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Urban Mass Transportation Administration

Fire and Life Safety Training Needs of Rail Rapid Transit System and Fire Service Personnel

Transportation Systems Center
Cambridge MA 02142

MAY 1983
Final Report

Technical Assistance - an UMTA Program

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16. Abstract

This report, prepared under the direction of the UMTA Fire and Life Safety Education/Training Working Group presents a summary and the results of the successful workshop "On Track to Fire and Life Safety in Rail Rapid Transit." Sponsored by the Urban Mass Transportation Administration's (UMTA) Office of Technical Assistance Safety and Security Staff, and developed in conjunction with the Federal Emergency Management Agency's (FEMA) National Fire Academy, the workshop represented the initial effort in a program to identify the fire and life safety training needs of rail rapid transit system and fire service personnel.

Seven specific training needs are identified and recommendations for their implementation are discussed.

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METRIC CONVERSION FACTORS

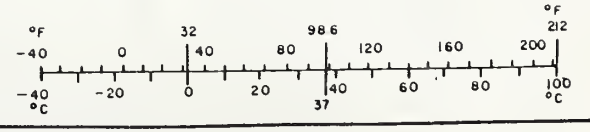
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	squere inches	6.5	sq.are centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5 9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



PREFACE

This report presents a summary and the results of the successful workshop "On Track to Fire and Life Safety in Rail Rapid Transit," held on August 2-4, 1982. Sponsored by the Urban Mass Transportation Administration's (UMTA) Office of Technical Assistance Safety and Security Staff, and developed in conjunction with the Federal Emergency Management Agency's (FEMA) National Fire Academy, the workshop represented the initial effort in a program to identify the fire and life safety training needs of rail rapid transit system and fire service personnel. To provide guidance in the design, development and implementation of their program, UMTA formed a working group composed of the following organizations and individuals, who deserve special thanks for their efforts:

Lloyd Murphy, UMTA, Chairman

Gwen Cooper, UMTA

Gerry Bassett, Federal Emergency Management Agency, National Fire Academy

Donald Dzinski, American Public Transit Association

Robert Carpenter, Washington Metropolitan Area Transit Authority, formerly of the Arlington County Fire Department

William Hathaway, Transportation Systems Center

The workshop was conducted by the IMR Corporation, Energy, Management and Marketing Division. Their staff is to be commended for their efforts in supporting this workshop. The authors also wish to acknowledge the contributions of Albert Powell of the Taurio Corporation who also assisted in the workshop development and implementation. Also to be commended is Garry J. Prowe of the Raytheon Service Company for his assistance in preparing this report.

Additional contributions to this effort were provided by the session moderators and numerous other transit and fire service resource persons who deserve special recognition, many for their assistance in developing the individual sessions and for their outstanding efforts in conducting each of the sessions.

Appreciation is also extended to each of the 76 fire service and transit system attendees, who made this workshop a success through their participation. Through the efforts and contributions of the workshop participants, the UMTA Fire and Life Safety Education/Training Working Group has been provided with the information necessary to implement the training needs identified.

TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

In 1981, the 11 major rail rapid transit systems in the United States carried more than 1.5 billion passengers. Historically, the safety record of these rail rapid transit systems has been very good.[1] A recent study sponsored by the Urban Mass Transportation Administration (UMTA) indicated that fire and smoke incidents represent between one and five percent of all rail incidents.[2] Although the occurrence of severe train fires is rare, the potential for fire is always present. Once ignition occurs and a fire spreads, life threatening situations can develop.

Because of this potential, on July 28, 1980, the National Transportation Safety Board (NTSB) convened a public hearing on rail rapid transit safety. The hearing brought together representatives of transit system management and labor, local fire departments, national fire safety organizations, and state and federal agencies in an effort to explore how this high level of safety of the nation's rail rapid transit systems can best be maintained.

The NTSB report[3] resulting from this two-day hearing contained a series of 31 recommendations to the U.S. Department of Transportation, the Federal Emergency Management Agency (FEMA), International Association of Fire Chiefs, International Association of Fire Fighters, National Fire Protection Association, American Public Transit Association, International Transport Workers Union of America and the Amalgamated Transit Union. Recommendations R-81-14 and R-81-15 stated that UMTA:

> "Offer to assist and cooperate with the United States Fire Administration in its development of a national training curriculum for fire service personnel involved in the administration of fire protection on rail rapid transit systems. (Class II, Priority Action)(R-81-14)"

> "Develop Federal guidelines for training programs for rail rapid transit employees, to include actual performance, under simulated conditions, of the duties they may be required to perform in the event of a fire or other emergency. (Class II, Priority Action)(R-81-15)"

Similarly NTSB recommended that the United States Fire Administration (USFA):

> "Offer to assist and cooperate with the Urban Mass Transportation Administration in its development of rail rapid transit system training program guidelines which address fire safety concerns, such as tunnel rescue in a smoke and/or fire environment. (Class II, Priority Action) (R-81-21)"
>
> "In consultation with the Urban Mass Transportation Administration, develop a national training curriculum for fire service personnel involved in the administration of fire protection on rail rapid transit systems. (Class II, Priority Action) (R-81-22)"

As a result of these recommendations, UMTA initiated a Reimbursable Agreement with FEMA's National Fire Academy (NFA), then the training and education arm of USFA and now, along with USFA, part of FEMA's National Emergency Training Center. The objective of this agreement was to formally coordinate the efforts of the UMTA and FEMA/USFA/NFA in the areas of fire and life safety in rail rapid transit. Furthermore, it was designed "to promote fire safety in rail rapid transit by conducting seminars, workshops and formal courses in rail rapid transit fire safety and emergency preparedness, and to provide technical assistance to transit systems with site-specific fire protection, life safety or emergency preparedness problems." The agreement included the following tasks for FEMA/USFA/NFA:

> "a. Conduct a planning workshop for development of a Fire Safety/Emergency Preparedness course for rail rapid transit.
>
> b. Provide technical assistance as required in matters pertaining to fire and life safety in rail rapid transit."

This document presents a summary of the workshop "On Track to Fire and Life Safety in Rail Rapid Transit," the first step in this joint UMTA/FEMA program. The report includes a discussion of the training needs identified by the workshop participants, as well as recommendations for implementation of these training needs.

2. WORKSHOP STRUCTURE

2.1 WORKSHOP OBJECTIVES

The primary objective of the workshop was to identify the fire and life safety training needs of the transit and fire service community. This workshop objective was accomplished by providing a forum for the cooperative information exchange on the fire and life safety concerns, needs and priorities of the transit and fire service community. The workshop participants worked to identify training needs in the following four key areas.

- o Prevention, detection and notification
- o Emergency evacuation
- o Fire suppression and rescue
- o Emergency planning.

In addition to the primary objective of identifying training needs, a secondary objective was to determine the best means to implement these needs.

2.2 WORKSHOP DESIGN

To fully achieve the stated objectives, a three-day workshop was designed to provide ample opportunity for the participants to exchange information and identify the training needs necessary to enhance their response to fire and life safety concerns.

The workshop was directed at rail rapid transit systems and metropolitan fire departments serving those systems. The audience included operational transit systems, systems currently under construction, and systems in the planning and design stage. Personnel from a total of twenty-one transit systems and 25 fire departments participated in the workshop.

Fire service attendance was limited to departments with primary protection responsibility for the transit systems. It was not possible to invite every department represented on multi-jurisdictional fire/transit liaison committees. In identifying fire service attendees, the workshop planners sought participation from the officers responsible for coordinating fire department/ transit operations, emergency planning, and training. Each transit system was asked to send the management level staff members responsible for system safety and for coordination and planning with the fire/rescue service. Forty-one fire service representatives and 35 transit officials attended the workshop, as well as 20 representatives from UMTA, FEMA, and other allied organizations. A complete list of the 96 workshop attendees is included as Appendix A.

The workshop format included full sessions featuring spotlight presentations on innovative fire and life safety programs, as well as structured small group discussions. The small group discussions contained group exercises designed to broaden awareness of transit and fire safety emergency roles, information and training needs, and requirements for effective communication among groups. A detailed workshop agenda is included as Appendix B.

The primary discussion activity was centered around the four small groups, each containing 15 to 20 participants. These groups reflected the closest possible balance of old, new, and future transit systems. Fire and transit representatives from the same metropolitan area were kept together to encourage localized information exchange and dialogue. Participant groupings are shown in Table 2-1. For some activities, groups were further split into fire and transit subgroups.

Discussion groups were directed by four leadership teams consisting of two co-moderators and one or two resource experts. Fire service and transit personnel were represented on each leadership team. (See Table 2-2.) Leadership teams switched groups after each session to expose moderators and participants to the widest possible range of perspectives and viewpoints on the issues.

