simulations of high profile incidents to ensure familiarity with the unique aspects of rail.
- Agencies with their own police forces report unexpected benefits. Anecdotal information from the case examples noted a difference in agency-first responder relationships when transit police are involved. Police know how to talk to police, and there is a greater understanding, trust, and "sharing the same language" between transit police and local police. Rail operations personnel can develop a similar rapport with local police and other first responders, but it takes working together over time to build a similar level of trust.
- Providing information to passengers on-board at the site is critical. Survey respondents cited clear, detailed, and timely communication as the major action to assist on-board passengers. One agency estimated that riders are informed within 10 to 20 minutes, given the chain of the information flow and the need to script and vet the message.
- Rail agencies have clearly entered the new age in communications. Even five years ago, it would have been very unlikely to find so many agencies relying on Twitter and other social media, along with text and e-mail alerts. The near-instantaneous nature of social media and text alerts is extremely valuable during a critical incident, enabling the agency to inform customers of delays and service alternatives and to provide regular updates even if no additional information is available. The conventional wisdom of just a few years ago that commuter rail riders are more likely to have smart phones and other electronic devices may still be true, but the gap between commuter and light-rail riders is narrowing. Light rail and heavy rail agencies are as likely as commuter rail agencies to rely on social media as an important aspect of customer communications. Agencies also need to ensure that correct information is being provided. The Utah Transit Authority case example, with agency personnel dedicated to monitoring social media and correcting misinformation, may indicate the wave of the near future.
- Post-incident reviews are very useful. Results of these reviews typically include changes to operations and/or vehicles, improvements to customer communications, enhanced internal and external coordination, and incorporation of lessons learned in emergency plans.
- A proactive approach to training is very effective. Responding to rail incidents is generally not a major part of day-to-day activity for most first responders, so inviting them in to train raises the profile of the agency and helps familiarize as many of them as possible with rail. The training exercises build relationships between transit personnel and first responders, which may be as important as familiarity with the system in ensuring successful management of critical incidents.
- Rigorous and engaging training can be more effective. As noted in the Miami–Dade Transit case example, local police and fire chiefs want drills that are realistic and taxing. First responders appreciate such drills because they generally have a strong real-world focus. As the word spreads about rail training, the transit agency will have opportunities to train more first responders.

Findings from this synthesis suggest six areas of future study:

- How rail passengers get transit information and how they perceive the benefits of such information. This study would have as one of its goals measuring the use of and reliance on social media. The drawback to this type of study is that it can become quickly outdated. Nevertheless, such research could fill in gaps in agencies' understanding of how passengers now obtain and how they prefer to obtain information. The study could appropriately be broadened to bus as well as rail modes.
- How the NIMS model might be enhanced if modified to address critical rail (and other) incidents. A few agencies that follow the NIMS model noted that local jurisdictions were less likely to have experience with the model or the concept of an Incident Command System. One reason could be that most local incidents are clearly within the purview of either the police or the fire department, so there has not been a need for ICS. The increased focus on security in recent years would suggest a greater familiarity with NIMS on the part of local jurisdictions, but NIMS may not be seen as applicable in situations other than terrorist activity or natural disasters. Case examples of how ICS/NIMS has worked in real-life critical incidents (transit and others) might be helpful in documenting its usefulness, along with any benefits and disadvantages.

- Quantifying expedient procedures for restoring rail service and moving passengers. What are the most successful practices that address the unique nature of rail incidents? What are appropriate metrics to measure success?
- First responders' views of critical incidents on rail systems. Along the lines of "police can talk to police," it might be more effective to have first responders "explain" rail transit to their peers than having transit officials provide the explanations. The consistent finding that first responders who have greater experience with rail view the restoration of service issue more sympathetically suggests that training alone will not change the situation appreciably. First responders were not part of this survey because it was beyond the scope of a synthesis project; therefore, this partially anecdotal information concerning a subset of all first responders may not be sufficient to draw conclusions.
- Bus bridging/shuttles and other service alternatives. The general sense of the survey is that adjacent-track operation is the preferable service response to a critical incident. Bus bridging is very popular; however, there are serious problems with vehicle and driver availability. Studies in the literature have proposed proximity to known critical incident locations as a criterion in locating bus depots, but this appears problematic. Others suggest creating a reserve fleet specifically for use in bus bridges/shuttles; this also appears impractical. Is there a better solution to the capacity issue? Are there other alternatives that may be or become feasible?
- Transferability of critical management strategies. Can the experience in one city or rail mode be applied with confidence elsewhere? Are there specific mitigating circumstances that affect success in specific circumstances? How do these circumstances apply?

ACRONYMS

CP	Canadian Pacific
DPS	Department of Public Safety
EMS	Emergency medical services
FD	Fire department
IC	Incident Commander
ICS	Incident Command System
MDT	Miami–Dade Transit
MOU	Memorandum of Understanding
NHS	National Health Service
NIMS	National Incident Management System
NTD	National Transit Database
OCC	Operations Control Center
OEM	Office of Emergency Management
PA	Public address
PD	Police department
RTC	Rail Traffic Control
RTO	Rapid Transit Operations
SEPTA	Southeastern Pennsylvania Transportation Authority
SOP	Standard operating procedures
TRID	Transportation Research Information Database
UTA	Utah Transit Authority

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APPENDIX A

List of Participating Transit Agencies

1.	Albuquerque, NM	Rio Metro Regional Transit District
2.	Alexandria, VA	Virginia Railway Express
3.	Baltimore, MD	Maryland Transit Administration
4.	Boston, MA	Massachusetts Bay Transportation Authority
5.	Charlotte, NC	Charlotte Area Transit System
6.	Chesterton, IN	Northern Indiana Commuter Transportation District
7.	Chicago, IL	Metra (NorthEast Illinois Regional Commuter Railroad Corporation)
8.	Cleveland, OH	Greater Cleveland Regional Transit Authority
9.	Dallas, TX	Dallas Area Rapid Transit
10.	Denver, CO	Regional Transportation District
11.	Hampton, VA	Hampton Roads Transit
12.	Houston, TX	Houston METRO
13.	Los Angeles, CA	Metro
14.	Miami, FL	Miami–Dade Transit
15.	Minneapolis, MN	Metro Transit
16.	Montreal, QU	Agence métropolitaine de transport
17.	Newark, NJ	New Jersey Transit
18.	New York, NY	MTA–New York City Transit
19.	New York, NY	MTA–Long Island Railroad
20.	New York, NY	Metro North
21.	Oceanside, CA	North County Transit District
22.	Philadelphia, PA	Southeastern Pennsylvania Transportation Authority
23.	Pompano Beach, FL	South Florida Regional Transit Authority
24.	Portland, OR	Tri-County Metropolitan Transit District of Oregon
25.	Sacramento, CA	Sacramento Regional Transit District
26.	Salt Lake City, UT	Utah Transit Authority
27.	San Carlos, CA	Caltrain
28.	San Diego, CA	Metropolitan Transit System
29.	San Francisco, CA	San Francisco Municipal Transit Agency (Muni)
30.	San Jose, CA	Santa Clara Valley Transit Authority
31a.	Seattle, WA	Sound Transit–Commuter Rail
31b.	Seattle, WA	Sound Transit–Light Rail
32.	Toronto, ON	Toronto Transit Commission
33.	Vancouver, BC	TransLink
34.	Washington, DC	Washington Metropolitan Area Transit Authority

APPENDIX B

Survey Questionnaire

1. WELCOME

This TCRP synthesis will document rail transit agencies' experiences regarding critical incident response. Critical incidents are those involving fatalities and/or resulting in major service disruptions. The study will summarize the major issues faced by agencies in responding effectively, identify successful strategies, and report how post-incident evaluation affects response to the next incident. This synthesis will aid rail transit agencies by identifying best-practice solutions that work in the real world and will also provide a clear, concise guide for communities and their first responders.

The survey questions try to address as many situations as possible, but given the variety of circumstances and transit systems, not all questions may be appropriate for all agencies. We encourage you to obtain input from others in your agency as needed. If any question does not apply to your system, simply answer "N/A." All survey responses will be confidential.

We also ask for recommendations for other agencies to be included in our sample and for your willingness to participate in a telephone interview if your agency is selected for a more detailed case example.

The final report, to be published by the Transportation Research Board, will summarize best practices in critical incident management and clearance.

Thank you for taking the time to participate.

2. Default Section

1. Today's Date

MM DD YYYY

MM/DD/YYYY ____ / ____ / ____

*2. Please list your name, agency, and contact information

Name:

Title

Company

City/Town:

State/Province:

Email Address:

Phone Number:

3. TYPE OF RAIL SERVICE

3. What type of rail service does your agency operate?

- ☐ Commuter rail
- ☐ Light rail
- ☐ Rapid transit/heavy rail

4. How many municipalities does your agency's rail system serve?

5. Does your agency's rail service operate in more than one state?

- ○ Yes
- ○ No

6. How would you characterize your agency's operating environment?

- ○ Primarily urban
- ○ Mix of urban and suburban
- ○ Primarily suburban
- ○ Mix of suburban and rural
- ○ Mix of urban, suburban, and rural

4. BARRIERS, OBSTACLES, AND CHALLENGES

7. Please characterize the following elements as major challenges, minor challenges, or not an issue in critical incident management and clearance practices.

	Major Challenge	Minor Challenge	Not an Issue
Response coordination among multiple jurisdictions	○	○	○
Presence of uninjured passengers on the train	○	○	○
Communication with passengers	○	○	○
Clear chain of command at the scene	○	○	○
Insufficient training for agency personnel	○	○	○
Insufficient training for non-agency personnel	○	○	○
Educating first responders re constraints for rail	○	○	○
Electrification/power issues	○	○	○
Ability to decide on/implement alternate service	○	○	○
Unavoidable procedural delays	○	○	○
Avoidable procedural delays	○	○	○
Remote location of incident	○	○	○
Other	○	○	○

Other (please specify)

8. Please describe the nature of the one major challenge.

5. ASSESSMENT

9. Does your agency conduct a post-incident review for critical incidents?

- ○ Always
- ○ Usually
- ○ Sometimes
- ○ Rarely
- ○ Never

6. ASSESSMENT 2

10. Does your agency incorporate findings of the review into revised procedures? If so, what have been the primary benefits of the review process? Please give examples.

11. What has been the most beneficial change to procedures, and why?

7. ASSESSMENT 3

12. Does your agency review and incorporate findings from post-incident reviews conducted by other agencies? If so, what have been the primary benefits of the review process? Please give examples.

13. If you could change ONE aspect in the process of critical incident management and clearance practices, what would you change?

14. What would be the most useful guidance your agency would offer to local jurisdictions?

15. Please describe any "lessons learned" that would benefit other transit agencies.

8. COORDINATION AND COMMUNICATION WITH LOCAL JURISDICTIONS

16. Who has primary responsibility for managing a critical incident?

- ○ Transit agency
- ○ Local municipality (city or county)
- ○ Other (please specify)

17. How soon are local jurisdictions and others notified after a critical incident?

18. Describe your agency's role in managing a critical incident

19. Who in your agency has primary responsibility for managing a critical incident?

20. How would you describe ongoing coordination with local jurisdictions?

- Conduct joint training exercises
- Meet on a regular basis to discuss critical incident management
- Meet on an ad-hoc basis to discuss critical incident management
- Communicate in other ways
- Varies by jurisdiction (please describe below)

Other (please specify)

21. What are the major impediments to coordination with local jurisdictions in managing critical incidents?

22. What actions would be most useful in improving coordination with local jurisdictions in managing critical incidents?

9. MINIMIZING PASSENGER IMPACTS

23. What steps does your agency take with regard to uninjured passengers?

24. How do you communicate with passengers remaining on board?

25. What information does your agency communicate to passengers remaining on board after a critical incident?

- ☐ Instructions on what to do
- ☐ Instructions on what not to do
- ☐ Description of the incident
- ☐ Description of ongoing procedures in response to the incident
- ☐ Estimates of the potential delay
- ☐ Other (please specify)

26. What are the major impediments to minimizing passenger impacts in managing critical incidents?

27. What actions have been or would be most useful in minimizing passenger impacts in managing critical incidents?

10. MINIMIZING PASSENGER IMPACTS 2

28. What steps does your agency take to communicate with other passengers whose travel is affected by the critical incident?

29. What information does your agency communicate to passengers whose travel is affected by the critical incident?

- ☐ Estimates of the potential delay
- ☐ Alternate service
- ☐ Other (please specify)

30. How soon after the critical incident is this information communicated to passengers?

31. What types of alternate service does your agency deploy or arrange for and recommend to passengers when a critical incident occurs?

- ☐ Alternate rail lines within the agency
- ☐ Rail lines operated by other agencies
- ☐ Alternate bus routes
- ☐ Single track operation around the critical incident site
- ☐ Bus bridge around the critical incident site
- ☐ Bus bridge to another transit service
- ☐ Other (please specify)

32. Does the selection of the type of alternate service depend on any of the following factors? If so, please explain.

- ☐ Expected duration
- ☐ Time of day/day of week
- ☐ Incident location
- ☐ Availability of vehicles/personnel
- ☐ Cause of the critical incident
- ☐ None of the above
- ☐ Other (please specify)

33. What are the major impediments to minimizing impacts to other passengers whose travel is affected by the critical incident?

34. What actions have been or would be most useful in minimizing impacts to other passengers whose travel is affected by the critical incident?

11. LIMITING SERVICE DISRUPTIONS ON ADJACENT TRACKS

35. Does your agency operate rail on multiple tracks?

- ○ Yes, as a general rule
- ○ Only on specific segments
- ○ No, all single-track operation

12. LIMITING SERVICE DISRUPTIONS ON ADJACENT TRACKS 2

36. What steps does your agency take to limit service disruption on adjacent tracks? Are these actions entirely within your agency's control?

37. Do first responders from local jurisdictions view limiting service disruptions on adjacent tracks as important?

- ○ Yes
- ○ Yes but it is not a high priority
- ○ Depends on the jurisdiction
- ○ No

38. What are the major impediments to limiting service disruptions on adjacent tracks in managing critical incidents?

39. What actions have been or would be most useful in limiting service disruptions on adjacent tracks in managing critical incidents?

13. ISSUES UNIQUE TO ELECTRIFIED TERRITORY

40. Does your agency operate trains in electrified territory?

- ○ Yes
- ○ No

14. ELECTRIFIED TERRITORY 2

41. Who has primary responsibility for the decision to shut down power so that first responders have safe access to the train?

- ○ Transit agency
- ○ Local municipality (city or county)
- ○ Other (please specify)

42. Who in your agency has primary responsibility to shut down power?

43. Who has primary responsibility for the decision to restore power?

- ○ Transit agency
- ○ Local municipality (city or county)
- ○ Other (please specify)

44. Who in your agency has primary responsibility to restore power?

45. Are there other issues unique to critical incidents in electrified territory?

46. What actions have been or would be most useful in addressing issues surrounding electrification at the critical incident?

15. SAFETY OF NON-RAILROAD/NON-TRANSIT PERSONNEL

47. Is safety training a part of ongoing coordination with local jurisdictions and first responders?

- Yes, they receive the same training as agency personnel
- Yes, they receive an abbreviated version of agency training focused on their particular tasks
- No

48. Does participation in safety training vary by jurisdiction?

- Yes
- No, required of all first responders
- Don't know

49. What steps does your agency take with regard to the safety of non-railroad/non-transit personnel?

50. Who in your agency is responsible for safety-related training of non-transit personnel?

51. What are the major impediments to ensuring the safety of non-transit personnel in managing critical incidents?

52. What actions have been or would be most useful in ensuring the safety of non-transit personnel in managing critical incidents?

53. What would be the most useful guidance your agency would offer to local jurisdictions in terms of safety of non-transit personnel?

16. ACCELERATED CLEAN-UP OPERATION AND KEEPING A TRAIN IN SERVICE

54. What steps does your agency take to accelerate clean-up operation after a critical incident?

55. At what point in the critical incident management does your agency take back control of the site? Who decides this?

56. Are there any particular strategies your agency uses to allow a train to remain in service?

57. What are the major impediments to accelerating clean-up operation and allowing a train to remain in service after a critical incident?

58. What actions have been or would be most useful in accelerating clean-up operation and allowing a train to remain in service after a critical incident?

59. What would be the most useful guidance your agency would offer to local jurisdictions in terms of accelerating clean-up operation?

17. PROCEDURES TO HANDLE ACCIDENT EVIDENCE/DATA COLLECTION

60. What procedures does your agency follow to handle accident evidence and data collection for a critical incident?

61. Does your agency "own" the accident evidence or is it the responsibility of another agency?

62. What are the major impediments to handling accident evidence and data collection after a critical incident?

63. What actions have been or would be most useful in handling accident evidence and data collection in the future after a critical incident?

64. What would be the most useful guidance your agency would offer to local jurisdictions in terms of accident evidence and data collection?

18. CASE STUDY

65. Would you be willing to participate further as a case study, involving a telephone interview going into further detail on your agency's experience, if selected by the TCRP panel for this project?

- ○ Yes
- ○ No

19. OTHER AGENCIES

66. Is there another rail transit system that you suggest we include in this synthesis project? Please provide the agency name and a contact.

20. THANK YOU!

Thank you for participating! This survey is now complete. Please contact Dan Boyle at dan@danboyleandassociates.com or at 858-259-6515 if you would like any additional information about this study.

APPENDIX C

Simulation and Research Studies

This appendix summarizes simulation and research studies of interest but not directly relevant to critical incident management and clearance practices.

Cardaso et al. (*23*) studied the disruption management problem of rapid transit rail networks. The authors explicitly deal with the effects of the disruption on the passenger demand, proposing a two-step approach that combines an integrated optimization model (for the timetable and rolling stock) with a model for the passengers' behavior. They report their computational tests on realistic problem instances of the Spanish rail operator RENFE. The proposed approach is able to find solutions with a very good balance between various managerial goals within a few minutes.

Community disaster resilience does not make theoretical or practical sense without viewing infrastructure as the combination of capitals and services. Specifically, infrastructure is characterized by its relationship to other infrastructure, agents, possible disruptions, possible interventions, jurisdictions, and markets. Miles (*24*) presents a subset of evolving conceptual, algorithmic and geo-visual representations of infrastructure-dependent community disaster resilience. This builds upon existing work on ResilUS—a prototype simulation model of community disaster resilience—and other contributions from the literature. The ultimate goal of this research is to provide the means for making lifeline infrastructure mitigation planning and restoration decisions that account for socio-technical and recovery-based goals.

Train delays in suburban railroads can impact subsequent trains, as well as passengers on the delayed train. It is possible to reschedule the delayed train, and sometimes subsequent trains, to minimize the effect on the whole system. Boland et al. (*25*) describes a method for rescheduling to lessen the effect on passengers. It considers a double track railroad system, and takes into account boarding times at crowded train stations, the ability of trains to exclude and bypass stations, and passenger travel times.

After a major service disruption on a single-track rail line, dispatchers need to generate a series of train meet-pass plans at different decision times of the rescheduling stage. Based on a stochastic programming with recourse framework, Meng and Zhao (*26*) incorporate different probabilistic scenarios in the rolling horizon decision process to recognize (a) the input data uncertainty associated with predicted segment running times and segment recovery times and (b) the possibilities of rescheduling decisions after receiving status updates. The proposed model periodically optimizes schedules for a relatively long rolling horizon, while selecting and disseminating a robust meet-pass plan for every roll period. A multi-layer branching solution procedure is developed to systematically generate and select meet-pass plans under different stochastic scenarios. Illustrative examples and numerical experiments are used to demonstrate the importance of robust disruption handling under a dynamic and stochastic environment. In terms of expected total train delay time, the experimental results show that the robust solutions are better than the expected value-based solutions by a range of 10% to 30%.

Lorek et al. (*27*) propose a novel event-based integer programming model. Features include shifting and canceling of trips as well as modifying the vehicle schedules by changing or truncating the circulations. The objective maximizes the number of recovered trips, possibly with delay, while guaranteeing a conflict-free new timetable for the estimated time window of the disruption. The authors demonstrate the usefulness of the approach through experiments for real-life test instances of relevant size, arising from the subway system of Vienna. The authors focus on scenarios in which one direction of one track is blocked, and trains have to be scheduled through this bottleneck. Solving these instances is made possible by contracting parts of the underlying event-activity graph; this allows a significant size reduction of the integer program. Usually, the solutions found within one minute are of good quality and can be used as good estimates of recovery plans in an online context.

Preston et al. (*28*) review existing approaches to the management of disruptions to railway operations in Britain. The paper devises and assesses methods of, and strategies for, disruption management, through the dynamic re-scheduling and re-routing of train movements. A series of real time computer tools are examined with reference to a specific junction on the British rail network, Abbotswood Junction on the Birmingham to Bristol line. It is found that although classical linear programming approaches work well on simple urban rail networks, they work less well on complex mixed traffic networks. Alternative approaches based on genetic algorithms and a guided search procedure are found to provide better and faster solutions, but still fall short of providing online support at a practical scale. The alternative strategies for and methods of recovery from disruptive incidents are compared and evaluated, in order to determine the most promising ones.

The positive trend of increased use of both railway passenger and freight transportation in Europe has resulted in an increased occurrence of, and sensitivity to, traffic disturbances. The kernel of the disturbance management solution is to revise the original timetable in line with the new conditions and decide where, when, and how trains should overtake or meet to minimize the negative effect of the disturbance. There exist both sophisticated and simple models and methods which have different strengths and weaknesses. Kraseman (*29*) presents results from a Swedish research project and investigates the pros and cons of different re-scheduling models and methods.

Valdes et al. (*30*) evaluate three control logics for metro operations under incident conditions to determine which operational strategy performs better when minor disruptions occur. The simulation was performed using SIMAN/Arena with data collected from various sources, including a metro system, with automatic train control operation. The models developed use the Tren Urbano of San Juan Puerto Rico as a case study. According to the results of the models, the schedule-based operation is more effective for high service frequencies and disruptions that are less than one time the operating headway. The headway-based operation is more effective for low

frequencies disruptions that are greater than one time the operating headway.

Railway operating disturbances have a significant impact on the satisfaction of customers. Increasing demand for rail service has led to highly congested networks, which, in spite of improvements in railway scheduling and planning, are more susceptible to operating disturbances and impacts. Schranil and Weidmann (*31*) report research on the handling of railway operation disturbances. The research shows how railway systems engineering can optimize processes to reduce disturbance impacts, particularly for highly congested rail networks such as those in urban areas,. The proposed approach was developed by combining statistical correlations and improved procedural considerations. The approach can be used to help guide operating decisions and also be used in incident prevention planning.

APPENDIX D

Summary of Survey Results

RESPONDENT INFORMATION

1. Date:
2. Contact Information

   Name of Respondent:

   Agency Name:

   Title of Respondent:

   Agency Address:

   Agency Size (note: this was entered after survey responses were received, based on FY 2012 NTD data)

Small (<50 peak rail vehicles)	11	32.4%
Medium (50–249 peak rail vehicles)	13	38.2%
Large (250+ peak buses)	10	29.4%

   Respondent e-mail address:

   Respondent Telephone Number:

TYPE OF RAIL SERVICE

3. What type of rail service does your agency operate?

Commuter rail	55.9%	19
Light rail	58.9%	20
Rapid transit/heavy rail	29.4%	10
Commuter rail only	26.5%	9
Light rail only	26.5%	9
Heavy rail only	8.8%	3
All three modes	8.8%	3
Light rail + heavy rail	8.8%	3
Light rail + commuter rail	17.6%	6
Commuter rail + heavy rail	3.3%	1

4. How many municipalities does your agency's rail system serve?

   Not summarized in report. Responses provided here.

   Fourteen (14).

   Eighty-three (83).

   Thirteen (13) member cities. LRT goes through to eight cities. Commuter (joint operation with another agency) through/to five cities.

   1

   7

   Two states, nine counties, numerous local.

   Eleven (11).

   Currently only one city. The system is being expanded (under construction) to extend into another city.

   Approximately 22 within three counties.

   Commuter Rail services 12 communities with 12 stations. Light rail serves 13 stations in and between several communities. Another Light Rail system (more like a streetcar) has 6 stations in a 1.2 mile corridor within one city. This survey will focus on the commuter rail system from here on, for simplicity.

   59 municipalities, including 38 cities, nine villages, two townships.

   One county.

   Three

   Fifteen (15) on the main line system between. 3 additional on peak hour only extension.

   One

   Eleven (11).

   Fifteen (15).

   Approximately 10.

   Over 175.

   Five counties plus parts of two other states.

   Six

   One

   Three currently.

   One city plus 5 counties.

   Eight counties.

   Nine

   100 give or take.

   Six counties, 45 cities, 85 jurisdictions.

   Nine

   One city.

   Four cities plus four counties.

   Thirteen (13).

5. Does your agency's rail service operate in more than one state?

Yes	23.5%	8
No	76.5%	24

6. How would you characterize your agency's operating environment?

Mix of urban and suburban	47.1%	16
Mix of urban, suburban and rural	29.4%	10
Primarily urban	20.6%	7
Primarily suburban	2.9%	1

BARRIERS, OBSTACLES, AND CHALLENGES

7. Please characterize the following elements as major challenges, minor challenges, or not an issue in critical incident management and clearance practices.

	Major challenge	Minor challenge	Not a challenge
Educating first responders re constraints for rail	33%	48%	18%
Response coordination among multiple jurisdictions	11%	51%	38%
Remote location of incident	30%	42%	27%
Communication with passengers	21%	52%	28%
Presence of uninjured passengers on the train	21%	36%	42%
Unavoidable procedural delays	19%	63%	19%
Clear chain of command at the scene	18%	48%	33%
Electrification/ power issues	18%	30%	52%
Ability to decide on/ implement alternate service	15%	48%	36%
Insufficient training for agency personnel	15%	30%	55%
Avoidable procedural delays	12%	64%	24%
Insufficient training for non-agency personnel	12%	61%	28%
Other	10%	20%	70%

Other includes: (1) Re-opening main track after a fatality injured incident (major). (2) Tribal issues. (3) To be clear, we deal with many different communities and jurisdictions. In most cases, we attempt to have our own Police Department take over jurisdiction of scene if allowed. Some responders/communities have been very cooperative and helped to get service restored, others have gotten needlessly bogged down in details and irrelevant procedures.

8. Please describe the nature of the one major challenge.

Responses summarized in Table 34, chapter three of report. Verbatim responses are provided here.

Some local agencies are more willing to assist in incidents than others; some stations and locations are in very rural areas and are hard to access for any emergency response agencies.

A derailment or a crossing accident or any type of disruption that will block the main line for a period of time more than 30 minutes in the peak period or more than one hour in the off peak periods

During an actual emergency, all responders do focus on solving the problem. However, getting everyone to train together is an issue based on shift schedules and overtime and availability of assets. If we could train and exercise together more frequently, solving the emergency would go smoother. We have had issues where outside responders do not fully understand the rail system and the functions of our personnel to assist them—such as our Traction and Electrical System personnel to take care of overhead power. We have been delayed getting to the scene due to responders not letting us through a road block, we have had responders get stuck driving on the tracks, and other issues where responders just do not understand our system. It is not because we do not provide training to them—they have a lot to train on and we have a very good safety record so we are not a high priority all the time for them to keep up with.

None to speak of.

In a situation of major flooding, mass evacuation of communities could be a challenge especially physically challenged individuals.

It is difficult to respond to this question set because any one of these elements can present a major challenge depending on the location and magnitude of the incident. (The emergency resources in the core city are significantly different from those in outlying areas of our territory.) that being said, response coordination among multiple jurisdictions is always an interesting element. Prior knowledge of the different municipalities, their capabilities, personnel and communication networks can greatly streamline emergency operations.

Major bridge structures located in the ocean.

With multiple jurisdictions no two responders in different areas conduct investigations the same.

State oversight rules require investigation of types of accidents: Type of Accident (1) Fatality at the scene or where an individual is confirmed dead within 30 days of a rail transit related incident; (2) Injuries requiring immediate medical attention away from the scene for two or more individuals; (3) Property damage to rail transit vehicles, non-rail transit vehicles, other rail transit property or facilities, and non-transit property that exceeds $25,000; (4) An evacuation due to life safety reason; (5) All evacuations causing passengers to be in the right-of-way; (6) A collision at a grade crossing; (7) A main line derailment. A collision with an individual on the rail right of way; (8) A collision between a rail transit vehicle and a second rail transit vehicle or a rail transit non-revenue vehicle. This can lead to a significant delay of service (depending on location). Also, fire on train in revenue service requiring municipal fire and possibly EMS response.

Coordination and communication of alternate service. Dense operation, constrained operator and vehicle resources, and significant traffic congestion make alternate service slow to set up and inefficient. Also, communicating complex and irregular substitute service requires trained staff often not available and/ or poorly coordinated.

Response time variation for three different county coroner offices to process fatality scenes in a timely manner to allow reopening of the railroad

Clearly, communications are a challenge in any scenario when safety and service come into play.

Rapidly communicating changing information (service changes) to stake holders.

Electrification/power issues. We operate on a major rail line that is not serviced by our agency and power problems on that line cause delays.

Being a large agency covering over 2,000 square miles, we have a need to interact with nearly 200 emergency response agencies—mostly of the volunteer variety. Arranging training and conducting drills with these agencies is a tremendous challenge due to the nature of the volunteer organization.

Ensuring power has been removed from the train in the event that the controller has to remotely remove power.

Decision making at the scene is the most difficult constraint to restarting service or clearing an incident area.

Communication with passengers in stations and on trains is a major challenge

A commuter rail train struck a trespasser with an outbound evening train loaded with several hundred passengers. We understand there will be associated delays with such an event, but this situation was particularly challenging because the city police department detective dispatched to the scene treated it like a traffic accident and wanted to interview all of those on board to document what they saw. The result was a delay to the many passengers waiting to go home was much longer than needed. This demonstrates the challenge of making sure every potential person in charge of any incident understands more of the nature of train accidents, the differences with rail transportation, and the need to expeditiously restore service when possible.

The challenge to our agency is training. Not in the sense of providing, but with logistics and work force availability. Training consumes enormous resources in workforce availability, and can critically impact operations. Our transit agency serves a statewide area, and travels through multiple counties, cities, townships, villages and so forth. Reaching such a large network is very difficult. We have partnered with the FRA who conducts an open forum training to Fire and EMS agencies which helps.

Getting some agencies to understand that the incident typically does not need to be labeled a "crime scene," that in the majority of cases, traffic can resume at a reduced (sometimes "walking") speed on an adjacent track with a railroad supervisor on the scene to coordinate train movements. Everything does not need to be shut down and remain shut down until all of their "evidence" has been obtained.

Our rail system is built through some heavily wooded portions of a very densely populated area. Response time can be steep due to heavy traffic in main and arterial routes and compounded by the time taken to properly locate and reach the rail equipment.

Access to remote incident locations is problematic. Also, the transfer of passengers off incident trains to alternate transportation is very difficult, especially during inclement weather.

Continued education and coordination with multiple police and fire agencies to ensure smooth Incident Command Structure and function at scenes. Commuter rail line runs 90 miles, adjacent to river and between significant elevation differences. Depending on location, access to sight can be difficult.

The bulk of our system is fully-automated, driverless rail. As such we do not have staff on trains and our overall station staffing levels are significantly lower than attended systems. As such, we have limited resources readily available to respond to failures or emergencies making communications with passengers and passenger management a challenge.

First responders understanding that there are passengers on the train who are stuck on the train until it is released.

ASSESSMENT

9. Does your agency conduct a post-incident review for critical incidents?

Always	67.7%	23
Usually	23.6%	8
Sometimes	9.9%	2
Rarely	2.9%	1

10. Does your agency incorporate findings of the review into revised procedures? If so, what have been the primary benefits of the review process? Please give examples.

Responses summarized in Table 36, chapter four of report. Verbatim responses are provided here.

Yes; revisions are made to applicable plans and documents as needed. Procedures are revised as easier or more efficient ways of handling situations become apparent. Occasionally, maps and other documents are created to ease the incident process for staff.

Yes, pre-positioning of manpower, increase inspections of rolling stock, rail infrastructure, identify back up equipment, and increase communications to our customers

Yes, we incorporate lessons learned into revised procedures. This has helped a lot as our system has grown and certain aspects of the system change and complexities are added that in all reality are not obvious when planning or initially operating the new parts of the system.

Yes, we incorporate findings into revised procedures. The revisions have enhanced employee and customer safety. As example, we had a major incident that disabled our signal system impacting operations along 10 of our 11 branches. Fully loaded trains were left standing—some for considerable periods of time. Our After Action Review of the incident resulted in changes including: how we account for trains during service disruptions (formalizing a Customer Advocate position in our movement bureau); how we communicate with our customers (both on-board the train and in stations/terminals—delivery, frequency and content of messaging); and resulted in water being stored on trains to ensure customer comfort and safety.

Yes, part of the continuous improvement. Helps us avoid repeats.

Yes, our agency always conducts periodic reviews of our procedures/SOPs and incorporates comments & findings.

Yes. Our agency conducts after-action debriefings and attempts to revise plans, policies and procedures with lessons learned from critical events. The primary benefit of this review process is to recognize shortfalls and institute real change based on these lessons learned.

Yes. Our agency conducted an emergency exercise drill to test evacuation procedures on an elevated structure that helped finalize the procedures for evacuation. The review process helps validate procedures based on real world experiences.

This has led to reviewing and revising emergency procedures.

Yes, Buses are ordered upon any conditions of track closure for any incident to be ahead of the curve for response. Not

always are buses available; however a reach out to all providers is done early in the incident.

Not always . . .

Bulletins are issued following major incidents addressing identified problems and recommendations.

Our agency does use post incident debriefs to identify areas for improvement, including processes, communications protocols with customers and the media, service recovery techniques

Yes, we do in the aftermath of the incident review. Incorporating "lessons learned" is key.

It has allowed us to step back and look at the incident more objectively using confirmed data as opposed to early reported data.

Better coordination and incident command understanding by responding agencies.

Our Emergency Plans are treated as "living documents" and each time we do critical after actions or reviews, if needed we amend our procedures.

Yes. In one case, a local fire department tried to extract a passenger through an emergency window that was partially obstructed by a stanchion bar. Due to feedback from the fire department, we removed the stanchion bars from that location on 112 light rail vehicles.

Updating procedures.

Upon review of major services disruptions, our communication with the "customer service" call center has been better.

Improvements in response—example, Control Center handling of emergency situations, revising SOPs, and training controllers on better situational handling led to improvements in decision making and time to return to normal service.

Yes, we now have a much better response to customer needs in regards to bus bridging service levels and time frames.

Yes—Better scene coordination, consistent timely response to all types of incidents by personnel and better customer communication.

Yes, the review process provides an opportunity for discussion of areas to improve and implementation of enhanced practices. In the example above, a debrief concluded the agency would benefit from having transit police be dispatched to the site of the incident where they could help inform the emergency response authorities and investigative units in charge the need for expediency for the sake of the many customers being impacted.

Benefits: better on-scene coordination and safety at next incident (or) changes to the infrastructure to allow better service management during similar incidents. Example: A crossover was added after rail traffic was halted/diverted due to near-fatal accident. This crossover allows trains to turn back and for better bus bridge operations during serious incident at this (known) higher-risk location.