TABLE 2-1. WORKSHOP PARTICIPANT GROUPINGS BY METROPOLITAN AREA

GROUP I	GROUP II
Atlanta	Cleveland
Boston	Chicago
Los Angeles City/County	Miami
Oakland	Montreal
San Francisco	New York City
	Pittsburgh

GROUP III	GROUP IV
Baltimore	Camden
Buffalo	Philadelphia
Jersey City/Hoboken	Houston
Newark	Toronto
Washington, DC	Vancouver

TABLE 2-2. WORKSHOP LEADERSHIP TEAMS

TEAM 1

William Hathaway
Transportation Systems Center
U.S. Department of Transportation

Harvison Hunt
Manager of Safety and Systems Assurance
Kaiser Engineers/Baltimore MD

Edward Murphy
Assistant Chief
San Francisco Fire Department

TEAM 2

John Balog
Senior Transportation Engineer
Ketron, Inc.

John J. Troy
Gage-Babcock & Associates, Inc.

Walter Wise
Chief
Bethesda (MD) Fire Department

TEAM 3

Lawrence Engleman
Fire Protection Coordinator
Washington Metro Area Transit Authority

Michael Farrell
Assistant Chief
San Francisco Fire Department

William Shives
Battalion Chief
Baltimore City Fire Department

TEAM 4

Thomas Boyle
Manager of Safety
Chicago Transit Authority

Kirk Johnson
Director of Public Safety Programs
Metropolitan Washington Council of Governments

Robert Pawlak
Transportation Systems Center
U.S. Department of Transportation

William Wood, Jr.
Division Chief
Coral Cables (FL) Fire Department

The moderators were given flexibility in structuring their sessions, but were advised to keep discussions about specific hardware or system design choices to a minimum. Moderators were also directed to maintain a list of training needs identified in each session. These lists of training needs were then consolidated at the end of each day, and a composite list of training needs was prepared for review by the participants prior to the conclusion of the workshop.

3. SUMMARY OF WORKSHOP SESSIONS

3.1 OPENING SESSION

The workshop opened on Monday, August 2, 1982, with welcoming remarks delivered by Joseph L. Donovan, Superintendent of the National Fire Academy. Edward M. Wall, Deputy Superintendent for Resident Programs, introduced the fire service and transit personnel representing each of the 21 metropolitan areas participating in the workshop. Introductions were followed by keynote remarks by Lloyd G. Murphy, Director of the Urban Mass Transportation Administration Safety and Security Staff.

Participants were then divided into the four groups shown in Table 2-1, and dispatched to conference rooms. Composition of the groups had been predetermined to ensure a proper mix of old, new and future systems. This opening session was designed to stimulate a dialogue on the priorities, constraints and operational modes of the fire service and the transit systems. The four groups were subdivided into fire service and transit teams, moved into separate rooms, and asked to respond to the question, "What do you need to know about the other side in order to understand how they operate?" Each fire and transit sub-group developed a list of information needs in four categories: organizational structure, operational methods, budget considerations, and other constraints and priorities. The fire and transit teams were also asked to suggest training that might help meet these needs and promote understanding and productive exchange.

3.1.1 Organization

Each group stressed the importance of joint understanding of terminology, command structure, standard operating procedures, and who is in charge at the scene of an incident. Collectively, participants identified the following organizational issues:

- Which jurisdiction is in charge of fire, rescue, and police functions?

- What is the fire department and transit system decision-making process?
- How are decisions made in an emergency situation?
- Who are the spokespersons for the fire service and transit system?
- Is there a formal mechanism for meetings?
- What is the chain of command and process for incident followup, coordination, and verification?
- Who interprets local or state building and public safety codes?
- How do the fire service and transit system communicate priorities? If something was expected and did not happen, what prevented it?
- How should liaison be structured?
- How is corrective action taken if mistakes occur? Who makes the changes?

3.1.2 Operations

The workshop participants discussed operational methods in terms of training and coordination. They were unanimous in their interest in the training process used by the other side and its relation to command structure. Collectively, participants wanted to know the following regarding operational issues:

- What is the fire service perception of the transit system's responsibility?
- What are the transit system's incident reporting requirements and are they always followed?
- Is there one main fire department to contact?
- How does the transit system decide to call the fire service?

3.1.3 Budget

Budget concerns are central to any organization. One major concern in the area of rail rapid transit fire and life safety is

equipment. Collectively, the fire service wanted to know the following about transit budgets:

- How much is budgeted for fire/life safety and rescue equipment?
- How funding is distributed?
- How are fire and life safety items selected for funding?

In turn, transit representatives asked the fire service the following budget questions:

- What are their funding periods?
- What are their budget priorities?
- Do they budget for transit safety items and training?
- What equipment does the fire service provide?

In general, the opening session accomplished its basic purpose: to start fire and transit representatives talking about basic information needs and concerns related to fire and life safety. It laid a foundation for much of the discussion that occurred during the remainder of the workshop.

3.2 PREVENTION, DETECTION AND NOTIFICATION SESSION

The Prevention, Detection, and Notification Session was designed to focus participants on the following concerns:

- Prevention of fire and life safety problems through dialogue, information sharing, and (where appropriate) training during system design;
- Identification of information and training needs related to fire prevention;
- Identification of the human component and training needs in detection and notification systems; and
- Identification of requirements for clear initial communication when an incident occurs.

Four spotlight presentations addressed the major issues related to prevention, detection and notification. Although the primary thrust of the workshop was training, many of the spotlight presentations discussed systems design and operation to provide the participants with a broad understanding of how training may be employed.

Harvison Hunt, Manager of Safety and Systems Assurance for Kaiser Engineers, on the Baltimore Metrorail Project, started the session with a spotlight presentation on the "total system" concept of fire prevention in rail rapid transit. He began by reviewing five steps that can reduce fire hazard potential in rail transit design:

- Minimize fire opportunity through proper selection of materials and adequate ratings between occupancies.
- Should a fire occur, provide for rapid and reliable detection.
- Ensure the prompt notification of proper personnel and agencies.
- Should the situation require it, provide for effective rapid evacuation of patrons without panic.
- Finally, install adequate firefighting facilities.

The speaker emphasized that fire protection is not a separate and distinct feature of a rail rapid transit system. Rather, there are elements of fire prevention and protection in all of the following components:

- Station and line
- Supervisory control system
- Train control and communications
- Escalator and elevator
- Signing and graphics
- Traction power substation equipment
- Vehicle
- Fare collection
- Fire extinguishers
- Security
- Mechanical equipment

The presentation addressed some of the fire protection features included in three major elements of rail system design:

- o Station structure - should consider rated separations, conduit runs for normal and emergency power, lighting, communications, and wall-ceiling penetrations for fire lines.

- o Station finish - should consider selection of noncombustible finishes in public areas; and the location/installation of sprinkler, standpipe, and Halon extinguishment systems.

- o Vehicle - at a minimum, should comply with the UMTA Recommended Fire Safety Practices for Rail Transit Materials Selection developed at the Transportation Systems Center.

Mr. Hunt added that fire protection components must be developed in compliance with the system's quality assurance and testing requirements.

He concluded with the reminder that effective fire protection starts with early planning in the design process. Designers should try to foresee fire protection needs rather than attempt to correct them. If a change is required, the designer must examine the system as a single entity and assess the impact of the modification on the integrity of the total system.

In a discussion session following Harvison Hunt's spotlight, participants were asked to focus on information and training needs related to fire prevention. Moderators asked the groups to identify areas of concern related to ignition sources, vehicle materials, and design configuration. Moderators also asked groups to identify, from a prevention standpoint, information, training, and coordination needed by transit and fire personnel to make decisions in fire engineering that could reduce the likelihood of ignition and minimize fire spread. Resulting discussion identified five critical elements of prevention: system design, maintenance, communications, passenger education, and training.

While training related to fire prevention was difficult to define, groups were able to identify several needs. One group pointed out that hazard recognition training should be made available to all transit operating personnel, as well as Central Control

staff. This would improve the ability of transit personnel to detect problems, determine severity, and report them quickly and effectively, thus minimizing damage and injury. Conversely, fire service personnel, who fight fires in a variety of configurations, also need training in recognizing the special hazards posed by the rail rapid transit environment. As suggested by one group, prevention-related training for the fire service might include:

- Transit system hazards recognition;
- System familiarization - structures, facilities, communication systems; and
- Vehicle design.

Three spotlight presentations reinforced key points developed during the prevention discussions, and provided a transition to the detection and notification segment.