The agency performs post incident accident root cause analysis to determine unacceptable or undesirable hazards, risks, or concerns. We also do after action meetings and create lessons learned reports for major incidents and from drills.

Yes, primary benefits are increased safety.

There are almost always informal discussions after each incident among the agency's managers who typically respond on scene. Discussions about what went right and what went wrong are plentiful, and are often useful at the next incident. I don't believe we have formally recorded this type of information, though.

As a matter of policy, staff reviews every incident that results in a delay over one hour or where else may be necessary. Each time we meet we discover practices that are missed or steps we could have improved upon to speed up a resolution to the incident, one specific example being when one of our trains is disabled to the point where it begins to significantly impact the train behind it, coupling with the train approaching from behind has become a near mandatory policy. We discovered by avoiding the time spent trying to make such a decision, we can have both sets of equipment on their way and as an added benefit, we avoid the further impact of railroad signal delays caused by two trains in one block of track.

Ensuring that our procedures are applicable, clearly written and that training has been provided to all employees that the procedures pertain too.

AARs are conducted and Improvement Plans (IPs) created. Benefit is facilitation of discussions and tracking actions to improve.

Yes, the findings have clearly driven the evolution of practices and procedures. Real examples of sub-standard responses promote the "what if" discussions, leading to real time and obvious analysis of the effects of doing things different.

Operational issues/coordination issues example: we put "lift point" decals for FD on trains after a recent debrief.

Occasionally.

11. What has been the most beneficial change to procedures, and why?

Responses summarized in Table 37, chapter four of report. Verbatim responses are provided here.

The creation of certain forms and documents has been very helpful in the past, as well as modifications and creations of phone number lists.

Increased communications to our customers.

We have developed a central business district (CBD) shut down plan. All of our light rail lines use the same track in downtown. If something happens (and it has) where the CBD track must be shut down, we have developed a plan on where trains will be stopped and turned and where bus bridges will operate and where police and other employees are deployed to assist customers.

Formalizing procedures created after incidents assists in proactively addressing customer and employee safety when future critical incidents occur. These procedures are memorialized in Standard Operating Procedures and rule books as well as incorporated into the training for employees involved in train movement, train and engine service and customer communications; as well as the emergency responder community that serves our system. When a critical incident occurs, management, front line employees, our labor partners, and emergency responders understand what to expect—thus facilitating expedited response and recovery.

SOPs have become living documents being upgraded periodically.

In several recently revised plans, a beneficial change has been to reduce to writing certain additional procedures that may previously have been considered to be "obvious" to more seasoned railroad personnel. We are seeing a lot of retirements and turnover and knowledge of "the basics" cannot be assumed of the reader.

Review of procedures by multi-disciplinary departments, because it provides an opportunity for various departments to submit comments/input to improve existing procedures.

Reducing delays to service and increasing passenger and employee safety.

Establish of a conference call within 15" of a reported incident, pages sent to all partners to join in and the call remains open till track or tracks are open (even if a speed restriction applies). Partners include train operations, bus operator, mechanical, dispatch, safety and security, contractors as well as agency staff and customer service employee to remain current of changing status of activities.

Checklist definition and sequence of safety critical procedures. Latest example is how to take a door out of service and secure it, preventing accidental opening in the subway.

This is a practice that has been in place for some time, but I think it is the procedure that helps us manage all incidents better. For all major/critical incidents, the agency's contract operator opens an emergency call-in number—internal managers from all aspects of the direct operations plus our parent agency are listening in on this call as key information is exchanged and decisions are made. This includes our public information/media and customer service teams who can hear and receive in real-time the status of various activities to allow their communications to be more timely and accurate. Having rail operations oversight managers directly in contact with our TASI contract operator also allows us to ask follow up questions and agree upon an appropriate service recovery plan for the specific incident—such as single tracking around incident scenes if approved, turning back trains to create/protect service on other segments of the line, establishing bus bridges or mutual aid from adjacent transit providers.

We are constantly reviewing procedures. Use of configuration management helps. But more broadly, receiving input, reviewing the governing document, achieving consensus, then making the changes in writing and training has been very beneficial. The key is to conduct this process ASAP after the incident takes place, while the "trail" is still fresh.

No changes have been required to procedures as a result of the incident review process to date.

County migrating to same type of communication system to promote inter- and intra-departmental communication capabilities.

Post Hurricane Sandy—we have developed "Safe Haven" polices and location to safeguard rolling stock and equipment.

The most beneficial change to procedures has been our utilization of the ICS and our ability to better communicate with first responders. This has allowed us to manage the incidents more effectively and communication better with first responders.

Re-educate all levels of an updated procedure.

Overall communication and the flow of information have improved.

Our decision process is based on safety, service and schedule in that order. Improvements to procedures have improved safety for our passengers and employees, enhanced our customer service, and led to a faster/smoother return to normal operations.

With the amount of time that can pass between needing a bus bridge and actually putting one into service our procedure now advises the Control Center to make this call first. This allows the bus operations center a chance to begin the bus bridge process and if not necessary can be easily canceled.

Improved scene management leads to quicker resolution to incidents and better customer communication.

1) Communications—The agency has made enhancements to the communications systems based on feedback from incidents; an 800 MHz radio system has recently been procured in order to enhance communications with key responding entities and allow for a system that is less vulnerable to communication disruptions during major events (like cell phones). 2) Bus Bridging—The agency has implemented specific procedures to the plan for interrupted service, especially involving bus bridging with great benefit. To maintain loyal and satisfied ridership, every effort needs to be made in keeping the customer experience as "seamless" as possible, even under adverse conditions. Using buses during periods of interrupted rail service is an area that has been developed over the years and provides a premium level of service that helps retains customers.

Smoother incident management; greater confidence and interagency coordination and communication.

We improve rules, procedures, and help identify measures for improvement.

About 7 years ago we were successful in getting our own agency Police responders focused on restoring service as quickly as possible. Previously, they were often the biggest deterrent to getting the trains moving again. This came as a result of discussions following some fiasco type incidents, and I believe we were able to achieve a basic philosophical change on their part which has assisted us immeasurably since. It is now to our advantage to get the agency police quickly on scene, and attempt to gain jurisdiction over the remaining investigation.

Timeliness but also safety. Having a less unpredictable operating environment enables an increase in safety.

Secondary review by non-operations personnel. This has helped ensure procedures are clearly written and that the nomenclature/terminology remains consistent throughout the procedures.

Official ICS structure within the agency to delineate clear line of command, and area of responsibility to responders (Rail, MOW, police, Safety, claims, etc).

Procedures become much stronger and have less ambiguity if they are based on real-time experiences. Less interpretation results in less errors or omissions.

Meeting with one particular jurisdiction's first responders to educate them on the fact that there are riders on the train stuck until the train is released.

12. Does your agency review and incorporate findings from post-incident reviews conducted by other agencies? If so, what have been the primary benefits of the review process? Please give examples.

Responses summarized in Table 38, chapter four of report. Verbatim responses are provided here.

N/A

Yes, if the findings can be implemented in our operations we do implement them, the primary benefits are time and cost saving. Having spare equipment ready in case of mechanical failures.

Yes, where possible—not all post-incident reviews are shared unless specifically asked for. There is incredible cooperation between agencies if asked for—but I don't generally share an after action report with other agencies unless they specifically ask for it. AAR contains sensitive information and I don't want to send it in a blast email to all my contacts—even if I trust them.

We have used case studies in our training programs.

Yes, when we become aware and the findings are appropriate to our environment.

Yes. Review of procedures by multi-disciplinary departments, because it provides an opportunity for various departments to submit comments/input to improve existing procedures.

Whenever possible, yes. Using lesson learned from other critical incidents can yield the same benefits.

Yes, when is it applicable. This has allowed us to refine our preincident plans where the agency has been written into external response plans (i.e., nuclear evacuation plan)

Yes, train to train bridge plates have been purchased to allow movement from one train to another train on an adjacent track (if local responders will allow a train on the adjacent track).

We consistently review industry events to ensure we have adequate protocols in place.

I personally review NTSB incident reports and I believe our Safety chief does too. I have not seen any systematic incorporation of findings into our procedures yet.

I'm not aware of any work in this area.

We would if the information is made available.

Yes. These are mostly reported through our regulatory representatives. Most recently another agency had an employee fatality which resulted in changes to the RWP rules. This has lead to greater safety.

The "hot wash" gives the responding agencies a better understanding of our procedures and realizes our concerns with protecting all responder around the transit environment

Yes, most recently a train derailment elsewhere was reviewed by Rail Operations to make sure that factors involved there are not duplicated at our agency.

Only if the incidents are investigated and reported nationally. That review may lead to process changes. One example is our roadway worker protection program which had been enhanced after review of other agency's roadway worker incidents.

Not directly.

Lessons learned and not repeating mistakes.

Most often what is incorporated are lessons learned from APTA peer reviews in which our personnel take part on other properties. On an occasional basis we will review a high profile incident that has occurred and look for lessons we can learn.

Not really. Although we do pay attention to "Dear Colleague" letters or requests from our partners.

The primary benefit is improved scene management which directly impacts the customers experience during the incident.

No, we currently do not review the findings of other agencies; this would be a good idea to implement, however.

No.

Yes, NTSB findings and recommendations.

Yes—this helps ensure that our procedures/rules are well-crafted to implement successful communication between employees and management.

We always review other reports and do incorporate changes and recommendations where applicable. This results in stronger procedures based on directly relevant experiences. There are always best practices to be gleaned from others. Alternatively whether or not the experiences of others actually result in change, they can also re-confirm the viability of our existing procedures if others are doing similar things as well.

In response to other major incidents we review in house procedures, equipment response, and deem our methods acceptable or modify policy or procedures to better respond, or incorporate lessons learned.

No.

13. If you could change ONE aspect in the process of critical incident management and clearance practices, what would you change?

Responses summarized in Table 39, chapter four of report. Verbatim responses are provided here.

I would make a mandatory attendance of all persons involved in an incident in the debriefing, including law enforcement and coroners present at the scene.

The decision-making level, bring it closer to the field as possible.

I would change the perception of the event. Much of what happens is not in our control, but personnel feel as if when something goes wrong, someone is to blame. If someone is responsible that does need to be identified and dealt with from an administrative and supervisory stand point. An AAR is to identify what procedures went well and what we need to work on—not to point fingers.

Because our system is 24/7 and operates over multiple jurisdictions it is sometimes challenging to expedite the response of the local medical examiner's office to an incident that involves a fatality.

None, seems to be working.

Spend more time and efforts in pre-planning and better communication during the incident.

Employee accountability. We need to put a greater emphasis on a controlled and coordinated response by the numerous railroad employees and other emergency services that respond in order to better control the scene.

Finding the root cause of an incident and incorporating it into the procedures.

Briefings at the scene to allow trains to move on adjacent tracks to permit safe movement of passengers not on the affected train involved in the incident.

Just reaffirming the importance of unified command and joint decision-making and respecting each stakeholders needs.

Find a way to get the recommendations to the operators better than we do now. Too much reliance on bulletins and inspectors. Not certain the operators fully understand what causes accidents/incidents and which actions they must take to avoid them.

I would like to get all three County Coroner offices to have the same level of response to critical incidents. Unfortunately this is very challenging since each is staffed a certain way, covering their own unique territory and with their own levels of other calls that they must prioritize for response. We have established an excellent working relationship with one County office thru meetings, education, and long-term relationship building that has resulted in outstanding response time and cooperation to process incident scenes.

Difficult to identify one in particular.

Eliminate critical incidents!

Clear chain of command among multiple responders.

Clear lines of responsibilities, "service restoration, incident investigation, incident management, information collection, and communication." Who is responsible for what and how is that information communicated.

Improve our radio system.

Have the same AHJ respond to all of them.

Be more consistent with assigning initial and appropriate personnel assets on the front end of the incident.

Make sure emergency responders understand the nature of rail transit as opposed to highway traffic.

Can't think of anything.

Getting responding agencies to agree to basic philosophical principles, such as a piece of a broken cell phone, or someone's sneaker lying between the rails does not constitute the type of evidence that would require that track to be shut down; an understanding on their part that however tragic the event may be, the needs of thousands of people trying to get home from work should outweigh, or at least be on a par with, the needs of a police investigation where the circumstances are usually fairly clear.

Expedite the investigative process to resume revenue service sooner.

Incident Command. All too often, we the boots on the ground get pushed aside by regional or governmental agencies that will not attend joint planning exercises when offered but who parachute in and assume control with zero knowledge or experience of what our capabilities and limitations are. Results in tremendous amount of valuable time being directed toward educating the uninformed when more critical recovery activities should be underway.

Clarify accident reconstruction methods. Vary from "mark and drive," quick measurements to full LIDAR survey of crossings

Making a top priority for all parties to handle the passengers stuck on the train.

14. What would be the most useful guidance your agency would offer to local jurisdictions?

Responses summarized in Table 40, chapter four of report. Verbatim responses are provided here.

Use the train crew to your benefit, and work with them to get the train back moving as soon as possible.

Simplify the coroner process.

Get basic training on our operations, but depend upon our subject matter experts in an emergency if it deals with our system. Don' think they know the train better than we do.

To take advantage of the classroom training and drills offered by our agency. Participation in education and simulations provides insight into the challenges of responding to an incident on railroad property and equipment. It also enables us to "test" procedures and make adjustments to ensure appropriate response in the event of an actual incident.

We open communications.

Participate in agency system familiarization and ongoing refresher training opportunities.

Seek out training from rail operators in your jurisdiction. Ensure that you get to know and periodically touch base with your contacts to review joint procedures. Conduct joint exercises.

Train movement can occur without compromising safety of responders so the train can stop within ½ the sight distance as they pass thru the area to permit traffic flow as well as continued safe conduction of the investigation.

Take advantage of emergency preparedness training offered by the agency. This training can be modified to better suit your needs. This process helps build an open line of communication and provides a better understanding of each organization's structure including roles/responsibilities.

Stay in communication during the incident (Incident Command). We do a very good job of responding, assessing, and setting up initial response. Problems develop as the incident evolves and during the service restoration process. Single leadership for us and each responding agency with sustained coordination throughout the incident is key.

Identify all the key stakeholders for types of incidents that could occur on your system and engage them in a collaborative process to ensure that overall goals are understood, what the key needs are of the various stakeholders, establish expectations and behavioral norms for incident handling, and train key personnel to be prepared. Debrief every incident for lessons learned and try and incorporate when possible into established SOP.

Be aware of overhead power lines, track conditions (tripping hazards) and train movements on adjacent tracks.

After Safety First—communication is key.

Understand the rail transit environment and seek training with qualified and knowledgeable people from the transit agency in order to recognize and understand the hazards inherent in the transit operating environment.

Work with your local transit agency. Seek out the agency to provide information on hazards and risks that may be of a concern. Also make sure the local jurisdictions first responders are familiar with them and cross train with transit first responders.

The incident most likely to occur is not the mass casualty event. There should be more preparation for the smaller incidents that lead to more soft tissue injuries.

Alignment familiarization.

Work with "transit" as a primary partner instead of as a secondary partner.

Get to know your transit emergency response counterparts as they support ESF-1 and incorporate them in your planning and training activities.

How important it is to quickly reinstate service. Overcrowding on the system when it's shut down can lead to unintended problems and possibly other incidents.

Clear the incidents as quickly and safely as possible and return to partial and/or full rail service. During emergencies the sooner we get back to some type of service on the rail line it directly limits the possibility of crowd management on the surface by local jurisdictions.

Have a procedure document that has been well vetted, then update as needed and train with that document.

Be uniform in your responses to rail incidents (as much as possible)

Operational and rolling stock familiarization.

Partake in all training opportunities

Get involved and stay involved with our training exercises. Recognize that rail is much more than public transportation—we can easily become an ambulance service, a command post, an emergency shelter, an emergency response personnel transporter, etc.

How does your police/fire agency identify the Incident Commander? The transit agency lead should know who to contact at a scene. What assistance/training do your officers need to respond to rail incidents?

Communication and coordination. Know local responders before an incident if possible. Have relationship with police and fire leaders so you can call their cell phones if things are not going as planned.

Trying to ascertain a good estimate of how long it will take to clear the scene so that alternative arrangements can be made if appropriate.

15. Please describe any "lessons learned" that would benefit other transit agencies.

Responses summarized in Table 41, chapter four of report. Verbatim responses are provided here.

Emergency response agencies are constantly changing personnel; offer equipment and classroom training at least annually.

Be as specific as possible when it comes to procedures. Plans and policies can be broad, but the more specific procedures can be the better. With our CBD shut down plan, we say which switches will work, where each line will turn around, and where employees will be deployed to assist customers. These are specific and measurable during an exercise as well. We also use the incident command system for every major event which makes every major event an exercise of sorts. Filling out forms and personnel knowing their roles—it has helped our organizational structure during prolonged events such as the recent ice storm. This lesson learned we have shared with many transit agencies.

Establishing a foundation of standard operating procedures, conducting after action reviews, and providing training to employees and the emergency responder community facilitate the appropriate response and recovery from critical incidents.

Our focus has been to be inclusive and seek out input from the community and have incorporated those findings into our procedures and training.

Joint exercise drills, exercises & tabletops should be well planned and executed on regular basis.

Develop partnerships with the external agencies (i.e., Fire, EMS, police). An emergency is no place to exchange business cards.

Be as diplomatic as possible with local responders so as not to delay the clearing of the scene any longer than necessary.

Evaluate rules and procedures on a regular basis and update accordingly. Even the best procedures may have to be revisited over time. The agency recently revised an SOP related to fire, smoke, and alarms at or between stations. In short, the procedure outlines roles, responsibilities, ensures safe operations but minimizes the impact to operations. Initially, technology is used to check for signs of smoke or fire followed by on-site inspection . . .

Although not always transit priorities, scene preservation and witness retention become important in the after incident investigation both for the transit agency and law enforcement. Procedures to allow service restoration priorities to work with investigative needs are needed with ongoing coordination between agencies.

If your system is operating thru or adjacent to other public transit systems/modes—take time before incidents to establish a relationship and discuss possible mutual aid type needs and possible responses. Examples include accepting your fare media on their system without having to go thru a lengthy approval process (my teams are empowered at the operating control center to make these types of decisions without senior management approval), alternative service such as bus bridges/shuttles that can be activated on short notice, etc.

Assign one person as in overall charge. He can delegate, indeed he must, but assign one person.

Good incident command structure and communication with other stakeholders is key.

The essential nature of setting up a unified incident command post so that one course of direction can be relayed to all personnel in the field.

Find opportunities to engage the communities where you operate. Train together for possible emergencies; develop relationships prior to an event. Communicate often and effectively with these communities on issues that may impact them or their residents.

Maintain open and productive dialogue with the first responder agencies and OEM. Don't assume that everyone knows what everyone is responsible to do.

1. Communication; 2. Procedures for the following: 2a. Incident management, 2b. Service restoration, 2c. Incident investigation, 2d. Emergency communication, 2e. Information collection.

A closed loop process with new lessons is required. You get the lesson learned, implement, check for implementation and then follow up six months or a year later to see how that implementation is going—is it still in place? Has it worked? Is it meeting agency needs?

We had a homeless encampment outside of one of our tunnels that was burning trash to keep warm. The prevailing winds blew the smoke into the tunnel and caused an evacuation. When the fire department could not locate the source they wanted to walk the tunnel. It was rush hour and thousands of passengers were stuck. I knew that if 20 fire fighters started walking the tunnel it might be hours to reassemble them all. I convinced the Chief that riding in an out of service rail vehicle was a much better way to find the source. They were happy that it was suggested and that we could make it happen. They rode on the vehicle and found the source of the smoke thereby saving at least one hour or more.

Establish good working partnerships with local jurisdictional emergency management agencies, police and fire departments on transit related incidents.

• Instruct conductors not to grant permission for riders to cross the tracks unless specific permission is granted from the dispatcher. This practice is not the result of an issue but an effort to avoid an incident. • Station agents and security staff (that are not uniformed officers) can only tell people not to cross with the crossing arms down, but they cannot physically stop people once they start crossing. • Timely and direct communication is needed between station agents, conductors, and security. Imple-

mentation of the 800 MHz radio system greatly improves this internal communications. • Update Service Interruption Plans annually on a cycle that coincides with changes made in the service. • Create checklists within the Service Interruption Plan for Duty Officers to use in order to keep track of the chronology of events and key information.

Our newest Rail Line first-responder training incorporated both hands-on training and train-the-trainer, recorded (DVD) trainings so fire fighters could do refresher training in their firehouses without direct RTD trainer involvement, year-round.

Our biggest "successes" are usually due to getting to the scene quickly, quickly assessing who is in charge of the investigation, and then try and develop a rapport with that individual to the extent that they can be convinced that trains can be brought through the area slowly and safely in a manner that does not put his personnel in danger.

Hire enough staff to support critical incident response.

Emergency drills and exercises are excellent to facilitate the coordination. Ongoing dialog and hands on familiarization training with first responders is very beneficial. Training pamphlets and videos distributed to local police enhances education.

Debrief after every incident. Include all local emergency responders. Often helpful to have internal debriefing in addition. You can discuss operational issues such as passenger communication and bus bridging without boring the police and fire staff.

Communication with the First Responders is critical

16. Who has primary responsibility for managing a critical incident?

Transit agency	21.9%	7
Local municipality	37.5%	12
Other (please specify)	40.6%	13

Other includes: (1) The Conductor is the incident commander until relieved by either Management or Emergency Responders on the scene. (2) There are two facets to a critical incident: a. The Transit Agency manages the operational response and recovery in coordination within the National Incident Management System Framework with b. Emergency Responder (Law Enforcement, Fire, Emergency Medical Service). (3) Transit agency for small issues (i.e. service delays, passenger illness/injury) or issues that only affect the transit system (derailment). If the issue has impacts outside of the transit system, the City may activate the emergency operations center and lead the strategic response. (4) Agency certainly does, but the nature of the incident plays into this answer. For example, if HAZMAT involved, the fire department takes a large role. (5) Depends on the incident. Initially police and fire stabilize the scene and then transit agency takes over. (6) First responder from each agency takes the lead until relieved by a senior-more person. Primary oversight is dependent upon nature of incident, i.e., fire-rescue, police, transit, etc. (7) If it is a transit specific issue it would be the transit agency. If it impacts the locals it is a Unified Command with transit in the lead. (8) It depends on the incident. If municipality is involved they are responsible, if just the transit agency then transit agency is responsible. (9) The agency and the local jurisdictions have agreed to utilize NIMS unified command to manage incidents. We use a local jurisdiction representative, a transit police representative and a rail representative as the three components of our unified command. (10) Coordinated command, following NIMS model. (11) Local municipality until such time as they will relinquish control to agency police. Sometimes they will do this, sometimes they won't. (12) Depends on the incident. If on transit property, the agency but once outside the entrance, municipality.

17. How soon are local jurisdictions and others notified after a critical incident?

Immediately.

As soon as possible.

Local jurisdictions will receive immediate notification through 911 calls generally—if not, our police dispatch will notify them and request assistance as soon as we know we need them.

Immediate notification is made.

Immediately.

As soon as possible, but within 2 hours at the most.

Immediately.

Immediately.

Immediately, sometimes passengers on the train call 911 before the official call from Operations or the train crew.

Immediately.

Five minutes.

In many cases local PD may roll/arrive at a scene before our own PD or others can respond. Thru the relationships we have built, the vast majority of the time the local PD will turn the incident scene back to our Transit Police to then process with the coroner or other investigatory units.

Immediately. No delay is desirable.

Immediately.

Within minutes of notification at the transit agency property.

Immediately.

Immediately.

Immediately.

Immediately.

911 call from Integrated Control Center (transit) Dispatcher.

Someone usually calls 911 even before we know about it.

Public Safety emergencies are immediate notification by the Rail Control Center and /or Police Communications.

The emergency responders of local jurisdictions are notified immediately by the dispatcher when an event is known to have occurred. Also, the Rail Duty Officer will put out an email to a "Command Post" address list (contains dozens of staff that need to know) of the details as they are made known. Phone calls are made to the Customer Service, Safety, and Media staff in order to make sure key contacts are notified directly, where an email is more passive.

Almost immediately.

Immediately or as soon as practical.

Immediately to five minutes.

Immediately.

Immediately.

Within 10 minutes.

Immediately. Train operator calls to dispatch. Agency Police dispatch calls local jurisdiction or appropriate responder dispatch.

Immediately.

18. Describe your agency's role in managing a critical incident.

Responses summarized in Table 6, chapter three of report. Verbatim responses are provided here.

Dispatch is in charge of notifying emergency responders. Management is in charge of getting passengers on-board the vehicle/train in question to their destinations, either by bus or rescue train.

In our properties we take the lead and in our partners properties we assist them.

If it is solely transit related (which probably won't meet the general threshold for "critical"), it will be managed by our Police department such as grade crossing accidents. We can manage an incident where their multiple injuries—if it becomes a mass care incident the local jurisdiction will become involved in the scene management; otherwise our police coordinate with EMS on patient transport to hospitals. If it is more complicated than an accident or it is an incident that affects our system (such as a structure fire along our tracks), the local jurisdiction is in-charge from the beginning

Under the National Incident Management System framework we work with local emergency responders who set up Incident Command and control the scene.

We typically handle the initial phase of a critical incident until others arrive.

It depends, transit agencies usually work under the Incident Command System (ICS). The Incident Commander is either a fire chief or police depending upon the nature of incident. Transit agency becomes part of the logistic.

Establish and participate in a Unified Command. Provide technical and logistical support to the Unified Command as required.

The agency plays a key role in moving/evacuating people from affected areas of the city to designated evacuation centers.

Assure our contractors are performing appropriately by short turning trains, bus bridges are in place and passengers onboard are informed as well as make and monitor station announcements, web updates and phone leader messages.

Maintain command until agency security/sheriff department arrives. Support emergency responders (e.g., police, fire).

Control access to the operator. Re-direct riders to alternate service Coordinate investigation and reporting. Manage repairs and inspection for service restoration. Complete investigations and reports with recommendation follow up.

Monitoring incident scene handling by first responders, updating customers and the media, arranging for emergency mutual aid, coordinating service recovery plans during incident and post-incident to normal operations.

We will manage those processes that we control, but allow our "partners" to perform their functions without our slowing them in any way.

Depends on where it occurs. In most situations first responders (police and fire) stabilize the scene and then transit agency takes over.

Transit personnel are first responders for the critical incident, if it is on transit property. All subsequent activities will be governed by the incident commander. If the emergency is not on transit property, we are a support department and may be used to aid in the response to the incident, in any way deemed necessary by the Incident Commander.

We follow the NIMS doctrine and are extensively trained in the Incident Command System.

Agency supports emergency responders.

Utilizing an incident commander to communicate with OCC and other responders.

Primary responsibilities unless loss of life or destruction of property are involved.

After cleared by Fire, the transit agency takes over—first safety to review the situation if it meets State Safety Oversight requirements for an investigation and report, concurrently service quality to assist the passengers to their destinations, then operations to restore service.

We are the on-scene coordinators until the police or fire arrive. Then we are in a supporting role until the first responders release the scene.

We use Unified Command to manage critical incidents—transit police and rail are always part of the unified command supported by other internal departments.

The initial person responsible for managing the scene is usually the train conductor, who turns things over to the local jurisdictional emergency responders, who take command from there. As a Command Post is activated, participation by the agency will continue to support the scene with operational information, assistance from the Public Information Officer, etc.

Depends on the nature of the incident. We are primarily a transit agency; we serve supporting/logistical support role, for the most part.

Incident Command—Transit Police part of incident command working with other agencies.

Working directly with those in charge of scene to get trains moving as quickly as possible. Will typically authorize train movements through the area via radio at reduced speeds until police and cleanup agencies have left.

Transit Police conduct police investigation and manage traffic around the incident. Operations is responsible for bus bridge and service restoration. Safety responsible for investigation and SSO notification. Customer service and Media for handling customer communication and service disruptions.

We have our own PD and they take the lead in investigating incidents

If on our property, we initiate emergency contacts, secure the scene, make the site safe for emergency responders (isolate power, apply grounds, escort responders into restricted areas, etc.), prepare and provide CCTV recordings, assist with isolating witnesses if applicable, crowd management, assist with investigations as required.

Manages everything on or near the rail and platforms. Train, passengers, power, crossing mechanical devices and corridor. Coordinates with local jurisdiction. Manages walking speed passing trains when allowed. Local jurisdiction has fire, medical, scene control, investigation and public information. Transit agency will assume last three as relinquished by local officials.

19. Who in your agency has primary responsibility for managing a critical incident?

Operations Manager.

Operations manager and the business resumption plan manager.

For police/law enforcement incidents, the Deputy Chief for Operations. For transportation centered incidents (such as service disruption due to a structure fire), our VP for Transportation is in charge of coordinating our response.

Transportation Services Department.

First supervisor present on the scene, until relieved by safety or more experienced operating staff.

Police services.

Typically the Operations and Safety departments.

Transit Control has the initial responsibility. If the incident grows beyond their capabilities, the Operations Command Center is activated.

Safety and Operations directors or managers.

Corporate Safety.

Control Center, Metro Rail Operations Inspectors (Supervisors) and Safety Inspectors

Our Transit Police unit along with our Rail Operations oversight group and/or Deputy CEO, Operations

The Incident Commander who communicates with Executive Management.

Director or his /her designee.

The Police Department serves as the Incident Commander for Transit specific events.

First manager on scene.

Field ops representative.

Rail Management Team and Communication Control.

Safety.

The on duty Rail Supervisor or Chief.

Metro Transit Police and Rail Operations utilizing unified command.

Typically primary responsibility for managing critical incidents would be with the emergency response entities. Participation and responsibility for the agency interest will fall with the highest ranking agency public official present (unless otherwise delegated,

AGM, Safety, Security and Facilities, and his delegates.

Operational and Safety concerns.

Agency Police Officers will handle the scene. A Transportation Department Officer will arrange for train movements once allowed.

Transit Police.

PD and Rail Operations.

Depending on the incident—Duty Managers are first responders, may escalate to VP Operations or Duty Safety Officer.

ICS for rail incident is Train Operator, Rail Supervisor, transit agency police. Each assumes Incident Command until the next arrives. Rail Supervisor becomes Rail Chief, when transit agency assumes IC.

Director of our Commuter Rail service

20. How would you describe ongoing coordination with local jurisdictions?

Conduct joint training exercises	50%	15
Meet on a regular basis to discuss critical incident management	23%	7
Meet on an ad-hoc basis to discuss critical incident management	7%	2
Communicate in other ways	3%	1
Varies by jurisdiction (please describe below)	17%	5

Comments include: (1) We have multiple levels of interaction: Conduct joint training exercises with all jurisdictions, meet on a regular basis with the central city emergency responder community, meet on an ad-hoc basis with the suburban volunteer emergency responder community, communicate in other ways . . .

We meet more frequently with some jurisdictions than others. While we may speak several times a week with some (e.g., central city) due to system density, we may only touch base with others during significant storms or annually to discuss training needs, etc.

All of the options above.

* All boxes could be checked on this question.

We conduct monthly meetings with our jurisdictional partners, we conduct regular training and we conduct joint exercises.

Also includes meetings on ad-hoc basis to discuss critical incident management.

We also train and conduct exercises on a regular basis.

We have many agencies we meet with. Central city includes all items listed above, smaller agencies a combination of the above items.

There has been some follow up with local communities, but this is atypical.

Joint training exercises. FD training for rail vehicle familiarization.

We have a standing Emergency Services Committee made up of internal Operations, Maintenance and Safety personnel, plus senior representatives from all municipal fire departments, some ambulance personnel, some jurisdictional police, and our regulator. Meetings are held quarterly to discuss common issues and arrange joint training exercises. In addition, we try to conduct two joint table-top exercises and one full-scale joint emergency response exercise per year. Although desired, not all agencies attend regularly and no municipal or provincial emergency coordination staff attends. There are occasional ad-hoc meetings with municipal and state or provincial emergency coordination staff but these are typically single purpose such as to discuss earthquake preparedness with high level reviews of response plans.

Regular exercises in various areas, with monthly Fire Life Safety and Security Committee (FLSSC) meetings.

21. What are the major impediments to coordination with local jurisdictions in managing critical incidents?

Responses summarized in Table 8, chapter three of report. Verbatim responses are provided here.

Communication.

Politics and internal policies.

Knowledge of each other's capabilities—assumptions about what each other can and can't do.

Managing through the jurisdictional coordination when multiple agencies respond to one incident.

No major problems.

Misunderstanding of roles & responsibilities and lack of good communication.

The sheer number of emergency services agencies in our territory (266).

None. We all meet on a regular basis as part of the External Liaison Committee.

Local responders have no concept of the delay's impact to those on the train or other trains. Sometimes they will not even let passengers off the incident train to get on buses even if the location is safe to do so.

Local jurisdictions are typically volunteer or have high turnover rates. Difficult to ensure these employees maintain familiarization with agency equipment and procedures.

Staffing constraints, availability to participate in frequent coordination meetings.

In our case it is the sheer number of municipalities and counties that the system serves.

Time. Everyone is busy all of the time.

None that we haven't overcome. None, at this time. We have continual joint-training exercises often and maintain a very good working relationship with all jurisdictional entities.

Some jurisdictions have more training then others in understanding the Incident Command System.

Mostly volunteer organizations and are difficult to organize.

Time and coordination.

Dispatching emergency equipment to the site.

Local jurisdictional interest.

Lack of a written agreement providing direction on who is charged with the investigation, on scene coordination/management and clearly defines incident scene release.

Having multiple local jurisdictions in the service area that encompasses three states.

Turnover among staff at other entities requires continual coordination. Busy schedules and resource constraints make it clear priorities need to be clear for ensuring adequate coordination.

The vast number of jurisdictions and varying capabilities, equipment, and personnel.

Reluctance on the part of the local responder to relinquish complete control of the scene including allowing train movements where doing so would not create any safety issues.

Occasionally we deal with egos at the scene but this is managed by regular interaction and relationship building at senior levels in the various partner organizations.

Finding adequate staff time to support local jurisdictions training needs.

1. Their lack of commitment to attend ongoing meetings and to participate in joint exercises. 2. Not knowing who the key players are, when then would get involved, how, or from which location. 3. No clear definition of boundaries, responsibilities or accountabilities—we serve nine cities, all with different protocols, some municipal, some state or provincial, and some federal.

Time to train, coordinate, educate, and exercise knowledge of responding jurisdiction. Rail incidents are infrequent, so responding officers/firemen are usually new to the event.

Ascertaining who the lead contact is for the local jurisdiction and making contact with them.

22. What actions would be most useful in improving coordination with local jurisdictions in managing critical incidents?

Table Top Exercises.

Eliminate the politics and the internal policies.

More responder training—I work with managers and upper level responders and they have knowledge but that isn't always passed on to the responder on the street level.

Maintaining good communications.

Good planning, joint drills & exercises.

Joint training. Joint/regional meetings and interactions. Regional planning efforts and exercises.

Helping them see the number of passengers as well as consequences to other trains and passengers.

Joint Partnership Agreements that formalize roles, responsibilities, and procedures for handling critical events.

Address staffing and funding, increasing opportunities for training, meetings, and non-service disruptive drills. Provide adequate personnel for incident management and public service outreach.