Ralph Weule, Manager of Safety for the Bay Area Rapid Transit District (BART), outlined BART's Vehicle Fire-Hardening Program. This program is actually a systemwide fire protection improvement program covering the following six critical areas:

- Vehicle equipment modification - reduces the risk of interior/exterior fires, reduces the risk of flammability, and improves evacuation time.
- Wayside facilities - improves the system to allow faster and safer evacuation and better emergency response to disaster situations.
- Contingency planning - improves BART procedures, emergency plans, and response capabilities, and conducts a thorough review of outside agency capabilities to respond to BART disasters. This includes use of the Automated Emergency Response System (AERS).
- Training improvements - evaluates and improves BART training functions, including facilities, organization, personnel capabilities, methods, and subject matter on existing BART training.
- Passenger communication improvements - broadens passenger awareness of safety-related equipment, procedures, and BART's facilities so that patrons will be better able to respond to emergency situations without panicking.

- o System communications improvements - provides improved train radio, yard radio, and Central Control capabilities. Investigates means for improving police, fire, and emergency response communications systemwide.

Following the BART presentation, John J. Troy of Gage-Babcock and Associates updated the status of the National Fire Protection Association (NFPA) Standard 130 for Fixed Guideway Transit Systems. Mr. Troy is secretary of the NFPA 130 committee. The proposed standard applies to design and construction of new fixed guideway transit systems and to major modifications of existing systems. NFPA 130 covers stations, trainways, vehicles, vehicle storage and maintenance areas, emergency procedures (including training), and communications. If adopted by a local jurisdiction, the standard would become the "code" for design and construction or rehabilitation of a fixed guideway transit system.

The speaker gave a procedural rather than technical update. Mr. Troy reported that after consideration of public comments earlier this year, the committee had approved the standard and would present it for ratification by the full NFPA membership at the annual meeting in November, 1982.* Public comments on the proposed standard were published by the committee in September, 1982.

The final spotlight presentation of the Prevention, Detection and Notification session was given by Roger Choquette, General Engineering Superintendent for Fire Prevention for the Montreal Urban Community Transit Commission (MUCTC), who reviewed his system's training program for train operators. The MUCTC program, a full-day practical course, is designed to build operator skills in three areas:

- o Detection of an incident,
- o Communication with Central Control, and
- o Fighting the fire.

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*It was presented and approved by the membership but is presently before the NFPA Standards Council for approval for publication.

Training exercises are held in a special "simulator" facility housed in an out-of-service, three-car train parked in an unused section of tunnel.

MUCTC operators are trained to notify Central Control as soon as an incident is detected. Central Control then calls the fire department. Detection/notification procedures are practiced in simulated incidents. MUCTC's procedures anticipate a 10-minute time lag in relaying notification to the fire department.

MUCTC train operators are also trained in the simulator facility to fight fires using hand-held extinguishers and other suppression equipment until the fire department arrives on the scene.

In the discussion session on Detection and Notification, groups were asked to identify training needs in the areas of fire detection and notification emphasizing the roles of the transit system employees and passengers. Five specific categories of training needs were suggested by the moderators as discussion topics:

- o Planning - to determine system types and placement;
- o Maintenance - to keep detection systems and other devices functioning;
- o Familiarization - to acquaint fire department and transit personnel with provisions of the detection/notification system;
- o Analysis - to prepare personnel involved in problem notification to take correct action; and
- o Communication - to ensure that fire and transit personnel are using the same language in crucial initial communications.

Two group exercises were conducted during this segment. In the first exercise, participants critiqued a state-of-the-art "fire management panel" developed for the new Baltimore system, identifying human factors and training needs related to use of this system. Participants were encouraged to discuss detection/notification systems used in other transit systems. In the second exercise, groups completed a communications "quiz," based on a

sample dialogue between a transit control center and fire alarm headquarters, to reinforce the need for shared, precise vocabulary.

In summarizing the discussion on detection and notification the session participants provided the following six suggestions.

- Patrons should have a means to report fires, and they should be educated in the proper reporting procedures.
- Alarm panels should be in the same location in each station - if personnel know where one is, they know where all are.
- The fire department should have an agreement with the transit system to obtain a master key to doors and equipment panels.
- Simulations to test communications systems and procedures are needed.
- Cross training in notification and response is needed (e.g., exchange of dispatchers).
- Transit systems need to review employee compliance with reporting regulations. Are required procedures being followed?

Table 3-1 provides a summary of the training needs identified in the session on Prevention, Detection and Notification.

3.3 EMERGENCY EVACUATION SESSION

This session was designed to analyze the factors that can facilitate rapid and safe evacuation from a transit system during an emergency. Emphasis was placed on anticipating the effects of human crisis response, recognizing the role of education and training in effective decision-making under emergency conditions, and identifying skills and attitudes needed by key personnel in emergency evacuation situations.

Groups began the session by reviewing and discussing elements of a successful emergency evacuation program. A checklist included

TABLE 3-1. TRAINING NEEDS IDENTIFIED IN WORKSHOP SESSIONS

Prevention/Detection/Notification

	Subject	Training Target	Purpose	Methodology
a.	Fire prevention education	Transit station/operating/ maintenance personnel	To familarize transit employees with fire protection features of the system, to stress importance of fire prevention.	Not identified.
b.	Fire prevention: Hazard recognition	Transit station/operating personnel	To stress importance of hazard identification to develop skills identifying problems before fire starts; to develop skills in assessing hazard levels to know when to take appropriate action, when to summon fire department.	Not identified.
c.	Fire reporting for rail rapid transit system	Train/station/central control personnel; fire department communications center	To ensure common language in reporting/responding to fires so response is appropriate; to develop criteria for describing factors such as smoke density; to determine means of pinpointing location; to determine what information is needed for appropriate emergency response.	Cross-training; joint training; separate training followed by exchange of visits; FS involvement in Central Control training
c.	Fire inspection of transit facilities	Responding fire departments	To develop skills in assessing hazard levels in transit vehicles, stations, trainways, etc.	Not identified.
e.	Fire behavior of materials in rail rapid transit systems	Responding fire departments	To enable fire department to identify hazards in fire spread or toxicity associated with materials in cars, station, and other system components.	Not identified.

in participant materials provided six major elements for discussion:

- o Appropriate system design,
- o Adequate preparation of fire service and transit personnel,
- o Passenger preparation and direction,
- o Appropriate hardware,
- o Anticipation and simulation of emergency scenarios, and
- o Realistic plan.

Following this opening discussion, moderators moved to the major activity of this session - a role-response exercise that simulated a fire and smoke incident in a subway tunnel. Participants were asked to fulfill role responsibilities for: incident car passengers, non-incident car passengers, transit Central Control, fire alarm headquarters, train operator, transit field supervisor, and fire incident commander. Additional roles, such as elderly, handicapped, or injured passengers, were assigned as needed.

Moderators presented their group with an initial situation: passengers on board the subway train observe arcing and smoke outside. Participants were then asked to either act out or discuss an initial decision on what to do. When a decision was reached, the group was asked:

- o What equipment must be available and in working order to carry out your choice?
- o What do you believe the person you are "playing" would be thinking or feeling at this point?
- o What could go wrong - either to cause you to make a wrong decision or to keep you from carrying out your best choice?

Moderators could introduce additional problems to further complicate the scenario:

- o The train stops.
- o Smoke increases.

- Fire escalates.
- A technical failure prevents the train from moving.
- Lights go out in the vehicle.
- Lights go out in the tunnel.
- The rescue train cannot approach closer than 500 feet.
- Third rail power is on.
- A number of passengers are injured or non-ambulatory.

At each stage of the exercise, participants were asked to re-assess their thoughts, feelings and actions according to the changing situation.

After the exercise, groups were asked to identify the skills that were needed in each role for effective emergency response and how training can foster these skills. Moderators emphasized the need for realism in both evacuation planning and training. Moderators also asked participants to identify techniques they have used in planning and carrying out appropriate evacuation planning and training, and to suggest approaches for further training development and improvement.

One of the objectives of the role response exercise was to identify the skills and abilities needed by key players in an emergency evacuation. The following is a summary of the discussion on this topic:

Passengers

- Awareness of appropriate actions to take in event of an emergency.

Train Operator

- Trouble shooting skills (ability to locate and identify safety-related problems).
- Communication skills.
- Hazard evaluation skills.
- Knowledge of system configuration and equipment design.

- Knowledge of SOPs for passenger evacuation and fire suppression.
- Panic control skills (ability to remain calm and reassure patrons).
- Situation analysis skills (ability to recognize developing emergency and take appropriate action).

Transit Central Control

- Previous operations experience/knowledge of system.
- Ability to handle a variety of emergency situations.
- Communication skills.
- Ability to coordinate and communicate with fire department dispatchers.
- Understanding of fire department operational procedures.

Transit Supervisors

- Understanding of fire department operational procedures and command structures.
- In-depth knowledge of transit Central Control procedures and operational modes.
- Familiarity with transit personnel and their capabilities.
- Experience in use of fire suppression equipment.
- Ability to communicate with fire service using predetermined procedures and vocabulary.
- Ability to work with ranking fire officer on the scene (i.e., relinquish authority and support fire service operations).

Fire Incident Commander

- Basic knowledge of transit system configuration equipment.
- Familiarity with transit operational procedures.
- Knowledge of transit command structure.
- Knowledge of potential hazards in transit system.
- Knowledge of how to use special transit equipment.

Two concurrent spotlight presentations followed the session on Emergency Evacuation: the New York City Transit Authority (NYCTA) training film "Fire Down Below" and a demonstration of the Automated Emergency Response System (AERS) developed by BART (the AERS demonstration was repeated following the afternoon session).

The film "Fire Down Below" is designed to provide guidance to NYCTA train operators on what to do in event of a fire. Special emphasis is placed on controlling panic. The film highlights key learning points such as:

- Notify the command center.
- Notify partner of the nature of the problem.
- Notify passengers and detail the problem.
- Walk among passengers to reassure them.
- Have a crew member operate the radio.
- Explain why it is safer to remain on the train.
- Move passengers to a safer part of the train.
- Maintain communication with the command center via radio or phone

In summary, the film highlighted the need for cooperation and coordination between transit and fire services.

In the other spotlight, the Transportation Systems Center (TSC) demonstrated the Automated Emergency Response System (AERS) developed by the BART system.

Ventilation is a major concern of the BART system as 23 of the 71 miles in the system are sub-surface. The AERS, utilizing a microcomputer, permits the central controller to save time by activating the appropriate ventilating system for a particular emergency situation due to the speed of the computer. Other information contained in the AERS include exits, traction power cutoff, telephone locations, etc.

A summary of the training needs identified during the Emergency Evacuation session is contained in Table 3-2.

TABLE 3-2. TRAINING NEEDS IDENTIFIED IN WORKSHOP SESSIONS

Emergency Evacuation

	Subject	Training Target	Purpose	Methodology
a.	FS & transit SOPS for emergencies	Fire officers/transit supervisors	To familiarize responsible individuals with each other's procedures for improved coordination/communication.	Cross training, or training for transit by fire service representative and vice versa.
b.	Transit system layout familiarization	Fire service command personnel, other fire service personnel	To familiarize personnel with system access/egress and configuration to increase efficiency in evacuation, especially from tunnels, and plan for special problems.	Video or on-site
c.	Emergency procedures	Passengers	To enable passengers to exit safely if communications fail or rescuers cannot reach them quickly enough.	Graphics, announcements, programs in public schools, other public education activities
d.	Panic control	Train crew	To prevent panic at early stages of incident by appropriate action and communication.	Not identified.
e.	Evacuation drill	Designed and acted by FS/transit personnel	To practice plan, discover problem areas prior to emergency, and develop teamwork.	Simulation
f.	Drill or incident critique	FS/transit personnel	To jointly determine problem areas and explore/construct solutions.	Discussion (with media review)
g.	Stress management	Operator, others who do not ordinarily confront emergencies but have key roles	To prevent personnel from worsening situation because of poor reactions related to stress.	Role play

3.4 FIRE SUPPRESSION/RESCUE SESSION

In this session, small groups of participants completed a cross-role, decision-making activity designed to develop an awareness of transit and fire service needs for effective fire suppression and rescue. Using role-playing instructions they were asked to make choices representing key suppression/rescue decision issues. Following the role playing, the group critiqued the choices made by the other groups. Fire representatives pointed out problems for the fire suppression effort; transit participants noted problems from their perspective. The groups then responded to the critiques, discussing factors in fire suppression/rescue not identified in the initial decision-making exercise. Much of the discussion in this session reinforced points made in the Emergency Evacuation Session. The discussion centered around the following four topic areas:

1. Traction power.
2. Access and egress.
3. Fire service and transit interface.
4. Training and information needs.

Upon completion of the small group discussions, Port Authority Trans-Hudson (PATH) representatives presented a spotlight, a film developed as part of a system emergency preparedness program, "PATHways to Safety." The film, illustrates emergency response and evacuation procedures on PATH. The film is used during an ongoing refresher training course for PATH employees and is part of an orientation program for outside agencies that may be involved in a PATH emergency.

To put into practice and reinforce the emergency response and evacuation procedures illustrated in the training film, PATH conducted a simulation drill named "Operation Rescue" on November 16, 1980. This exercise provided "hands on" equipment experience and training for the interagency team that would respond in the event of an emergency on PATH, including the Jersey City Fire

Department, the Jersey City Medical Center Emergency Services Unit, PATH police, the PATH safety section, and staff from each of the other PATH divisions.

Following the film and a brief question and answer period, a large group of participants gathered for an early evening tour of the WMATA system, including vehicles, stations, tunnels, shops, and yards. The tour was hosted by Larry Engleman and John Thompson of the WMATA Office of Fire Protection, along with Battalion Chief M.L. Fleming of the D.C. Fire Department.

A summary of the training needs identified in this workshop session is contained in Table 3-3.

3.5 EMERGENCY PLANNING SESSION

This session began with two spotlight presentations on emergency planning. In the first presentation, Don McElroy of the Miami/Dade County system and Bill Wood of the Coral Gables Fire Department reviewed how the Miami system has met fire/life safety requirements for both the fire service and transit system. Their methodology included:

- Formation of a Fire/Life Safety Technical Committee to provide a formal approach to address fire service needs in relation to transit and vice versa.
- Development and acceptance of fire and life safety criteria in lieu of a building code.
- Enforcement of this criteria during the design phase and construction, installation, and testing.
- Development of training needs for outside emergency agencies responding to transit system incidents (see Tables 3-4 and 3-5).
- Development of emergency procedures and scenarios and the implementation of drills to test them.
- Ongoing committee action throughout the life of the system to address any emergency program and plans for changes that may affect the transit system or public emergency forces.

TABLE 3-3. TRAINING NEEDS IDENTIFIED IN WORKSHOP SESSIONS

Fire Suppression/Rescue

	Subject	Training Target	Purpose	Methodology
a.	Familiarization with rapid rail system equipment relating to fire emergencies	Appropriate fire service personnel	Increase efficiency and anticipate problems.	Video or demonstration with on-site practice
b.	Ventilation for the rapid rail system	Appropriate fire service and transit personnel	Ensure appropriate ventilation for specific conditions	Research should be conducted to establish the appropriate methods.
c.	Hazards of rapid rail system	Fire service command, other fire service personnel	Ensure awareness of hazards to life safety in rapid rail environment - do's and don'ts of 3rd rail policy, etc.	Preferably on-site
d.	First aid and/or CPR	Transit employees	Ensure ability to save lives when speed is essential	Not identified.
e.	Fire service operating procedures for rapid rail transit emergencies	Upper and line transit management	Prevent conflict or misunderstanding at emergency scene, improve coordination.	Not identified.
f.	Fire extinguishment for transit employees	Train operators, crew	To ensure small fires are put out safely (correlate with transit SOP, combined with 1c).	Not identified.

TABLE 3-4. METROPOLITAN DADE COUNTY TRANSPORTATION ADMINISTRATION FIRE/EMS TRAINING COURSE ASSIGNMENTS

DCTA PERSONNEL

Course # / COURSE / PERSONNEL	1 Basic Emergency Procedures	2 Basic Fire Prevention	3 Use of Fire Extinguishers	4 Standard First Aid	5 Advanced First Aid	6 Cardiopulmonary Resuscitation	7 Electrical Hazards, Precautions	8 Fire & Explosion Hazards	9 Advanced Fire Prevention	10 Function, Use of Fire Prot. Systems	11 Emerg. Evacuation, Rescue, Rescue Tools	12 Arson, Bomb Threats, Crowd Control	13 Disaster Planning	14 Bldg. Utilities, Ventilation	15 Maintenance of Fire Exting. Hose	16 Maintenance of Sprklr., Halon Systems	17 Maintenance of Fire Alarm Systems	18 Control Center Orientation
Central Control Supv.	X	X	X	X		X				X	X	X	X					
Central Console Oper.	X	X	X				X				X	X	X					
Train Operator	X	X	X	X		X	X				X	X						
Yard Dispatcher	X	X	X				X			X	X	X	X					
Station Agent	X	X	X	X		X	X	X		X	X	X	X	X				
Maint. Supv., Foreman	X	X	X	X		X	X	X	X	X	X			X				
Vehicle Repariman	X	X	X				X	X	X		X							
Bldg. & Structures Maintainers	X	X	X		As Required		X	X	X	X				X	X	X	X	
Wayside Equip. Maintainers	X	X	X			X	X	X	X		X							
Fire Brigade				X		X					X	X	X	X	X	X	X	
Safety Specialists	X	X	X	X		X	X	X	X	X	X	X	X	X				
Instructors	X	X	X				X	X	X	X								
QA Inspectors	X	X	X				X											
Int. Security Supv.	X	X	X				X	X		X	X	X	X					
Guards	X	X	X	X		X	X	X		X	X	X	X	X				
Transit Police Officers							X				X	X	X					
All other Yard, Shop & Wayside	X	X	X				X											
All Other	X	X	X															