Education on the impacts of critical incidents on the public—including the system and its customers as well as the public at large. Show the impact, particularly in the peak AM and PM service hours, how the system and public are impacted by a system shutdown. Lead by example—show everyone that "minutes matter." When this mindset is owned by all stakeholders then incident handling improves.

More scheduled meetings, more structure.

None that we haven't overcome. Regular communication, exercises, and training are key.

Continue to find opportunities for dialogue in advance of an incident, build up relationships that lead to trust. Train with local jurisdictions.

A central point of contact within the county's OEM that could coordinate with their local response agencies.

Getting front line employees involved with local jurisdictions through exercises.

Quarterly meeting to discuss roles and responsibilities.

Working with training officers of fire and police commands.

Having a written agreement outlining the above.

Conduct more regional transportation specific exercises with local jurisdictions.

The emergency exercises are crucial in preparation for the actual incidents; it would be useful to continue to make these a high priority.

Greater communication and consistency.

Produce a concise guide which we could provide local jurisdictions which emphasizes the points described—that trains can be moved while they complete their investigations, and can be done without creating any safety hazards.

Hire dedicated staff to coordinate and train staff from local jurisdictions.

Form a mandatory participation, joint Emergency Response Counsel consisting of transit agency, emergency responder, municipal, provincial, and, federal representatives who meet at least quarterly and who have the authority to establish generally accepted response principles and unified incident command structure applicable to prescribed situations or occurrences that all parties must formally agree to abide by.

The transit agency does a good job at keeping communication open, offering training, providing educational materials to the agencies. Periodic area wide events / planning with chiefs.

Improved communication with first responders.

MINIMIZING PASSENGER IMPACTS

23. What steps does your agency take with regard to uninjured passengers?

Responses summarized in Table 9, chapter three of report. Verbatim responses are provided here.

Able-bodied persons are asked to remain calm, follow staff/crew instructions, and in certain cases may be asked to assist staff/crew.

Provide first aid and assist until proper medical attendants arrive.

We take “customer care cards” that contains the passengers name and contact information. Operators are supposed to get these but passengers are not always cooperative.

It depends on the length of the incident. We provide alternate transportation when appropriate. We ensure on-going communication and provide water (depending on duration of incident).

Not sure of the nature of this question.

Arrange bus bridge to transfer uninjured passengers to their next connection point.

Assist them with evacuation if necessary. Direct them to a separate area and keep out of harm’s way. If possible, assign EMS to the gathering point to address any delayed symptoms, etc. Gather names and contact information to the extent possible. Provide timely information and alternate transportation as soon as practicable.

We provide shuttle service around an incident when the subway is closed.

On the train, try to keep them comfortable and calm, determine if any travelers need to make connecting flights at one of the three international airports we serve. At stations inform them so they can make an informed decision on their travel options before boarding the train.

Make announcements and ask if anyone is injured. Or respond to intercom calls by passengers.

We interview them and provide them with claim cards. We retain video record in case they submit false claims later.

We try and keep them informed as best we can regarding the status of their train, service interruption, and our progress on getting them moving again. Whenever possible we try and get an incident train moved to a location where passengers can be transferred to another train or bus bridge to get them moving towards their final destination.

We try to assist in every possible way, from communicating an evacuation plan to establishing a communication link to the friends and family of passengers.

Operator controls the scene and keeps them in safe location until the IC arrives and statements are taken.

Dependent on the situation, the Incident Commander may have a muster tent in order to question the injured patrons and attend to them, on an as-needed basis. Risk Management may also want to collect information for further use.

We try to remove them from the incident site in a safe and efficient manner and reconnect them with transportation to their final destination.

We attempt to get information on those passengers before they leave the scene.

Account for them and keep them safe.

Collection of personal information.

Gather name and address, witness statement, and see they get transported to their destination or next available station/terminal.

Depending on the circumstances, witness cards are requested. Then we accommodate them by whatever means is most timely.

Customer communications is paramount. Customers need to be kept informed of any service disruption. From initial notification to updates during incident so they can make decisions on transit options. We utilize train operator and station announcements, we put police and rail personnel on trains to keep customers informed, we use e-mail and twitter (social media) alerts using an incident communications protocol developed by media relations and the rail operations information center.

Keep them informed with regular announcements of what is happening and what is known about the expected delay time.

Minimal stabilization until qualified personnel arrive.

Evacuation, accounting, and egress protocols.

We have had some involvement with “special needs passengers” (one was a diabetic in need of medication). If necessary, local fire departments should be called to get passengers of this type off the train. As for the remaining passengers on the train, we try and make frequent announcements with any updates that can be given as to when trains will be able to move again. Whenever possible, other trains that are not directly involved in the incident are held at passenger stations so that passengers who elect to do so are able to get off the train and make other arrangements to be picked up.

We request their name and address and what they witnessed.

Identify with the follow up contact information.

Informational cards are distributed and collected from each. Information on contacting transit agency is provided. Bus bridges provided as soon as practical.

Find a bus bridge.

24. How do you communicate with passengers remaining on board?

Responses summarized in Table 10, chapter three of report. Verbatim responses are provided here.

Passengers are communicated to via intercom, verbally, or written for hearing-impaired individuals.

Personnel and PA systems.

We have on-board announcements—however, these are not always easily heard if the train is noisy.

Train crew walks the consist sharing information and ensuring customer comfort and safety.

Operator makes announcements and provides direction.

Through onboard PA system.

The Public Address System, if viable. Otherwise it's direct communication moving car-to-car.

PA announcements from Transit Control (subway) or the operator or other staff on scene.

Onboard PA system as well as face to face by train crew and security if onboard.

Announcements over a public address system on trains and stations include message boards.

Operator initially, then responding inspector (supervisor).

The crew is in radio contact with the Central Control Facility—which is engaged on the Emergency Call established for the incident. Key message updates are decided and passed on to the crews for transition via PA and face to face on board. In addition key messages/updates are delivered to station visual message signs and PA systems.

Conductors are required to make first announcements immediately, next announcement within two minutes, then at least every 5 minutes. Crews are also required to walk through the train and interact with customers. Via the "Radio to PA" feature on new technology trains: train crews will activate the feature and allow supervisors in the Rail Control Center to speak to customers on the train.

Usually, face to face contact.

Internal communication system if operational after the event, otherwise bullhorn.

Through train-line announcements from the train operator and from the Rail Traffic Control personnel relaying information to the train operator.

Through the train crews, public announcements, "Transit alerts."

Intercom systems.

Passenger intercom and in person.

On site, via audio systems.

Public address system.

The operator, until a supervisor arrives.

Station and train announcements, text alerts, social media. We send police and rail personnel to affected trains to communicate with customers and provide stability.

Mainly with train conductors making announcement using the on-board public announcement system. We also use "gov.dot" alerts, which send "live" information about the delay times that can be expected to our customers that subscribe to the email service.

Onboard operator-to-passenger announcements; email blasts to subscribers to our "Rider Alerts" notification service. Facebook, Twitter, also. We find that many of our passengers are using their cell phones while on the trains.

PA systems, call boxes, bullhorns, and employee direction.

On board announcements. Also "service alerts" via e-mail from our website.

Train Operator via internal PA and rail field supervision.

Rail supervisor will communicate with all and obtain information . . . give information on service restoration.

Intercom Rail Supervisor or UTA Police, as available train hosts on our Commuter Rail Transit agency. Twitter feed provides information from the control room as made available.

Conductors make update, email notifications.

25. What information does your agency communicate to passengers remaining on board after a critical incident?

Instructions on what to do	96.8%	30
Instructions on what not to do	67.7%	21
Description of the incident	54.8%	17
Description of ongoing procedures in response to the incident	51.6%	16
Estimates of the potential delay	93.5%	29
Other	19.4%	6

Other responses include: (1) Appreciation for their patience. (2) Our descriptions of the incident are many times not specific—out of respect for the victim and need to complete the investigation. (3) Common sense guidance. (4) Passengers are informed of the general nature of the incident, without much detail. Customers on board are regularly informed of any developments, even if the news is "we continue to await the release of the train by the local authorities." (5) Incident description is limited and vague. (6) Evacuation plans and bus bridge information, when available.

26. What are the major impediments to minimizing passenger impacts in managing critical incidents?

Responses summarized in Table 11, chapter three of report. Verbatim responses are provided here.

The major impediment is getting the on-scene emergency responders to release the train, so that we can begin a bus/train bridge.

Keeping the passengers informed.

Communication is ALWAYS the biggest challenge in any incident. With today's expectation of immediate communication and knowledge, it is not easy to do that. Also people post misinformation on social media sites that customers take as fact.

The location and time of day the incident occurs.

The response time for alternative transportation.

Passengers self evacuation & not listening to the instructions.

The magnitude of the event. Location and access to alternate modes of transportation.

Effective communication, as the passengers may not speak English or may be hearing impaired.

The length of clearing scene by local responders to resume some train movement.

Not moving train until security/sheriff arrives . . . removing injured trespasser/vehicle from right-of-way.

Limited radio system. Limited public address system (not available in all stations). Constrained staff often not available to focus on public outreach during incidents.

The time required to process a scene and release the train/tracks for service. In the case of a trackside fatality due to accident or suicide, there are bio-hazard procedures that must be followed. These services are provided by specialty subcontractors that have their own response time issues—imagine a bio team being called to the middle of the system at the precise time that the freeways/roads of the region are most congested with peak period traffic.

Loss of power on the train, location of train on a bridge or in an under-river tunnel. Train radio reception.

Location can sometimes limit evacuation procedures.

Rerouting alternative service.

Reassurance of quick activities and the ability to keep all passengers calm during needed response delays.

Sometimes electrical issues require passengers to stay in place for their safety until the power issues can be resolved.

Dynamic situation that changes. Time of day and location.

Alternate service, establishing bus shuttles or substitutions are problematic and tend to become implemented after the incident has been cleared but if they are not established at all then the public feels that their needs of alternate service were not addressed.

Some areas of the right-of-way have very limited access and pose difficulty with passenger extraction; requiring a rescue train.

Good communications.

Consistent and accurate messaging to our customers.

The actual act of releasing the trains, and knowing when the train will be released by incident managing authorities.

Lack of infrastructure (more tracks, ability to run around the problem). Occasionally, the difficulty in reaching trains with buses so passengers can be evacuated.

Limited space in subway system and response times within subway. Response times on commuter rail due to distance.

1. Obviously, getting the trains moving. 2. Getting a reliable ETA of when trains will be able to move. 3. Getting this information to onboard personnel so appropriate announcements can be made.

Alternate bus service resources.

Communication with passengers.

Self evacuation and leaving the scene. Number of passengers on a train, especially during commute hours.

Finding alternative transportation.

27. What actions have been or would be most useful in minimizing passenger impacts in managing critical incidents?

Responses summarized in Table 12, chapter three of report. Verbatim responses are provided here.

Sending out updates to social media outlets (Facebook, Twitter, and text messages) has been very helpful in the past; keeping our passengers informed has proved to be key. Having local emergency responders familiar with our system and equipment is crucial.

Provide alternative service.

We are continually looking and improving our means of providing customer information.

Availability of alternate transportation and expedited response from Medical Examiner's Office.

More equipment in reserve.

Early passenger communication & direction to passenger and providing prompt assistance at the incident scene.

Pre-existing alternate service plans.

The installation of Station Managers has proven to be very effective for managing customers during critical incidents.

Allow safe train movement on adjacent track.

Ensuring a quick response with a rescue train and emergency response team.

Using transit fare inspectors as a ready resource to manage crowds and communicate with riders. We are developing a passenger ambassador program for all agency employees expanding ready reserve of personnel to respond to subway disruptions.

Reaching out to educate first responders, establish agreements on who will take control of incident scenes in advance, work closely with local coroners, have more than one bio-hazard contractor that is fully qualified and able to respond to your incidents. Establish service recovery techniques and have part of the team focused on this element of the incident so timely decisions can be made.

Early notification of incident; frequent communication with train crews.

We have improved our communication process . . . and that has been most helpful.

Use of social media to communicate faster.

On-train announcements and getting transit representatives to the scene to answer questions.

Fast and accurate communications as to what is happening, how it will impact, and how soon it will be resolved.

We're able to utilize other agency assets (i.e., buses) to assist in moving passengers away from the scene.

Communicating to all what is going on in terms of alternate means of service.

We purchased some four wheeled carts for difficult areas for use by Transit Police in responding to incidents and evacuating passengers.

Better communications with more timely options provided by us.

Consistent and accurate messaging, sending adequate staff to incident scene, directly above and below the affected area, and any major transfer stations that are affected by the incident.

Increasing regular communication with jurisdictions and education on the nature of rail transit.

Clear, uniform communication to passengers of the incident, estimated duration, and alternatives for them.

Enhanced communication and information systems.

Obtaining best (most reliable) information possible from the scene.

Having extra staff to assist with passenger communications both PA/VMS and boots on the ground at the incident site or affected stations.

Clearing the scene as quickly as possible.

28. What steps does your agency take to communicate with other passengers whose travel is affected by the critical incident?

Responses summarized in Table 13, chapter three of report. Verbatim responses are provided here.

We send social media alerts, written/audible messages to the station platforms, alerts to connecting buses and shuttles, and post information on our website.

The information is communicated through media, cellphones and radio news.

We have various means of communicating via social media tools as well as conventional media.

In addition to station announcements, we communicate through Twitter, FaceBook, etc.

Operator communicates, media releases.

Providing prompt information regarding bus bridge or alternate transportation arrangements.

PA announcements and message boards at stations and terminals. Keep media outlets in the loop. Frequently update company website and social media.

PA announcements.

Public address announcements, web updates, phone leader messages about conditions and smart phone applications updates.

Public announcements at stations, message boards, twitter etc.

We contact all connecting transit agencies through their control centers. Inspectors coordinate at transfer transit centers with other agency supervisors in the field.

Updates to the media, real-time updates to our website and social media (twitter, Facebook, etc), on-board and station messages.

Provide tweets, text alerts, Facebook updates, website (trip-planner) updates. Press release to media (radio and TV). Make frequent announcements (visual and audio) to stations.

Again, we use the tools at our disposal to communicate the relevant information.

Local media outlets, PA announcements and social media.

The transit agency maintains an e-alert system in which text alerts are sent to cell phones and messages are sent out over the web, informing patrons, and potential patrons, of delays.

All media opportunities are used.

Twitter, Facebook, website, Ready.gov.

Intercom announcements or in person by operator or supervisor.

Notification of service delays and areas affected estimation of potential delay means of alternate service.

Public address, updates on web, twitter, and e-mail.

Mass station announcements, e-mail updates and website updates that are made as quickly as possible.

Train and station announcements, Passenger Information Displays on platforms and kiosks, text alerts, e-mails, social media, press releases.

Messages are sent out by Customer Service department to all that subscribe to the email alert system.

Rider alerts, Facebook, Twitter, news releases.

System-wide alerts through media, networking, passenger alerting systems.

Website; Service alerts directly to passengers who subscribe for them. Local media (traffic radio, etc.) are notified, or call for information once they hear trains are stopped.

Twitter, text messaging customers, e-mail customers, website, station announcements, news media.

Station announcements on board train announcements social media news media.

Passenger Information signs on platforms transit agency Twitter account.

E-mail notifications.

29. What information does your agency communicate to passengers whose travel is affected by the critical incident?

Estimates of the potential delay	93.6%	29
Alternate services	96.8%	30
Other	6.5%	2

Other responses include: (1) Cross honoring information to take other modes of transportation. (2) Very brief summary of the type of incident, though this message can be very much "sanitized."

30. How soon after the critical incident is this information communicated to passengers?

As soon as updates are available.

As soon as possible.

As soon as possible—unfortunately, sometimes we think we can get things fixed quickly so don't make any announcements and things take longer than expected—at that time we are behind the information curve. However, our procedures do call for operator announcements.

Within minutes.

As soon as the information is available.

As soon as possible, the delayed information can cause impatience and anxiety among passenger and they will start self evacuating themselves unsafely.

As soon as reliable information is available.

Within 30 seconds.

As soon as a game plan for service is conceptualized.

Within the first three to five minutes.

Twitter feed and announcements within 10 minutes, direct communication and outreach typically takes 30 minutes to 1 hour.

It highly depends on the nature of the incident and estimated time to resolve. In many cases we will refer customers to adjacent transit almost immediately, noting both are prepared to accept their fare media to ride.

Immediately!

Hopefully, ASAP and on a continuous basis.

Immediately.

As soon as the first responders and transit officials make the determination of service delays and alternate transit service requirements.

As soon as possible, which is in most cases immediate.

As soon as possible.

As soon as possible.

Immediately.

We try and communicate information as soon as we have an assessment of the impact on service, how long or if there will be a delay.

As quickly as possible. We have customer staff in the control center during working hours to manage this.

As soon as possible. (We stop, we tell.)

As soon as possible. However, the reality is it can take between 10–20 minutes before they are informed of the problem. Because of the chain of the information flow, and the need to script and vet the message, this always takes longer than what would be desirable.

As soon as possible. Operators are typically instructed by Control to make clear, repeated announcements.

Immediately or as soon as practical.

Fifteen minutes.

As soon as possible. Station announcements and on board train announcements are immediately after the initial scene size up.

Immediately on train by operator. As available and clarified following.

Hopefully within 15 minutes.

31. What types of alternate service does your agency deploy or arrange for and recommend to passengers when a critical incident occurs?

Alternate rail lines within the agency	35.5%	11
Rail lines operated by other agencies	19.4%	6
Alternate bus routes	80.7	25
Single track operation around the critical incident site	77.4%	24
Bus bridge around the critical incident site	93.6%	29
Bus bridge to another transit service	29.0%	3
Other	9.7%	3

Other responses include: (1) Cross-honoring with other agencies; (2) Express runs, rescheduling of service intervals; (3) All of the above have been used, depending on the scene, location, and time of day. Bus bridges are typically impractical during rush hours due to the inability to get large volumes of busses already in use. If the incident occurs toward the end of one line where there are fewer passengers left aboard, the possibility of busing is greater. Some of our rail lines parallel others for a period of the route, and passengers are always encouraged to use these where they are available.

32. Does the selection of the type of alternate service depend on any of the following factors? If so, please explain.

Expected duration	96.8%	30
Time of day/day of week	87.1%	27
Incident location	83.6%	29
Availability of vehicles/personnel	80.7%	25
Cause of the critical incident	51.6%	16
None of the above	3.2%	1
Other/explain	12.9%	4

Other/explain responses include: (1) Expected duration—getting alternate service set up takes time, if we think the incident will be cleared before we could get alternate service set up, we don't set it up. Time/Date—peak service times are more critical (more passengers) than other times, thus more riders could possibly be affected. Location—there will be a different level of system influence if the incident is at a terminal station served every 20 minutes vs. in the CBD where trains from all lines come through every few minutes. Availability of vehicles/personnel—in incidents such as ice storms, we may not have the assets to set up alternate service. Cause—if there are suspicious factors that shut down service, we would have to determine alternate service based on the circumstance. (2) Sometimes weather (hot, sunny or rainy day) plays a role in detraining passengers from an incident train. (3) Whether alternative service is provided will depend upon the duration of the event. However the type of alternative service will always be bus bridging. (4) Less than 10 minute duration, the focus is clearing the incident and restoring service. If available we single track around the incident. For 30 minute delays when both tracks are blocked we would establish a bus bridge

33. What are the major impediments to minimizing impacts to other passengers whose travel is affected by the critical incident?

Responses summarized in Table 16, chapter three of report. Verbatim responses are provided here.

Location of the incident; severity of the incident.

Customer satisfaction.

Always communication—we have our sources of official communication but people follow unofficial information web sites that do not always give accurate (or close to accurate) information. There is no way we can ever wait until we have complete information to pass on—sometimes initial information we get from the scene is not correct or changes quickly so it may look like we are not putting out consistent messages. People expect immediate response and quick resolution of any issues, but it doesn't work like TV or movies (one response I get from exercise participants all the time—it took so long for them to get here and usually during an exercise equipment is pre-staged for safety reasons). I think we have to manage customer expectations through effective communication. We have done some great things with social media, but there is always more that can be done—it's just figuring out what that is.

The location of the incident train may impact other service.

Equipment.

Lack of planning, procedures or arrangements with fire, police, and other transit agencies in case of emergencies.

Loss of communications. Lack of reliable information. Regional event that affects alternate modes of transportation.

Effective communication.

Short turn trains back in the direction they came so part of the rail corridor can remain moving. Dependent on where it occurs most of the passenger volume may be unaffected (near one end of the rail corridor).

Short notice and confusion at terminals when normal loading procedures change.

Sustained communication after the beginning of an incident.

The time required to get the system back into normal operation. Also, sometimes in the peak of the peak, a bus system may not have the extra bus/driver resources to immediately respond to establish a bus bridge.

Our system is very crowded. Often we cannot reroute trains because of lack of track capacity. We often divert customers to routes that are already crowded and have little room for additional riders.

Establishment of alternate transportation service, then informing them of the plan.

Availability of resources.

This depends on the type of incident, but certainly the ability to mitigate a problem quickly matters.

Location, time of day, availability of alternate service.

Establishing alternate bus service.

Location and severity of the incident and available resources to work around (buses for bus bridging, available drivers, etc.)

Good communications.

Day of week, time of day, weather, any special events on going at time of incident.

Track capacity, as delays will result from the incidents, and the extent of the delays can be a function of that capacity. Communications is key, and being able to obtain useful information in a timely way is a continual challenge. This is especially true because people today have their own electronic devices, so they will know there is a problem much earlier than before, but their expectation for answers often exceeds the ability to develop and communicate the right answers.

Traffic congestion, availability of buses, and lack of third and fourth tracks to run around the problem.

Cost labor and equipment.

Getting good reliable information.

Staffing resources.

Providing information. Providing sufficient capacity to accommodate large crowds.

Finding alternate transportation.

34. What actions have been or would be most useful in minimizing impacts to other passengers whose travel is affected by the critical incident?

Trains have now been placed at northernmost location, which helps if there is an emergency at this end of the line.

Fees reduction.

Setting up bus bridges and getting appropriate information out.

Proper planning, procedures, and arrangements with fire, police, and other transit agencies in case of emergencies.

Alternate Service Plans have been developed for each station that pre-identify the shuttle locations in the event of a loss of subway service.

Informing them of conditions.

Having public relations/communications located in the control center.

Post incident review.

Having pre-established mutual aid understandings with other operators, and empowerment of the daily operations team to activate emergency protocols without having to seek prior senior management approval.

Customer information is important. If customers know about an incident, they can change their travel plans before they reach our system. Once they are in our system, they need to know what is happening and what their options are.

Good, forward leaning information sharing . . . via text, website, loud speaker, etc.

Flexibility to pull other employees off their assignments to use as resources for alternative service.

Transit agency maintains a very knowledgeable emergency response team which is dispatched to scenes of critical incidents to address the incident and provide oversight in restoring service and/or establishing alternative services.

Again communication, fast and accurate as well as possible alternatives to utilize due to the incident at hand.

Utilizing buses where possible. Have transferred passengers to Amtrak service when necessary.

Communication.

Early planning and effective communications within and outside the agency (to the customers).

Better communications with more timely options provided by us whenever possible.

Adequate staffing resources on to manage incident, consistent and accurate customer communication.

We have begun to have media relations staff monitor "tweets" and real time social communications in order to take advantage of additional ways of reaching passengers.

Manual block/single track around the problem.

Bus bridge operations.

Extra staffing both for customers communication and alternate bus service.

LIMITING SERVICE DISRUPTIONS ON ADJACENT TRACKS

35. Does your agency operate rail on multiple tracks?

Yes, as a general rule	87.5%	28
Only on specific segments	12.5%	4
No, all single-track operation	0.0%	0

36. What steps does your agency take to limit service disruption on adjacent tracks? Are these actions entirely within your agency's control?

Reroute some of the traffic on the adjacent track.

We have shared corridor with freight rail in some areas which are not in our control and we have to ensure all of our personnel are trained properly to operate in that corridor. We cannot control what happens on those tracks—we have had suspicious packages on adjacent tracks shut down service. We have to be able to quickly coordinate with other rail operators in any emergency.

It depends on the incident scope and scene.

Single tracking and all actions taken are within our agency.

We coordinate with tenant rail operators (Amtrak, freight) to optimize use of remaining tracks. We clear and postpone non-essential outages to keep remaining tracks open when possible.

Ask politely. No, these are not in our control

Always try to isolate the scene . . . sometimes with physical barriers or backdrops. No.

Limited to switchbacks, single tracking not practical in street operation and not advised in subway due to traffic volume and short headways.

They are not always within our control; safety of investigatory personnel on the scene may require a full system shutdown. Another factor is potential debris fields and recovery of remains. The entire transit PD and first responder team is trained to look at each scene and establish as soon as possible whether single-tracking is an option and if so, how soon it could be established. This can then be applied to the subsequent decisions that will be made.

We use common sense techniques, but only after evaluating the situation. No, the actions are not entirely within our control.

Depends on the nature of the incident. We may single track, reverse run, use bus bridges, etc.

Single track operation, if necessary and permitted.

If safe, we will always look to proceed with caution on adjacent tracks to continue service. Only where we control the tracks.

Utilize watchpersons and place speed restrictions. Not entirely within agency's control.

To operate safely when using adjacent tracks, yes.

This all depends on severity, but where possible, single tracking is a preferred option to continue service with minimal delay/disruption.

No, depending on the location.

Agency tries to maintain both tracks during revenue operations. Emergencies on rail lines may cause single track operation. Rapid and safe intervention is critical to successful outcome on any transit related incident, especially during peak ridership times.

Work with local jurisdictions and the dispatcher to try and expedite the ability to operate on adjacent tracks. These actions are not within our agency's control, and subject to the local jurisdictions judgments at the time, which vary by jurisdiction and the individual in charge.

We run adjacent to freight tracks in parts of our system. If the incident threatens their operation, their dispatch is notified. In a couple of locations, we have three tracks instead of two. In those areas we have all control.

Single track operation and bus bridge.

Once individual in charge of scene authorizes use of adjacent track or tracks, we will immediately begin using them in the most efficient way possible.

Typically during critical incidents both tracks are taken out of service to protect first responders. When the opportunity presents itself, single track operations are used to supplement alternate bus service. Yes.

Work with fire department and law enforcement to make track available to single track around incident. Often have to wait past initial triage to make sure FD/EMS vehicles are removed from track. Issue of training and coordinating with FD.

Out of our control.

37. Do first responders from local jurisdictions view limiting service disruptions on adjacent tracks as important?

Yes	26.7%	8
Yes, but it is not a high priority	20.0%	6
Depends on the jurisdiction	40.0%	12
No	13.3%	4

38. What are the major impediments to limiting service disruptions on adjacent tracks in managing critical incidents?

Responses summarized in Table 18, chapter three of report. Verbatim responses are provided here.

Level of traffic on the adjacent track.

Not all responders realize that different track is controlled by different companies—it is not always a "one call does it all" situation.

Location of the incident and scope.

Crowd control and safety of passengers and providing physical barriers between incident tracks and those providing single tracking service.

The magnitude of the incident determines how many tracks we get back and how quickly we get them back. Egos and lack of understanding on either side's part (railroad or emergency responders) can hamper efforts to restore service.

Local responders allowing it.

Incident command and lack of information about potential alternatives.

Street traffic and subway congestion.

Safety of incident scene personnel, recovery of remains/bio-hazard, location/distance between control points and track crossovers.

Communications with the first responders.

Safety.

Speed restrictions.

Scope of the incident and whether adjacent tracks can be safely utilized.

Fouling of adjacent tracks and emergency personnel.

Overhead catenary may need to be deenergized if equipment is being brought in that might come too close to the adjacent catenary (such as a crane).

Better understanding of rail operations by first responders.

Type of emergency and the station configuration (center platform/side platform).

Educating the emergency response jurisdictions about the nature of rail incidents.

Law enforcement, fire department release of the incident.

This is usually dependent on the extent of matter that winds up on the adjacent track, but the decision usually rests with the person in charge of the scene, and there is a broad spectrum of thought from community to community on when this will be allowed.

Distance between tracks. Scope of the incident.

Local fire stations . . . often you have a fill-in captain that is not used to working around the rail. They do not have the same familiarization or comfort level to allow one track to stay open.

39. What actions have been or would be most useful in limiting service disruptions on adjacent tracks in managing critical incidents?

Education for local emergency responders on the dangers of adjacent tracks.

Organize and obtain permission from our partners to reduce or reroute some of their traffic.

Coordination, planning and exercises are always useful—think things through and practice.

Rapid response (especially Medical Examiner) and clean-up of any biological hazards from the scene.

Providing crows control & safety of passengers between incident tracks and those providing single tracking service.

Meaningful and honest participation in the Unified Command. Having railroad personnel on hand that has an emergency services background. Prior joint planning. Trust. Good negotiating.

Restricted or walking speed thru the area on an adjacent track (generally we can't get permission to operate on the adjacent track from the local responders till many hours after investigation begins.

Establish criteria for impacting service and ensure that decision is made at the appropriate level within the agency/jurisdiction.

Exclusive rights of way on surface and additional subway crossovers making single track headways possible.

We are currently looking at key sections of our system that have the longest distances between crossovers to add these to improve single tracking flexibility and reduce the length and time to run around incidents.

Sharing of a realistic sense of when the problem will be remedied sufficiently so that service can resume.

Nothing within our control. Depends on the location of the incidents and collateral damage.

Coordination with investigative entities in reducing times during which the area is taken out of service.

Make sure first responders have a small footprint where possible to allow limited service on adjacent tracks.

This is dictated by the incident itself. There are no specific rules.

Having the right personnel on site to manage the situation.

Tow out with track vehicle on same track as incident took place.

More training and joint drills. (Maybe.)

Good command and control incident scene. The emphasis will be to establish partial or full rail service as soon as possible.

Frequent exercises with the jurisdictions is important, as well as meetings with key officials in authority who can inform their departments of the challenges associated with incidents.

Limit total disruption, allow partial or single track operations.

Communication directly with person in charge, assuring him/her that personnel involved in investigation and clean up can perform their tasks safely while trains are passing on adjacent track.

More space between main tracks.

Coordination, outreach, communication with local fire/EMS.

ISSUES UNIQUE TO ELECTRIFIED TERRITORY

40. Does your agency operate trains in electrified territory?

Yes	87.5%	28
No	12.5%	4

41. Who has primary responsibility for the decision to shut down power so that first responders have safe access to the train?

Transit agency	51.9%	14
Local municipality (city or county)	7.4%	2
Other (please specify)	40.7%	11

Other responses include: (1) Emergency Response agency works with movement bureau. (2) Incident dependent. Can be train crew, rail traffic controllers, first responders, etc. (3) The FD and PD have the authority to require power be removed where they feel it is necessary for the safety of customers and their staff, however there is dialog between the agency, Rail Control Center Desk Supt, who actually is responsible for initiating removal of power and then to discuss options other than power removal. (4) Incident Commander which could be transit agency or local jurisdiction depending on incident and location. (5) The transit agency controls the power and therefore the responsibility however local jurisdictions can request a power shutdown and Transit will always comply. (6) It depends on the incident. It could be the transit agency or municipality (7) Unified Command makes power management decision. Power is normally taken down during an emergency on the affected track prior to FD arrival. (8) This survey covers commuter rail, where power is not an issue. Will follow-up with another for power issues. (9) We've trained them, so they don't ask us to de-energize very often. We will de-energize whenever there is a threat to life. (10) Emergency fire or medical responders. (11) Amtrak.

42. Who in your agency has primary responsibility to shut down power?

Operations manager.

Track and Electrical Services technicians—train control can cut the power, however, most responders require verification by TES before working by the wire.

Engineering systems operations desk in our Movement Bureau.

OCC, systems maintenance.

On-scene coordinator.

The Power Department (Power Control Center).

The Incident Commander notifies Power Control.

Rail Operations Control/Traction Power.

Power Control.

The Rail Control Center (RCC) under the control of RTO is the primary decision maker, but power is removed by the System Operator in the Power Command Center.

Our line and signal foreman or EIC.

Way Power and Signal personnel.

Division of Rail Services.

Trainmaster.

Any person can request power out when necessary. The Power Dispatcher will remotely place power in reserve.

Controller, remotely. Or the OCS department.

Rail Operation Communication Control Center—Rail Controller.

Power and Way Manager.

Any on-duty manager or on-scene personnel.

Rail Operations Control Center.

Control Center, typically in coordination with MOW management.

Engineering and Maintenance—Power Department.

Rail Control Center.

Train control.

Maintenance of Way.

43. Who has primary responsibility for the decision to restore power?

Transit agency	61.5%	16
Local municipality (city or county)	7.7%	2
Other (please specify)	30.8%	8

Other responses include: (1) Emergency Response agency works with movement bureau. (2) Depends on the magnitude of the incident and in whose name the power was originally removed. (3) Whoever requested power be removed must be the one to request power be restored, unless they have passed that responsibility on to someone else. However, all power restoration requests go through the Desk Supt in the RCC. (4) Incident Commander. (5) It depends on the incident. It could be the transit agency or municipality. (6) Whoever has hold on power. (7) Unified Command. (8) Amtrak.

44. Who in your agency has primary responsibility to restore power?

Catenary maintenance manager.

TES.

ESO.

Systems maintenance.

On-scene coordinator.

Power Department.

The Incident Commander notifies Power Control.

Rail Operations Control/Traction Power.

Power Control.

The RCC manages all incidents and has the final responsibility to insure that all outside agencies and transit agency personnel have cleared the tracks and no longer require power to be removed, and then makes the final call for power to be restored. Power is restored through the system operator in the Power Control Center.

Our Chief Engineer, with assistance from his staff.

Incident Commander.

Division of Rail Services, in coordination with the Office of Safety and Security.

Trainmaster.

The person that ordered it off.

IC.

Rail Operation Controller.

Power and Way Manager.

Control Center through the Traction power group.

Rail Operations Control Center.

MOW, in coordination with Control Center.

Engineering and Maintenance—Power Department.

Rail Control Center.

Train control.

MOW.

45. Are there other issues unique to critical incidents in electrified territory?

Electrical protection for the intervention teams.

The electricity is the critical issue for responders.

Ensuring that the electrical hazards are identified and mitigated during response and recovery.

No.

Power shut down procedures, Red-tag and applying ground straps.

Residual energy in de-energized, but not physically grounded, catenary lines was an issue in a derailment in May 2013.

Caution must be taken when cutting power that other trains do not become trapped in the tunnel due to power off situations. Trapped trains will need to be evacuated after 20 minutes in the tunnel, leading to passenger and staff safety issues.

Local jurisdictions or emergency responders do not always understand how traction power systems work—the area that will be shut down/affected . . . and how shutting down power, in some instances, may create additional challenges.

Network connectivity makes segment isolation on the surface time-consuming. Subway does not have this problem (linear and more easily managed).

The rail system has Emergency Alarm boxes which provide someone on site the ability to remove power from a section of track. The EA box removes power from a very large segment of track, and should only be used where there is an imminent threat of serious injury or death. Because of the large segment

of track that is controlled by the EA box, the removal of power through this can impact other trains operating in the area that are not involved in the incident, which can then further complicate the incident and/or place customers on other train in danger. We train extensively with the FD and PD to request power removal from the specific incident location and to not use the EA box unless it is absolutely necessary.

Beyond the obvious concerns regarding voltage, the location of wires, weather, ponds (water sources) are all of concern in this context.