TABLE 3-5. METROPOLITAN DADE COUNTY TRANSPORTATION ADMINISTRATION FIRE/EMS TRAINING COURSE ASSIGNMENTS

Local Emergency Forces

Course #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
COURSE / PERSONNEL	Basic Emergency Procedures	Basic Fire Prevention	Use of Fire Extinguishers	Standard First Aid	Advanced First Aid	Cardiopulmonary Resuscitation	Electrical Hazards, Precautions	Fire & Explosion Hazards	Advanced Fire Prevention	Function, Use of Fire Prot. Systems	Emerg. Evacuation, Rescue, Rescue Tools	Arson, Bomb Threats, Crowd Control	Disaster Planning	Bldg. Utilities, Ventilation	Maintenance of Fire Exting. Hose	Maintenance of Spklr., Halon Systems	Maintenance of Fire Alarm Systems	Control Center Orientation
Fire Departments																		
Firefighters							X				X							
Emerg. Med. Tech.							X				X							
Chief Officers							X			X	X	X	X	X				X
Dispatchers					Not Required													X
Transit Police Division																		
Officers							X	X		X	X	X	X					X
Dispatchers																		
Co. Disaster Mgt. Agcy.							X				X	X	X					

In the second presentation, Robert Pawlak of the Transportation Systems Center, discussed the three components of emergency planning: hardware, people, and software. He observed:

> "There are three primary areas of emergency preparedness planning. The first deals with "hardware." The design, placement, maintenance and use of emergency equipment and facilities...The second primary area deals with the readiness and inherent capability of people; i.e., transit personnel, emergency response personnel, and passengers as a resource to cope with emergencies...The third area deals with the evolution of previously agreed upon information sources, procedures, and decisionmaking aids that are to be used by the people during emergencies...call the collection of these things "software"...The people and "software" are equipped to utilize the emergency equipment and facilitate in accomplishing successful response to any emergency. Emergency preparedness planning, therefore, deals with "hardware," people, and "software."

Following the spotlight presentations, the participants were divided into small groups for discussion of a means for developing, documenting, and disseminating emergency plans. Participants compared how needs related to emergency planning - information exchange, backup, coordination, training, and ongoing communication - are currently being met in various cities. Groups also discussed ways to meet these needs more effectively.

No new training needs were identified in this session. Participants reiterated the importance of training needs previously cited to ensure coordinated emergency response, including drills and mutual familiarization with roles, operating procedures, and equipment.

3.6 CLOSING SESSION

Joe Bardzilowski, Safety Supervisor for PATH, reviewed a video tape of "Operation Rescue II," an interagency simulated emergency exercise conducted on May 23, 1982. The simulation required coordination among PATH, the Hoboken, Jersey City, and New York City Fire Departments, the Emergency Medical Service of New York City, police rescue squads, and emergency service teams from local hospitals. An interagency liaison committee coordinated planning for the exercise.

The simulated emergency was triggered when the rear car of a seven-car train derailed. The derailment and impact against a tunnel wall resulted in loss of both third rail and signal power (momentary). When the rear car derailed and caught fire, many passengers were injured. Following this derailment, a four-car train stalled in a tunnel under the Hudson River.

To facilitate rescue efforts, three primary and one secondary command posts were established using PATH Transportation Division personnel and/or PATH police. Within a one mile radius, the following activities occurred simultaneously:

- Firefighting response to the burning train by two fire companies,
- Passenger evacuation from the burning train via a rescue train, and
- Passenger evacuation from the stalled train in the under-river tunnel via a rescue train.

Ambulatory passengers walked along the tracks at least 500 feet from the disabled train to a waiting rescue train. Communication among rescue personnel was established by sound-powered telephones and train/wayside radios. On-train triage was performed, and a major triage simulation was conducted at a Hoboken hospital. PATH representatives were on-site for comments and questions.

Following the spotlight presentation, the participants were asked to complete workshop evaluation forms and to review and comment on the Summary List of Training Topics identified in the workshop and shown in Table 3-6.

Closing remarks for the workshop were then provided by Mr. Fred J. Villella, FEMA, Associate Director of Training and Education.

TABLE 3-6. SUMMARY LIST OF TRAINING TOPICS

1. Prevention training for transit operations and security personnel on how to recognize a developing abnormal situation in time to mitigate.
2. Fire prevention education for transit employees, including fire protection features in their system, recognition of fire hazards, and importance of prevention work.
3. Training for fire service on how to inspect transit facilities from a fire hazard standpoint.
4. Training for fire service on implications of car and plant design features for effective firefighting operations.
5. Training for transit personnel in effective support of fire service at an incident (includes familiarity with fire service operations, fire service needs, operational features of their systems intended for use in fire).
6. Cross or joint training for fire service dispatchers and transit central control to ensure common language in notification/response.
7. On-site training for firefighters on physical plant, system configuration, access/egress features, and equipment available to mitigate emergency situations.
8. Joint training for fire service and transit personnel on most effective approaches to ventilating subway tunnels under diverse emergency conditions.
9. Training for transit employees on controlling personal stress in emergency situations.
10. Training for all levels of transit employees, including mid-level managers, on fire service operating procedures in subway, for purposes of improved coordination and support.
11. Training for all levels of fire service, including company and chief officers, on transit operating procedures in subway emergencies, for purposes of improved coordination and support.

TABLE 3-6. SUMMARY LIST OF TRAINING TOPICS (CONT.)

12. Training for train operators on situation analysis for purpose of determining appropriate action in the event of an emergency, such as initiation of evacuation.

13. Training for fire service and transit personnel on principles of crowd control in order to communicate effectively and prevent panic.

14. Education for public by the transit system on how to initiate evacuation if rescuers are unable to reach them in time to lead the rescue operation.

15. Training in basic firefighting techniques for any transit personnel expected to do so.

16. Training for transit personnel in first aid techniques.

17. On-site training for firefighters on means for analyzing whether safe operating conditions exist, including principles of traction power operation.

18. Frequent joint simulation drills of fire and emergency situations, with special emphasis on elderly and handicapped passengers.

19. Joint fire service/transit critique and debriefing for training purposes after incident or drill.

4. IDENTIFICATION OF TRAINING NEEDS

This section presents the training needs identified in the workshop and addresses the means for implementation. In the closing session the participants were asked through an evaluation questionnaire, to comment on the nineteen training topics identified in the workshop. Based upon a review of these comments the following seven basic concerns were identified as areas in which training or improvement of existing training is needed:

1. Training in the basics of fire prevention and firefighting for transit personnel
2. Emergency Plan Design
3. Situation Analysis and Mitigation
4. Emergency Notification
5. Crowd and Panic Control
6. Firefighting Operations in the Rail Environment
7. Joint Emergency Simulation Drills

Before recommending training as a specific means of improving performance in a given area of concern, it is necessary to identify all elements of the performance problem that may be associated with the concern. These elements could include:

- Motivational - Motivational factors whereby employees see little justification for being concerned about fire and life safety;
- Organizational - Organizational failure whereby the transit or fire service chain of command inhibits attention to fire and life safety;
- Informational - Lack of information regarding facts about fire and life safety;
- Education/Training - Insufficient education training in fire and life safety procedures; and

- Hardware and System Design - Hardware/system design that compounds the problems of evacuation and mitigation of an emergency situation.

Any combination of these factors can lead to a fire and life safety problem and only by considering them all, can it be assured that a training deficiency does in fact exists. It is also possible that more than one of these elements could be responsible for a fire and life safety problem. For example, a training deficiency may be compounded by motiviational factors, organizational failure, lack of information, hardware or system design problems or the deficiency may be insufficient training. Furthermore, the solution to many fire and life safety problems may require alternative approaches to the problem not related to training or other types of skill improvement. Some of these alternative approaches to the problem may include any or all of the following:

- Research,
- Coordination,
- Information Sharing,
- Training Improvement, and
- Materials Development.

The following sections discuss the seven basic training areas identified.

For each training area a summary of the problem is provided, applicable elements of the problem are discussed, possible training approaches are identified, and other approaches which will enhance the training or personnel response to the problem are presented.