Safety.

Personnel are trained to treat everything as "live" until TA power personnel have removed power, grounded it and tested it.

Safety.

Yes, ensuring when power is restored that everyone on site is safe and clear

Downed catenary wires, downed wires on catenary, but otherwise, no.

No.

Yes, procedural requirements can make power removal and restoration a challenge. Supervisory power outages are quick and efficient. Red tag power outages a lengthy process in making the work area safe. Can add 20 minutes to either end of incident.

TPSS.

Training EMS, law enforcement and fire agencies.

The uncertainty of first responders who are unfamiliar with LRT.

46. What actions have been or would be most useful in addressing issues surrounding electrification at the critical incident?

Provide proper training.

We have TES personnel available for the incident commander to address issues with—have the experts on-scene.

Training of FLS personnel.

Strictly following the procedures established under power shut down procedures, Red-tag and applying ground straps.

Too many to list. The most critical is a clear understanding of the system by first responders (training) and a clear communications pathway and protocol for requesting AND CONFIRMING de-energization.

The 3rd rail is always treated as live, even when the power has been cut.

Training and full scale simulations.

Integration of Power Control into OCC (Control Center) Automation of complex network segment isolation on surface operations.

Training with the outside agencies to understand the operation of the system with respect to power removal. The transit agency initiated a program where FD and PD liaisons are utilized in the RCC to communicate with their respective field personnel and the RCC Managers to understand the best use of power removal and restoration for an incident. The transit agency also dispatches an Emergency Response Officer to all major incidents to report to the Incident Command post and represent the agency.

Awareness of the issues by all parties.

Well trained responders are key.

During training activities, the issue of electrified third-rail is ALWAYS a main topic of conversation and explanation with all first responders.

Keep untrained personnel and people out of the affected area, designate a safety officer immediately.

Explain to responders that remote removal of power should not be accepted solely. Power appurtances should always be tested.

Communication.

Following established safe work practices for high voltage electrical hazards—NFPA 70E.

Better understanding of when it's actually needed.

Good command and control at the scene and having the adequate power crews available to rack out and place back in the breakers at the associated Traction Power or Tie breaker facilities to reduce time for power management activities.

SCADA control. Clear understanding (and rules) that make every employee responsible for reporting anything out of the ordinary that they observe.

Providing training and alert testing equipment.

Continued training of first responders.

SAFETY OF NON-RAILROAD/NON-AGENCY PERSONNEL

47. Is safety training a part of ongoing coordination with local jurisdictions and first responders?

Yes, they receive the same training as agency personnel	23.3%	7
Yes, they receive an abbreviated version of agency training focused on their particular tasks	70.0%	21
No	6.7%	2

48. Does participation in safety training vary by jurisdiction?

Yes	65.5%	19
No, required of all first responders	31.0%	9
Don't know	3.5%	1

49. What steps does your agency take with regard to the safety of non-railroad/non-transit personnel?

Responses summarized in Table 23, chapter three of report. Verbatim responses are provided here.

Railroad safety training is offered at least once a year to every police and fire department, corridor-wide.

We do provide basic safety training to all personnel.

We offer training to any one that asks for it. We also set up regular and scheduled training for local responders.

A safety representative responds to the scene to ensure site safety during response and recovery.

Ongoing track access certification and work coordination meetings.

We provide safety training to outside agencies such as fire & police and those personnel who are required to work within fouling distances of our rail system.

We have a dedicated position that is responsible for, among others things, being the primary liaison to emergency services agencies for the purposes of training and other needs. The Safety Department maintains and delivers a Passenger Train Emergency Response Procedures curriculum to emergency responders. The program has both classroom and "hands-on" components.

We are the subject matter experts and deliver the training to external partners and first responders.

Safety training and familiarization of RR operations before any are allowed on the property.

Outreach to local jurisdictions/emergency responders. And we require individuals to attend rail safety training before they can access the right-of-way.

On-track protection training/certification required. Otherwise active escort for those not trained.

The incident/scene employee in charge ensures that the public cannot gain access (using tape, extra officers to secure a perimeter). Access to the scene is limited to those with appropriate ID and authority.

The transit agency conducts interagency emergency preparedness exercise during which safety is observed and then discussed during hot wash. The agency provides training assistance to agencies in their development of transit familiarization training for their respective personnel and has provided resources to help the build their own transit training facilities. We also have strict right-of-way rules, postings, safety related signage, informational campaigns, informational videos on the transit agency website for the public.

Periodic drills are performed that include a frank discussion of everything we feel the first responder should know as they approach a railroad accident . . . on our railroad.

Safety is our number one priority and we have safety personnel who respond to every critical incident.

We offer contractor safety training to all personnel who are working adjacent to our structures. All contractors who work on transit agency property must have safety training and be escorted by agency personnel.

We advertise safety training, make it available. Have an annual rail safety and security conference for all first responders.

Non-railroad/non-transit personnel are not permitted in the track area without representatives of the transit agency responsible for their safety.

RAIL SAFETY TRAINING

Contract requirements for access to right-of-way, access control committee responsible for approval of right-of-way permits and power outage requests.

They all must complete on-track training before accessing the ROW.

We provide roadway worker protection training and support staff on incidents.

Emergency drills for the purpose of training sharing of training materials signage on equipment.

Anyone working or accessing our ROW must receive on-track-safety training; access permits for anyone entering the ROW. All work is protected by flagging and train orders, other procedures.

Operational and equipment familiarization.

Responding transportation officers typically assess the scene, and once allowed, bring trains through the area in a slow, controlled manner that would allow them to stop short of someone fouling the track.

Continued opportunities for first responders to have hands on experience. We also provide train the trainer videos for agency that request training.

Handout material/pamphlets. Training videos.

50. Who in your agency is responsible for safety-related training of non-transit personnel?

Safety Coordinator.

Safety Officer.

Emergency Preparedness specialist normally conducts training for non-police personnel with the assistance of our safety department and fleet services. Police training department usually conducts police related response training although the Emergency Preparedness Sgt. has conducted some training for police.

The Corporate Safety and Training Department.

Safety and operations.

Safety Department & Light Rail Department.

The Safety Department.

The Safety & Environment Department in partnership with Rail Operations.

Director and manager of Safety.

Instruction Department.

Safety group.

Our Chief of Protective Services has been the lead in coordinating outreach and training of local area potential first responders.

Director, Track and Track Safety of our Office of System Safety determines required training for contractors, vendors or non-transit personnel who will work or visit the system.

Our Manager of Safety, Rules and Training.

System safety.

The Office of Safety and Security and the Division of Training.

Rail Safety.

Safety & Training departments.

Safety & Security Department.

Training Department.

Our training department.

Transit Police/Office of Emergency Management for first responder jurisdictional personnel.

Responsibility lies with the Director of the Safety Department.

Rail Safety division.

Operations and Safety.

Safety Department.

Safety (Rail Safety Section).

Chief Safety Officer/Rail GMs.

51. What are the major impediments to ensuring the safety of non-transit personnel in managing critical incidents?

New hires, reluctance to take training, man-power, overtime.

To reach all the involved personnel.

They may have been trained but did not retain the training—personnel need to regularly attend training. Unfortunately, they have a lot of unique aspects in their jurisdictions—we are not the only thing they need training on. Training time is in high demand from several sources and there isn't always time to do all the training that needs to be done. We are very flexible in our training schedules and conduct training during various shifts to accommodate shift workers.

Level of awareness of hazards inherent in a railroad operating environment including walking on surfaces, moving equipment, and electrical hazards.

None.

Lack of participation from non-transit personnel.

Lack of training. Lack of on-scene coordination and control.

Gaining track level access.

They don't take it seriously.

Keeping everyone informed and patient, while attending to the incident.

None.

Major problem is the improper use of the EA box during incidents where it is not appropriate to use, resulting in power restoration from a much larger area. This occurs occasionally and in most cases power had already been removed and notification to the agencies dispatch center initiated.

Awareness of who is doing what and where.

Human nature.

Not familiar with the dangers of the rail environment.

Misunderstanding of the transit environment.

Communicating with various other responders.

Staffing.

Understanding the system.

Number of emergency responders in the region and their varying commitment or availability for training.

Education about the nature of railroads and the nature of train traffic.

Vast network of municipalities.

Not having enough staff to support properly support the incident.

Training.

Personnel wanting to see/participate in what is going on Scene Control.

52. What actions have been or would be most useful in ensuring the safety of non-transit personnel in managing critical incidents?

On-scene lookout.

Developing a learning course for all our personnel and suppliers

Make sure there is an agency liaison with the incident commander.

Limiting access to scene to only necessary personnel.

None.

Involving non-transit agency personnel in the importance of getting education & training in rail safety.

Providing early notification and information to local agencies. Getting knowledgeable railroad personnel into the Command Post and participating in the Unified Command.

The new track level training program has been very effective in providing critical information to first responders.

Training requiring a test to confirm level of absorption.

Training, SOPs, and simulations.

On-track safety training and certification protocol. Periodic emergency responder safety training and drills.

The use of agency liaisons and training!!!

Awareness. Job briefings . . . to the extent they can be performed.

Good communication.

Explaining, in detail, the transit environment, the vehicles and the processes by which we, as an agency, respond to critical incidents.

Training.

Remove power and stop train service during the incident.

Establishing communication parameters.

Increase the number of available trainers.

Ensure a better understanding the system.

Conduct more outreach-based safety training. Take the training on the "road" to the students.

More training exercises, table top drills, and meetings to review policies, procedures, and safety methods already developed.

Limited fire, law enforcement authority to shut down system for longer than is necessary.

Hire enough staff and train with first responders—Drill—Drill—Drill.

53. What would be the most useful guidance your agency would offer to local jurisdictions in terms of safety of non-transit personnel?

Responses summarized in Table 24, chapter three of report. Verbatim responses are provided here.

All non-transit personnel must have basic training in safety.

Make sure they have a liaison from the agency with the incident commander and don't make assumptions about the system—otherwise follow basic safety practices around railroad tracks that we were taught as we grew up.

Assist in ensuring access to scene is limited to essential personnel.

Training and communications.

Involving non-transit agency personnel in safety training at the beginning of new rail projects.

Regular training and joint planning and exercises.

There is no such thing as too much training.

I think the question is what does the local jurisdiction need from the agency to permit a safe operation concurrent with the investigation requirements.

Communication about injuries and locations of the injured/disabled prior to arrival. Help them prepare for response.

Awareness of safety hazards specific to transit and requirement to coordinate with OCC.

Engage with the local transit agency to establish training that includes system orientation, safety around a live rail system, how critical incidents are processed. Establish annual drills/simulations of an actual emergency incident, use that process to provide updated training each year, and then conduct the event and debrief afterwards.

Develop a strong working relationship between the emergency response personnel and transit agency personnel. Conduct exercise and provide familiarization training.

Beware of coming into contact with downed wire and be always alert to train movement.

Regular training and education are key.

Be cognizant of the operating environment and request specific training from the transit agency for all of your first responders.

Stay off of the rail infrastructure, wait for trained personnel. Always make sure with the transit agency before entering the rail environment to make sure it is safe.

Utilize the subject-matter experts of the TA to assist in understanding the environment.

When in doubt communicate with transit personnel.

Start early in the year and coordinate with the various training commands—try to fit into their training schedules.

Get to know them and keep them engaged.

Participate in train the trainer programs, establish minimum training requirements and commit to meeting them.

Extensive safety training of personnel is essential in providing the safe environment we all desire.

Reach out to the transit agency for hands-on training.

ACCELERATED CLEAN-UP OPERATION AND KEEPING A TRAIN IN SERVICE

54. What steps does your agency take to accelerate clean-up operation after a critical incident?

Responses summarized in Table 25, chapter three of report. Verbatim responses are provided here.

Gentle reminders to on-scene emergency responders to get train traffic released.

We have qualified suppliers on contract.

We have officers trained in accident investigation and we know what has to be taken and done before a train can be released—we ensure those are done as quickly as possible.

We have an on-call clean-up contractor.

Training.

Provide assistance whenever possible.

Planning for multiple operational periods. Having agreements and contracts in place with cleanup contractors, wreck and re-rerailing operators, etc.

Set up MOUs with police and the Coroner and bring in extra crews.

We have an outside contractor handle clean-up including hazardous materials on-site or at shops.

Inspect vehicles, track, overhead wires, signals, facilities. Clear debris and biohazards. Run sweep trains to verify restored track. Inform public of restored service. Implement service management to restore schedule/headways.

We have more than one bio-hazard subcontractor and use the one that can respond the quickest given the time/location and their call backlog.

The use of liaisons in the RCC and Emergency Response Officers working with the incident commanders at the scene.

We use contractors and engage our own forces ASAP.

Additional personnel.

All personnel are on stand-by at the site to perform critical PMs, walk-throughs, etc., in order to move any/all equipment safely to an area that will afford the agency to reinstitute service. A running electronic log is also kept of the incident to afford all division to notes activities taken throughout the period.

Adequate staff and contract with environmental resources if needed.

We don't "accelerate" clean-up. Clean-up occurs after all injured are attended to and an investigation has been completed.

Ensure That Appropriate Personnel Are Dispatched to the Incident.

If necessary, the use of outside contractors for clean-up.

We have clean-up staff on site ready prior to releasing of the scene.

Good command and control of scene, staging of appropriate assets at scene for recovery operations.

Dispatch agency personnel to an incident to be available in assisting Incident Commanders and attend to ad hoc needs.

MOW staff responds with appropriate spill/clean up equipment. Our on-site Incident (Transportation)) Supervisor communicates with PD or Fire Incident Commander to make sure clearance is given; we have procedures and responsibilities for clearing infrastructure and vehicles before movement or "clearing" of incident scene.

Track, Signal and Operation response crews.

When possible, train will continue to operate in its normal cycle to tie up point, where cleanup crew will meet and perform necessary cleaning. In some instances, equipment is cleaned at the site. This is discouraged unless absolutely necessary since it will keep operations impacted longer.

Communication with the incident scene.

Unified Command (ICS).

55. At what point in the critical incident management does your agency take back control of the site? Who decides this?

Responses summarized in Table 26, chapter three of report. Verbatim responses are provided here.

Control of the site is not taken until it is given by the incident commander.

Operations manager as soon as the track is clear.

When the incident is clear of local responders, we will do a safety check of the tracks to ensure they are safe to operate and take control.

Once the emergency responders have finished their investigation and the Medical Examiner has transported the body from the scene.

Post-incident debriefing.

When the critical incident scene is cleared or released by the Incident Commander to our on-scene coordinator.

Incident-dependent. The Incident Commander and/or Unified Command eventually returns the site to the rail operator.

When the emergency has subsided and we are in the recovery stage. This is decided jointly with the emergency services and the transit IC.

When they relinquish it.

If there is a fatality it would be after the coroner makes his/her determination. If trespassers strike, Fire Dept. would treat person away from tracks and handover control.

When law enforcement and/or fire have completed their operations The Incident Commander decides.

When the local incident employee releases the tracks for full revenue service with no restrictions. The EIC and Ops team on the ground decide and then communicate this to all affected personnel.

When the lead agency has completed its operations it informs the ERO at the ICP and its own dispatch center. When the RCC hears from the lead agency dispatch center and then all other agencies that were operating at the incident the control of the incident turns over to the transit agency.

That varies by case. Ultimately, the first responders make it clear that their work is done.

ASAP. Police and Fire make this determination.

This "take-back" is given from the Incident Commander of the scene. It may be Fire Rescue or Police. That information is relayed to the transit representative at the Incident Command Post and instructions on resumption of service are given through that designee.

The Agency would never give up control of the site and the Incident Commander operating under the Unified Command with all first responders would determine this.

The IC makes that determination when it is safe to do so.

When loss of life and major damage to property are no longer an issue.

Right after the Fire Department releases control—Fire Department turns over command to Safety Department, or, if there is a crime, the local Police turn over to Transit Police.

Varies depending on the scene and incident.

We utilize Unified Command so we are part of all ongoing decision making. Decision is made by Unified Command.

The Incident Commander will decide when the agency takes back control; this is after their initial on-site scene investigation is complete.

When investigation is concluded and is communicated officially to our on-site Incident Supervisor, we then take our internal steps to assure track, OCS, switches, vehicle, etc. are each checked and cleared by specified members of responding team. Once all the "boxes are checked," the scene is released to Control so trains may be ordered to move and service restoration may begin.

When released by local authority, or Transit Police.

Depends on incident.

We follow NIMS and have the communication with the Incident Commander.

When injured are removed, police investigation is concluded, safety has final say to release the railroad.

56. Are there any particular strategies your agency uses to allow a train to remain in service?

Responses summarized in Table 27, chapter three of report. Verbatim responses are provided here.

This is entirely up to mechanical and management personnel on the scene.

Yes we run train on the sections of our track that is not affected by the disruption.

No—but we only stop trains when necessary.

SOPs.

Depending on the incident, certain steps are taken to ensure safe resumption of service.

Any train involved in an incident will go back to the shop for inspection before returning to service.

Just the mechanical inspection performed at the scene.

All trains are dispatched to the yard for inspection. Trains are inspected and returned accordingly unless a hold is placed.

Station bypass on adjacent track once perimeter established.

By applying agency and FRA regulations we come to that determination . . . but a thorough physical inspection is essential.

Common sense—safety first, the vehicle involved in the critical incident is impounded until investigation is completed.

All vehicles that are involved in incidents are properly inspected by transit officials before being returned to normal passenger service.

It depends on the type of incident.

If train has not been directly involved.

No.

We meet with the on scene AHJ as quickly as possible to offer any assistance necessary.

For most major incidents, the incident train is taken out of service to the rail yard for incident investigation and inspection and repair. Loss of one train does not significantly impact our system.