4.1 TRAINING IN THE BASICS OF FIRE PREVENTION AND FIRE FIGHTING FOR TRANSIT PERSONNEL

4.1.1 Summary of the Problem

Budget constraints often hamper both the fire department's ability to assist rapid transit in spotting potential hazards

within the system, including those posed by malfunctioning fire protection systems, and transit maintenance employees' ability to consistently prevent such hazards from developing. Consequently, there is always a risk that hazards will develop and not be recognized, as such, in time to prevent a fire or life safety problem.

In addition, in the event of a fire, transit personnel often have little idea of how the fire department would handle a given emergency and how transit personnel could best assist them. Without such knowledge there is always the danger of compounding a problem through inadvertent action.

4.1.2 Elements of the Problem

Motivational: Transit personnel may have so many routine responsibilities that they may not see fire prevention and fire fighting as their responsibility.

Organizational: If the organizational structure appears to concentrate fire prevention responsibilities in a few hands, it may have a negative effect on the willingness of the majority of transit personnel to be aware of fire prevention.

Informational: Complicating the fire prevention problem is the lack of a firmly established research base comprising common fire causes, the hazards associated with particular materials and design, and the type of fire protection system best suited to the unique characteristics of particular rail rapid transit environments.

Education/Training: Education for appropriate transit employees should address the following goals: instill a sense of the importance of fire prevention; enable employees to recognize and mitigate fire hazards; and enable employees to identify, maintain and use fire prevention and firefighting equipment.

4.1.3 Possible Training Approaches

- Prevention training for transit operators, security, and maintenance personnel on how to recognize developing abnormal situations in time to prevent a fire emergency.
- Training for transit employees in the specific fire protection features of the system.
- Training for transit personnel in the basics of firefighting, including familiarization with fire service procedures.

4.1.4 Other Possible Approaches

Research: More research is required on how specific features of car, station, or tunnel design can contribute to fire hazards. This includes studies of various fire protection options for specific environments.

Coordination and Information Sharing: Fire service expertise can do much to assure transit of the appropriateness and adequacy of its fire protection programs. Mechanisms should be established according to the needs of each system to enlist fire department aid in fire prevention program design and, possibly, implementation.

4.2 EMERGENCY PLAN DESIGN

4.2.1 Summary of the Problem

Emergency planning is critical to successful, coordinated teamwork by the various agencies involved in a rail rapid transit emergency situation. Emergency plans, however, are often difficult to understand and unworkable. The result can be that conflicting procedures are developed with insufficient understanding of the possible effect on the priorities and response plans of other groups concerned. Lack of explicit, clear understanding of roles and responsibilities may lead to confusion and delay in an emergency. For example, if fire service personnel complete emergency operational plans for rail rapid transit environments without sufficient knowledge of what transit personnel would be doing simultaneously, conflicts may result and rescue efforts may be hampered.

4.2.2 Elements of the Problem

Motivational: Most transit systems and fire departments recognize the need for joint emergency planning, but local relationships may impede the design and development effort. With numerous immediate concerns, it may be difficult to find the time and energy required to achieve a consensus on a new emergency plan or update an old one. The need is there, but it may be considered a lower priority than more pressing concerns.

Organizational: The absence of commitment to information exchange on the part of top management in either the fire service or transit authority would be a significant component of the problem.

Informational: A lack of information on problems and solutions employed by other transit systems makes planning more difficult for those systems in the development stage.

Educational/Training: A particularly difficult element of the problem is the time, effort and logistical dilemmas required to conduct joint simulation drills to test the workability of the plan and the readiness of personnel to implement it. In addition, if information received by top management on transit operational procedures is not made accessible and memorable to line personnel through appropriate training, the possibility of poor coordination due to misunderstanding or inadequate communication remains.

4.2.3 Possible Training Approaches

- A national workshop in conjunction with the publication of the UMTA Emergency Preparedness Guidelines might assist transit systems in learning from each other's experience.
- Each fire department should incorporate information about transit operating procedures and priorities in their training programs. Class presentations by transit representatives or training materials provided by the transit authority to illustrate transit responsibilities addressed by their training, may increase understanding.

4.2.4 Other Possible Approaches

Research: Collect and distribute sample plans. Research

case studies in planning procedures and share suggestions acquired from experience.

Coordination: Emergency planning will require joint transit and fire service efforts, and should ultimately involve other agencies as well. Each transit system will need to exchange key planning documents with the fire service and follow up with face-to-face meetings to resolve any possible problems.

4.3 SITUATION ANALYSIS AND MITIGATION

4.3.1 Summary of the Problem

In the event of an emergency on a train, particularly at a distance from a station, the train operator plays a key role. This operator must decide whether a problem does exist and then if necessary contact Central Control and provide accurate and detailed information as the situation develops. The operator also may have to determine whether to stop the train, whether to attempt to mitigate the problem alone (and if so, how), and whether to initiate evacuation (and if so, how to do so as safely as possible). On the scene, the train operator will not have time to try to locate the appropriate page of the safety handbook, but will need to think quickly and accurately. This person may be the only transit representative on the scene for some time, depending on difficulty of access, and the first few minutes of an incident are always critical.

4.3.2 Elements of the Problem

Motivational: Depending on the individual's perception of system priorities, the operator may be motivated to underrate the hazard posed by a given situation in order to keep the train moving.

Organizational: Organizational factors may inhibit accurate situation analysis if they lead to inadequately defined policy or a failure to address safety issues.

Informational: At present, little research on the factors that may impair the train operator's judgment is available. Without such information, it is possible that formulated policies may not take these factors into account.

Educational/Training: An overwhelming majority of workshop participants felt existing training programs are adequate, but over a third said the training is not in place. The existence of a specific policy statement in an operator's handbook cannot be considered adequate preparation for an actual emergency.

4.3.3 Possible Training Approaches

Transit systems should improve training programs for train operators and other key operations personnel. Fire service input on fire and life safety aspects of training is seen as helpful. In addition, refresher training should be offered.

4.3.4 Other Possible Approaches

Research: A study should be made of the training programs and materials currently used to determine how they may be improved.

Coordination: The fire department may be an aid to transit systems, particularly in assessing the fire hazard potential of specific situations.

Materials Development: Case studies and reports on key factors in decision-making, training outlines, and training aids such as realistic video programs to test appropriateness of reaction should be developed.

4.4 EMERGENCY NOTIFICATION

4.4.1 Summary of the Problem

The first few minutes of an emergency are critical ones in which misunderstandings, inappropriate reactions, or delays can quickly escalate danger. Yet, the different jargon spoken by transit Central Control and fire communications personnel can eas-

ily lead to confusion and costly errors. The fire department may not understand the precise nature of the event or its location, leading to delays or inadequate response.

4.4.2 Elements of the Problem

Organizational: The organizational policies of either the transit authority or fire service may be an element of the problem if they clash with the standard procedures and expectations of their counterparts.

Informational: To a large extent this is an informational problem. Neither side is completely familiar with the procedures and terminology of the other. In addition, transit systems often do not hear of problems others have encountered that may be relevant to their own situation.

Educational/Training: Transit systems may not address the specific problem in training, nor do fire departments prepare their dispatchers for distinctive concerns associated with incidents in the rail rapid transit environments.

4.4.3 Possible Training Approaches

Visits of fire department dispatchers to transit Central Control or transit personnel to fire alarm headquarters may be incorporated into existing transit programs, as well as practice dialogues based on recorded internal messages representative of different types and levels of emergencies. Use of familiar words rather than unfamiliar ones will assist in clarity of communication. A useful reference guide in this area is "Teachers Word Book" (Thorndike and Lorge 1944), which lists the 30,000 most common English words used in order of frequency of use. Joint training may be incorporated in existing programs, and in some instances cross training may be advisable.

4.4.4 Other Possible Approaches

Coordination: Clearly, neither side can successfully address potential problems without the full cooperation of the other. Each

needs to learn the routine procedures and requirements of its counterpart to be sure all communication takes them into account.

Materials Development: Each transit system should develop taped dialogues for training session use, vocabulary pretests, reports on notification problems encountered in actual incidents, training program outlines, and joint notification SOP's.

4.5 CROWD AND PANIC CONTROL

4.5.1 Summary of the Problem

The problem of panic in both train operators and passengers during an emergency is a very real possibility. Ordinary duties of the train operator and other key transit personnel do not prepare them to exercise the type of fast, correct thinking required under the heavy stress of an emergency. There is a danger that stress will lead to critical errors that otherwise would not be made. In addition, with large numbers of people packed together in a confined space, the possibility of panic during a rail rapid transit emergency is very real. An understanding of how to prevent panic can hardly be assumed without specific training and practice. Yet, in an emergency the only transit representatives on the scene for several critical minutes might well be the train crew, whose usual job tasks by no means require such skills.

4.5.2 Elements of the Problem

Motivational: Some transit systems feel there is no need for this training if employees are properly prepared to take correct action in an emergency.

Hardware/System Design: Insufficient familiarity with system design, safety features, and emergency procedures can increase stress potential. This element is a factor where refresher training does not occur with sufficient frequency. Furthermore, inappropriately designed access/egress features (i.e., those in which a large crowd may be forced to walk a narrow path or pass through a limited exit) are likely to increase the probability of panic.

Many subways have these features, hence some degree of panic during an emergency may be assumed.

Informational: Workshop participants expressed a need for reliable, tested information on effective panic and crowd control policy and procedures.

Educational/Training: Few transit systems have satisfactory training programs in place to deal with panic and crowd control.

4.5.3 Possible Training Approaches

Two forms of training are needed, first, training for transit system employees on controlling personal stress in emergency situations. Second, training programs for fire service, transit, police, or other agencies with crowd/panic control responsibilities are needed. These programs should be geared to the specific situation and policies of each transit system. Ideally, the training would be based on case studies and other research available to all. Technical assistance from outside agencies or consultants familiar with crowd psychology and panic control techniques is recommended.

4.5.4 Other Possible Approaches

Research: Collect, analyze and share resource materials on stress control applicable to rail rapid transit emergencies.

Coordination: Crowd/panic control policy for each transit system must be agreed upon and publicized for transit, fire service, police or other agencies that might be expected to play a key role.

Information Sharing: A number of different organizations may be expected to have had relevant experiences with crowd/panic control problems and solutions. By sharing expertise and research, crowd/panic control procedures for all concerned agencies may be significantly upgraded.

4.6 FIREFIGHTING OPERATIONS IN THE RAIL ENVIRONMENT

4.6.1 Summary of the Problem

The rail rapid transit environment poses special problems to the fire service, especially in such areas as access for personnel and equipment, orientation, smoke spread control, communications, and safe evacuation. To adequately prepare for their operations, the fire service needs a clear and sufficiently detailed understanding of the problems posed by the particular system design and materials, and the resources provided within the system. Yet, available data are sometimes outdated or incomplete, or may not reach those in the fire department who must be able to act on them.

4.6.2 Elements of the Problem

Organizational: If relevant, updated information is to reach the fire service, there must be organizational channels within the transit system which promote awareness of fire service concerns and regularly pass on appropriate research findings, documents, and updates. Within the fire service, organizational channels must allow information to be digested and effectively passed on to all who might be affected by it.

Informational: Problems arise when pertinent documents, changes in SOP's, and other relevant data are not passed on to the fire department.

Educational/Training: There are often difficulties involved in keeping all concerned personnel updated on procedures and policies for rail rapid transit incidents, even if transit is able to carry out its part in keeping the fire department informed. Often transit incidents are considered less likely to occur than other serious emergencies, and transit-related training may become a lower priority.

Hardware/System Design: An absence of sufficient data on the firefighting implications of system design features, as well as effective use of fire protection equipment, is a key part of the problem.

4.6.3 Possible Training Approaches

While many aspects of firefighting operations will inevitably be site-specific, fire service personnel who attended the workshop were eager to learn from each other's experience. Opportunities were available for fire service personnel associated with the various rail rapid transit systems to exchange problem-solving approaches with counterparts at other transit systems. A workshop that allowed more of this exchange to occur would be helpful whether for the fire service alone or as a component of a transit/fire service conference. An exchange of views on how transit firefighting can best be incorporated into existing programs would be an important part of this exchange.

4.6.4 Other Possible Approaches

Research: Through case study collection and analysis and other information collection activities, it should be possible to benefit from past experience and pool valuable tips for effective firefighting operations that would be pertinent to all departments.

Coordination and Information Sharing: On a site-by-site basis, it is important that fire service and transit personnel exchange information and concerns. The fire service should work at making transit aware of its operational procedures and requirements. Transit should clarify how its equipment may best be used, and make data available concerning the system operation, materials, smoke movement options, and other information that will aid the fire department in completing a workable plan.

4.7 JOINT EMERGENCY SIMULATION DRILLS

4.7.1 Summary of the Problem

Transit system personnel who may be involved in responding to a transit system emergency often may have little idea of how the fire service would address a given emergency or how transit personnel could best assist the fire service. Likewise the fire service may not be aware of how transit system personnel would

respond. Without an understanding of the responses of both organizations, there is concern that their response could inadvertently compound the emergency situation.

4.7.2 Elements of the Problem

Organizational: Unless top management of both fire service and transit are committed to the principle of careful planning for coordinated emergency response and willing to devote time to it, organizational problems will contribute to the emergency. In addition, the operational requirements of any transit system to keep service running, make it difficult to find time and space for realistic practice drills in which coordination problems could be discovered and corrected.

Hardware/System Design: Any of the many complex components of a rail rapid transit system may have a significant impact on fire service operations. The type of fire protection equipment, access/egress provided, materials, system design features and control mechanisms for systems such as power and ventilation all pose potential problems unless there is some form of coordinated preparation for response to an emergency situation.

Educational/Training: In some cases, present training programs offered by transit and fire service appear to focus exclusively on internal SOPs, often without giving an adequate picture of what other groups will be doing and what coordination needs will arise.

4.7.3 Possible Training Approaches

It does little good for management to agree on coordination procedures if all personnel involved in implementation are not prepared to carry them out. Full scale drills are certainly essential to ironing out problems in the plan, and post-drill joint debriefings may lead to additional improvements. However, it may be generally impractical to expect drills to be held with the frequency and scope needed to serve a true training function. It is more likely that simulations will highlight some areas in which

smaller-scale joint practice or independent training programs on a regular basis will improve performance in specific task areas. Also, a well-planned and edited taping of the simulation, with stop-points for focused problem-solving discussion, may provide an invaluable training tool for new employees or others who did not participate in the drill itself. Ideally, a fire service representative would be available for clarification during the transit training and vice versa.

4.7.4 Other Possible Approaches

Research: Analysis of the interaction of transit and fire service personnel in actual incidents, or to a lesser extent simulated incidents, would help to identify potential problem areas. These case studies could be used in training programs and coordination sessions as the basis for the problem solving activities. Also, each transit system will need to collect, analyze and share joint SOP's to identify potential conflicts and plan for more effective support.

Information Sharing: As mentioned above, SOP's must be traded, carefully read, and discussed. In addition, it is important that both sides have an effective channel for communicating changes in equipment, personnel, or plans that could affect coordination requirements.

4.8 SUMMARY OF POSSIBLE TRAINING APPROACHES

The workshop, "On Track to Fire and Life Safety in Rail Rapid Transit," was the first time that a national audience of senior-level fire service and transit representatives had gathered in a cooperative, nonthreatening setting to discuss a wide range of issues concerning fire and life safety. This excellent audience produced the seven areas where improvements in training are necessary to insure a continued high level of safety in rail rapid transit. These areas are summarized in Table 4-1.

TABLE 4-1. SUMMARY OF TRAINING IMPROVEMENT PROBLEM AREAS

Training Area	Training Audience
Training in the Basics of Fire Prevention and Firefighting	Transit
Emergency Plan Design	Transit and Fire Service
Situation Analysis and Mitigation	Transit
Emergency Notification	Transit
Crowd and Panic Control	Transit and Fire Service
Firefighting Operations in the Rail Environment	Fire Service
Joint Emergency Simulation Drills	Transit and Fire Service

The most common elements contributing to these problem areas were organizational and informational failures. The organizational networks of both the transit system and fire service often failed to provide continuing training in fire fighting and life safety procedures. In addition, the transfer and sharing of information could be improved in terms of fire and life safety information needs.

Other elements of the problem areas included motivation and hardware/system design. Transit personnel are not always motivated to pay sufficient attention to fire and life safety concerns. In addition, the unique hardware and system design elements of a subway system contribute to the difficulty of insuring safety in the rail rapid transit systems.

In each of the seven areas of concern, possible training approaches have been identified as potential solutions to the problem. These possible training approaches include specific programs for both transit and fire service personnel on different aspects of firefighting in a subway environment, national or regional workshops where systems can share experiences and information, formal

lines of communication between transit and fire services, and joint emergency simulation drills.

Other possible nontraining approaches to the problem areas include research on fire and life safety issues, better coordination between transit and fire safety personnel, more information sharing among transit systems and fire departments, and the development of more relevant training materials.

5. CONCLUSIONS AND RECOMMENDATIONS FROM THE WORKSHOP

5.1 CONCLUSIONS

An analysis of the evaluation questionnaires completed by the 76 workshop participants shows that both transit and fire service representatives considered it a success. Table 5-1 summarizes the participant reaction to the workshop.

TABLE 5-1. PARTICIPANT REACTION TO THE WORKSHOP

Criteria	Percent of Participants Satisfied
Worth of the Workshop	
Met Expectations	93%
Ability to do a better job as a result	97%
Improved Fire/Transit Relations	98%
Content and Format	
Pace and Length	72%
Format and Content	79%
Media Presentations	80%
Small Group Exercises	83%
Small Group Discussions	85%
Spotlight Presentations	90%

Detailed participant comments on each of the workshop sessions are contained in Appendix C.

It was evident from both transit system and fire service participants that the continued discussion between these two organizations was essential and would greatly enhance their respective responses to an emergency situation. Furthermore, the implementation of the fire and life safety training needs identified by the participants should be guided by representatives of the transit systems and fire service. With this knowledge, the UMTA Fire and Life Safety Education and Training Committee was established

as shown in Figure 5-1. This committee will be responsible for the selection of the transit and fire service personnel necessary to assist in the implementation of the training needs identified in the workshop. The personnel participating in this implementation process will include the following:

- Urban Mass Transportation Administration
- Transportation Systems Center
- Federal Emergency Management Administration (National Fire Academy)
- American Public Transit Association
- Key representatives of transit systems (approximately six members)
- Key representatives of fire service (approximately six members)

The committee will be chaired by the Director of the UMTA Safety and Security Staff.

5.2 RECOMMENDATIONS

To plan and coordinate followup activities, it was recommended that UMTA proceed to convene the Fire and Life Safety Education and Training Committee. The transit system and fire service representatives on the committee should be drawn from the workshop participants. This committee should then meet quarterly to identify and develop methods for implementing the training needs identified and to monitor the progress of the implementation effort.

Additional recommendations to facilitate the sharing of information are as follows:

- Establish a Transit Fire and Life Safety Training Resource Center to serve as a central repository for training and technical resource materials.
- Publish an information bulletin on fire and life safety issues. This bulletin would be circulated to the combined transit and fire service community and would report on the efforts of the UMTA Fire and Life Safety Training Committee.

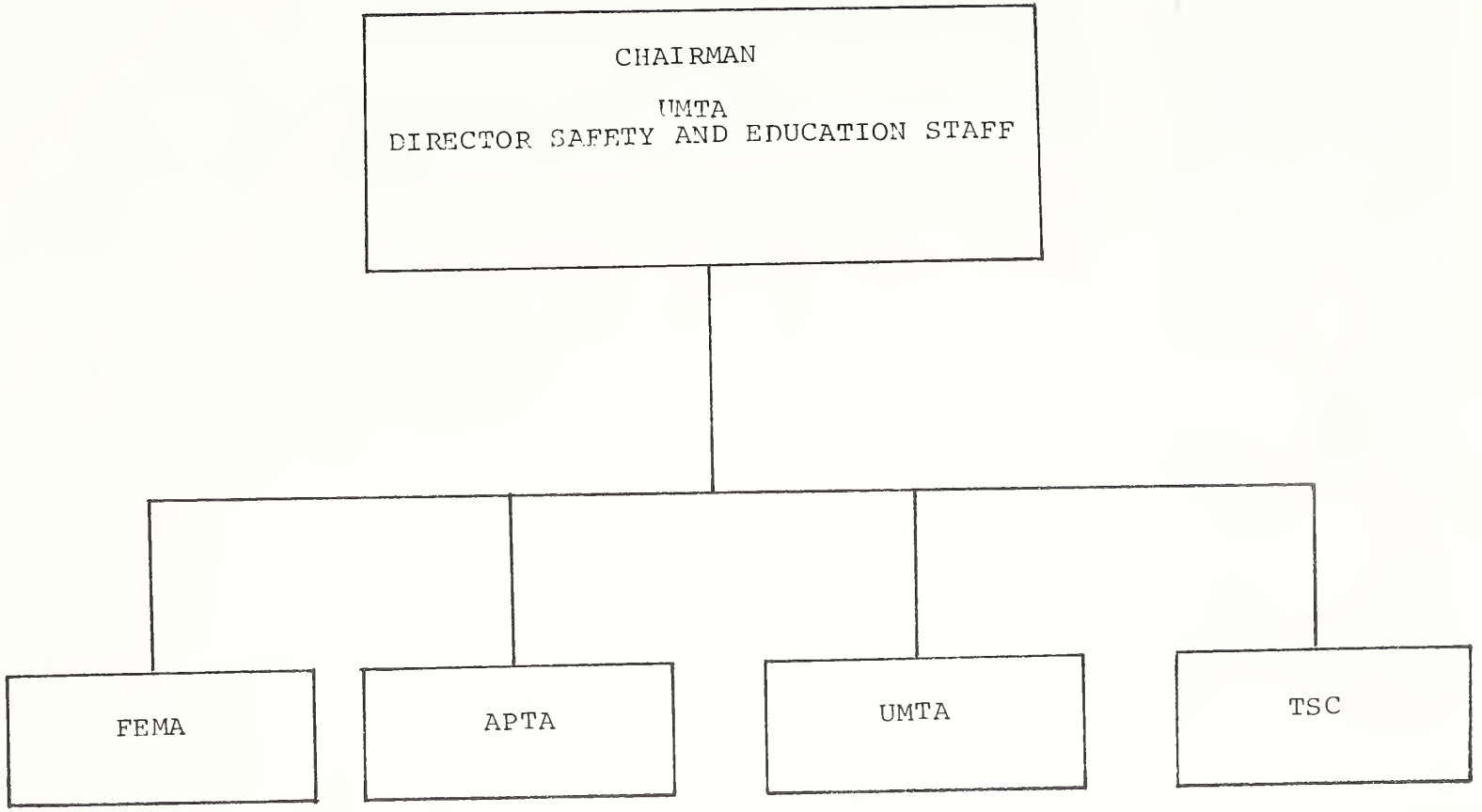

FIGURE 5-1. UMTA FIRE AND LIFE SAFETY EDUCATION AND TRAINING COMMITTEE

- o Disseminate pertinent fire and life safety research efforts and reports to the fire and transit safety community. As an initial effort, this report should be distributed to all workshop attendees with a request for written comments.

- o Develop specialized workshops to further define specific training development objectives such as a workshop sponsored by UMTA and FEMA to review the implementation of the Emergency Preparedness Guidelines.

6. REFERENCES

1. "Safety Effectiveness Evaluation of Rapid Rail Transit Safety," National Transportation Safety Board, Washington DC, January 1981, NTSB-SEE-81-1.

2. "Identification of Fire Threat in Urban Transit Vehicles," U.S. Department of Transportation, Urban Mass Transportation Administration, Washington DC, June 1980, UMTA-MA-06-0051-80-1.

3. National Transportation Safety Board, op.cit.

APPENDIX A

ON TRACK TO FIRE AND LIFE SAFETY IN RAIL RAPID TRANSIT

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APPENDIX B

WORKSHOP AGENDA

Monday, August 2

0830 Registration **(Admiralty Foyer)**

0930 Opening Session **(Farragut Room)**

- Welcome (Joseph L. Donovan, Superintendent, National Fire Academy)
- Introductions (Edward M. Wall, Deputy Superintendent, National Fire Academy)
- Keynote Remarks (Lloyd Murphy, Chief, UMTA Office of Safety and Security)

1030 Break

1045 Warmup Activity **(Conference Rooms 104, 204, 304, 404)**

- Theme: Fire Service/Transit Interface: Requirements for Understanding on Both Sides.

- In small groups, participants will discuss fire and life safety information needs from both the fire service and transit perspectives. Groups will suggest training that can help meet these needs and promote understanding and productive exchange.

1200 Luncheon **(Decatur Room)**

1300 Session A: Prevention, Detection, and Notification **(Farragut Room)**

- Theme: Prevention of fire/life safety problems through dialogue and training during system design. Identification of information and training needs related to fire prevention. Identification of human component and training needs in detection and notification systems. Identification of requirements for clear initial communication relating to an incident.

- Following a brief introductory presentation on the total system approach to fire prevention in rail transit, participants will break into small groups for discussion of key issues and concerns related to fire prevention. Groups will suggest types of fire prevention information exchange and training needed by fire service and transit personnel.

1445 "Spotlight" Presentations **(Farragut Room)**

- Bay Area Rapid Transit (BART) Vehicle Fire-Hardening Program.

- Status of NFPA Standard 130 for Fixed Guideway Transit Systems.

- Montreal's Detection and Notification Training Program for Transit Personnel.

1515 Break

1530 Session A: Continued **(Conference Rooms 104; Dewey I, II, III)**

- In small groups, participants will identify training