If a train retains passengers and is not disabled, it will complete its run, regardless of how late it is, as long as the agency was unable to transload passengers to a more expeditious completion of the commute.

Depends on the severity of the incident/accident. We will sometimes relieve the Operator of the incident train and have him/her remain on the scene while another qualified employee proceeds with the incident train. This way, the Operator does not leave the scene and the police can conclude their interviews as trains move.

Yes, single track operations.

If train is operational mechanically, we try to use it. Sometimes passengers are transferred to other trains that have been released while the train involved in the incident is being held (we often use the ADA lifts of one train to connect the vestibules of trains on adjacent tracks). If passengers have been transferred, original equipment can usually proceed directly to tie up yard. The cleanup contractor that we typically use is paid by the hour, so they are often not in a big hurry to finish up. Transportation Officer on scene needs to assess situation and be firm to insure that cleaning process does not drag on longer than necessary.

Onsite inspection.

57. What are the major impediments to accelerating clean-up operation and allowing a train to remain in service after a critical incident?

Damage to the equipment.

Coroner and police authorities.

I think we have got clean-up and quick restoration down pretty good if we are handling the scene—when local jurisdictions are involved they do not have the sense of urgency to restore service as we do.

Location and time of incident.

SOPs.

Manpower & resources are the major impediments.

Damage to rolling stock that cannot be accessed or repaired in the field. Testing of power, signal, and track components to ensure that all aspects of the system are safe and ready for service restoration.

Delay in crews getting to the scene as subway service is suspended.

Local responders allowing an inspection of the equipment.

Outside investigations involving local jurisdictions.

Oversight agency investigations. Law enforcement investigative holds.

The biggest is the need to deal with bio-hazard issues. Frequently a train is perfectly safe to operate to the end of the line, but the bio-hazard issues will not allow it to remain in revenue service.

Track occupancy . . . on adjacent tracks and employee fatigue.

Vehicle goes into impound.

Vehicular damages, being held for further inspection by jurisdictional investigative officials.

The physical work necessary based on the factors involved.

"Acceleration" is not the goal. Safety first; then complete investigation; then service restoration.

Personnel on the site and clearing the site of emergency equipment.

Funding and procurement process requirements, equipment availability, and manpower availability.

AHJ not understanding the importance of service restoration.

Type of incident, investigation, and infrastructure damage.

Timing. It seems that the local jurisdictions have a different perspective than transit agencies, and are often not inclined to accelerate clean-up, but let their process run its course on its time.

We have excellent recovery strategies, and utilize well trained crews and equipment to assist.

See above.

Lack of staff.

Rapid clearance requires training and coordination internal and external.

58. What actions have been or would be most useful in accelerating clean-up operation and allowing a train to remain in service after a critical incident?

One agency used cones to identify where body parts were, to ease the work of the coroner when she showed up on the scene.

Meet and inform the authorities on the importance on clearing the track.

Awareness of the purpose of public transportation and importance of scheduled service—acknowledging our need to restore service for our customers and stakeholders—respecting our priorities (after ensuring the safety of our employees and passengers—getting service going again is a top priority).

On-call contractor.

SOPs.

Having better planning and necessary MOU with various agencies to accelerate clean-up operation and prompt resumption of service.

Allowing transit response personnel to have emergency lights to move through traffic.

Access.

Established agreements with local jurisdictions for less severe incidents.

Education and agreements allowing immediate photography/video/measurements to release incident trains.

Just close attention to individual and departmental responsibility . . . who is to do what and where.

Don't impound rail vehicles.

Collaborative working relationships with jurisdictional investigative personnel (this is an on-going process).

"Acceleration" is not the goal. Safety first; then complete investigation; then service restoration.

Depends on the situation; there is no pat answer.

Assistance by the Fire Department with cleanup.

Good understanding and a good working relationship.

Ensuring that appropriate assets are staged with proper equipment needed for recovery operations.

Education of local jurisdictions on the nature of public transit and the benefits of accelerating clean-up.

Transportation Officer on scene needs to assess situation and be firm to insure that cleaning process does not drag on longer than necessary.

Cross training field supervisor to inspect trains and track for anomalies post-incident.

59. What would be the most useful guidance your agency would offer to local jurisdictions in terms of accelerating clean-up operation?

Responses summarized in Table 28, chapter three of report. Verbatim responses are provided here.

Work together with the train crew and any other on-scene personnel to cover up any exposed body parts, so that passengers inside the train do not have to see them.

Communications with them.

Let us be the technical advisor for what is necessary—we have the contacts and have procedures down on how to clear a scene quickly and efficiently.

Follow SOPs.

Have better planning and MOUs.

Plan for the next operational period. Have agreements/contracts in place with (or at least contact information for) cleanup contractors, wreck and re-rerailing operators, etc.

Make the MOU's with the partner agencies common knowledge throughout the entire organization (i.e.. police).

Offer to do all they will let you do without getting in their way during their investigation.

Have agreements in place with vendors to expedite clean-up. Establish agreements with other agencies/railroads for equipment. Move investigation to yard if appropriate. Require an on-scene coordinator to coordinate with local jurisdictions on scene. And have procedures to ensure decisions that impact service are made at the appropriate levels. Make room available for local jurisdiction equipment (e.g., coroner's equipment) throughout system (e.g., stations).

Cooperative education with outside agencies and consistent preservation of evidence required for their investigations.

Difficult to pinpoint an answer to this question.

Maintain safety at scene, have proper training for bio-clean-up and disposal.

If possible, allowing single-track operations during the period of investigation in order to maintain more seamless continuity of transportation until regular service is restored.

Cooperate with the experts under the NIMS system to deal with any situation.

Cleanup cannot occur until the incident is over.

Clear lines of authority.

Plan ahead.

Get to know them.

Local jurisdictions recognizing the importance of regional transportation issues during emergencies on the rail line. The quicker we can restore service, the less of an impact to the local jurisdictions.

Have representatives on the scene to answer questions, assist the, investigation, and make the case for acceleration of the process.

Replication of an accident is counterproductive. We will take the train to the yard and isolate it until they conclude their non-critical vehicle assessment/investigation. The police need to understand the limits of their jurisdiction under their state's laws. Traffic cops (or at least some of them) should take a Rail Accident Investigation class so they know what they are doing.

Use common sense, particularly if scene is in a rural or non-populated area. Site, depending on location, often does not need to be completely spotless.

Train your employees and work closely with local first responders.

PROCEDURES TO HANDLE ACCIDENT EVIDENCE/DATA COLLECTION

60. What procedures does your agency follow to handle accident evidence and data collection for a critical incident?

Responses summarized in Table 29, chapter three of report. Verbatim responses are provided here.

Formal investigation on the site, evidence gathering and analyzing by experts.

Staff/crew is instructed to not handle any evidence. The only exception is to cover body parts to prevent on-board or nearby persons from seeing them.

We follow state legal procedures and agency procedures approved by the SSO.

Our Safety and Claims divisions work with our agency Police Department to conduct an investigation as required.

Safety department.

We have written SOPs to handle accident evidence & data collection.

Evidence is controlled and processed by law enforcement in conjunction with NTSB.

The Supervisors complete initial reports.

Chain of custody form.

The procedures are part of our system safety program plan. All evidence is processed through the sheriff's department to ensure chain of custody and preserve evidence.

Law enforcement handles evidence on scene and measurements. Transit agency handles video, audio, and photography. Claims and Safety handle passenger interviews. Operations handles operator interviews.

Normally fatality scenes are investigated by the local PD and coroner, so they "own" the data and reports. We receive copies. We have on board outward facing cameras, so we capture these potential images from hard drives and provide to the investigatory units, retaining a copy for our files.

The following statement is applicable to all questions pertaining to the evidence collection/data collection; in any incident that would be considered to be criminal in nature, the City Police Department would be responsible for collecting/

securing the evidence. If the National Transportation Safety Board (NTSB) were to assume control of the incident investigation, then they would dictate how they want the evidence collected/secured. Typically most incidents that are investigated at the transit agency may result in disciplinary action, not criminal charges. Data collected from devices such as event recorders are captured and retained by the Operating Department that owns the equipment; i.e., Division of Signals, Division of Car Equipment, and copies of the downloads are provided to the Office of System Safety along with an analysis and interpretation of the data by a qualified individual. In other instances, such as an employee fatality, physical evidence such as employee's Personal Protective Equipment will be collected at the scene by OSS investigators and stored with the case files, which are kept in a locked room, within a locked cabinet that is accessible to Rail Investigation staff members.

We follow FRA and other appropriate standards as they apply.

We have a SOP that covers this.

The incident scene is maintained to allow only those personnel with investigative intentions to access the scene in order to preserve and collect evidence and incident measurements. All support and operational division are required to submit informational reports which will become part of the main accident investigation.

The Agency has a sworn police department who would follow law enforcement protocols for evidence retrieval.

The System Safety Department is the Investigator-In-Charge at critical incidents.

OCC SOPs.

Safety and Security Transportation.

The transit agency has an Accident Investigation Administrative Procedure that applies to all accidents including rail-related—AP002.

We use our transit police.

Criminal incidents the police are the lead, accidental incidents not involving death, the office of safety is the lead.

State law, chain of custody of information, and procedures regarding the downloading of event recorder information.

We have a chain-of-custody protocol for onboard videos so cops get theirs. We offer to impound a vehicle for further investigation. Accident reports are filed by all concerned.

Transit Police secures evidence. Operations examines track, signals, vehicles and rules compliance, and reports accordingly.

Transit Police are capable of handling everything necessary.

Our PD handles all evidence.

Police investigation secures evidence (transit police).

61. Does your agency "own" the accident evidence or is it the responsibility of another agency?

Responses summarized in Table 30, chapter three of report. Verbatim responses are provided here.

Yes we do as the operator but we also have the Transportation Safety Board and the Federal and also State/provincial entities.

It is the responsibility of the coroner.

If we work the accident, we own the evidence.

Depends.

Collectively collected, but the agency is responsible.

It depends, for critical items it's the responsibility of another agency, but for minor perishable items our agency can also handle the evidence.

Transit Police Department.

The transit agency will take their own samples/collect their own evidence and keep their own records. External partners (i.e. police) will do the same.

Generally once issued to the responders it is the responders.

Our agency owns the evidence.

Physical evidence remains with law enforcement, if not crime or enforcement related then rail maintenance preserves evidence.

As stated above, usually the final report is the responsibility of the county coroner.

In our operating environment, where we have an exclusive Right of Way, our incidents are very much self-contained; therefore, evidence produced in the event is generally owned by the agency. As stated earlier, if some external influence (vandalism for example) were identified, it would be brought to the attention of the City PD and they would take possession of the evidence.

Best I know, we own it.

Depends on the location and type of incident. Usually it is the policing agency.

The agency owns the information and may provide to investigative officials.

The Transit Agency would be responsible for evidence preservation.

Yes, unless the municipality takes possession.

Unless the police take it.

Yes.

The transit agency owns the accident evidence and reports findings to the State/Provincial Safety Oversight.

Depends on the incident.

Depends on the incident; if a fatality is involved the police may take the lead and then turn the incident over to safety.

The agency will own data associated with event recorders and camera footage, though these are freely shared with need to know jurisdictions investigating the incidents.

The City police "own" the video. We make our copies.

Yes.

Depends on who is ultimately in charge of scene.

Yes.

Agency controlled and "owned."

Local agency is primary. Transit agency conducts its own investigation. We share reports, photos, and videos as requested by the agency.

62. What are the major impediments to handling accident evidence and data collection after a critical incident?

Responses summarized in Table 31, chapter three of report. Verbatim responses are provided here.

It's providing the information to all the agencies involved in the investigation.

Ensuring all evidence is gathered correctly and vehicle is quarantined as necessary if further evidence may be gathered from it—if an incident is on a train, the train can be moved to the rail yard to collect evidence and does not have to stay on the service tracks and impede service.

None.

It requires proper procedures & trained personnel to do the job.

Lack of access control at the accident site.

Proper documentation and storage.

Access, knowledge, working computer for video and event recorder downloads.

The protocols associated with third party evidence review.

Passengers refusing to stay/be interviewed. Responders contaminating evidence. Trains/cars being moved before data is collected. Failure to preserve video sequences on DVRs before they are overwritten.

The evidence can be disturbed by external personnel such as first responders (Police, Fire, and EMS); however, obviously, the preservation of life takes precedent over evidence collection. Additionally, in extremely rare cases, employees may tamper with the scene in an attempt to evade discipline or in other instances, overzealous employees may tamper with equipment, while trying to determine what led to the incident. In order to combat employees tampering with evidence at the scene of an incident, the transit agency periodically issues a bulletin that prohibits this activity. The bulletin in its current form is titled, Subways Bulletin 10-27, "TAMPERING WITH EQUIPMENT RELATING TO EMERGENCY INCIDENTS PROHIBITED."

Focus on collecting the information. Accident scenes are always beehives of nervousness . . . to the point where some folks lose focus of their mission.

Storage.

Quantity and weather conditions.

"Accelerating" service restoration.

None.

None.

Having clear established guidelines for the particular emergency/incident. Transfer of command at the incident scene can be challenging at times.

Having the key people with knowledge of information access available to support the information requests, in order to expedite response to requests.

None at this time. Protocols have been established and are understood.

Training and management.

Local agencies who insist on waiting for coroner or special investigation teams.

Chain of custody.

Chain of control.

63. What actions have been or would be most useful in handling accident evidence and data collection in the future after a critical incident?

Responses summarized in Table 32, chapter three of report. Verbatim responses are provided here.

We need to develop a centralized system to gather all the information. Presently we do everything by hand.

As mentioned above, if ON a train, we can collect evidence from the vehicle at the rail yard and not leave it on the tracks—know what has to be collected leaving everything where it is and what can be collected elsewhere.

Coordination between Safety, Claims and Transit Police.

SOPs.

Developed proper procedures and acquired trained personnel to do the job.

Control access to the site. Get the word out to all personnel that area is a potential crime scene and that nothing is to be disturbed unless necessary to preserve life and/or safety.

Investigation training is key to the process.

Review of both the video and event recorder data at the scene with emergency responders.

Perhaps a timeline for evidence linked to minor incidents.

Protocols regarding release of passengers from incident scenes. Early securing and control of accident scenes. Prompt review and preservation of video evidence

The transit agency issued Policy Instruction 10.28.1, "Accident Investigation Policy Program Manual," which defines each Division's roles and responsibilities during an incident, including preserving evidence to maximum extent feasible consistent with the needs of the investigation. In addition, upon the OSS Rail Investigation Division being notified of an incident by the Rail Control Center (RCC), our staff informs the RCC personnel of our intent to respond to the scene and requests that the RCC inform all personnel on the scene not to move or tamper with any equipment. In addition, the RCC is informed by field personnel of actions that were taken to secure the equipment, such as the application of handbrakes, the removal of the third rail power, etc., which the RCC documents in their incident report.

Communications and assignment of responsibility.

Let police do their job.

Well trained personnel with the proper equipment.

Designate one internal department as the custodian of record.

Proper training, proper coordination in the field and in the shop (sidelining equipment for inspection).

Use your police if you have your own force.

Command and control is key. Staging of appropriate assets between internal and external partners is crucial to a successful outcome of an incident.

Thorough procedures and training in those by a sufficiently broad number of staff who can respond to requests.

For us, putting transit police in charge can often expedite the process. Sometimes, however, if the local accident investigation group is already there, having them handle it can be faster.

Training

64. What would be the most useful guidance your agency would offer to local jurisdictions in terms of accident evidence and data collection?

We need to work together as a team in order to identify the root cause and the proper solutions to correct the problem.

Establish procedures and protocols. Communicate and share information to minimize duplication of effort and ensure consistency.

Follow SOPs.

Develop proper procedures and acquire trained personnel to do the job.

Have the Unified Command clarify and communicate the evidence collection policy and procedures to all stakeholders at inter-agency meetings.

Depending on the nature of the investigation, ensure your personnel are properly trained before collecting any evidence.

Let us help them get their job done.

Educate local jurisdictions on rail accident investigation authority and procedures. Ensure the local jurisdiction understands the jurisdiction for rail incidents.

Protocols regarding release of passengers from incident scenes. Early securing and control of accident scenes. Prompt review and preservation of video evidence

Whatever entity is deemed to be the investigative body in an incident and ensure that this information is communicated to the appropriate personnel. The policy should address evidence preservation and the agency should periodically issue bulletins to reinforce the prohibition of employees tampering with evidence during an incident. In addition, adopting technologies such as the use of onboard cameras, and cameras throughout the system is extremely helpful for accident reconstruction. Protocols must also be developed for the retention/acquisition of this data. Also have clear Memorandum's of Understandings (MOUs) with the fire, police, and EMS departments to ensure that they are familiar with agency's operating environment. This can also be strengthened through periodic table top and field simulations of high profile incidents.

Only that we are very much into collecting appropriate specimens and objects, and are prepared to share a list and inspection results as soon as practicable.

Have CCTV everywhere!

Training.

Designate one internal department as the custodian of record and educate other TA personnel of that fact.

Have a written and SSO approved accident investigation procedure in place.

Agreement to use transit police would be best.

Coordination, coordination, and coordination.

Be sure to develop thorough procedures and implement adequate periodic checking in those by a sufficiently broad number of staff who can respond to requests.

Reach understanding with local cops, your transit cops, your SSO, and (perhaps) FTA locals (brief them but don't include them).

Stress need to get railroad moving. Get agreement on utilizing the faster means for obtaining what evidence is needed.

65. Would you be willing to participate further as a case study, involving a telephone interview going into further detail on your agency's experience, if selected by the TCRP panel for this project?

Yes	87.1%	27
No	12.9%	4

66. Is there another transit system that you suggest we contact for this synthesis project? If you know of a contact at that system, please list the name also.

Various responses.

Abbreviations used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation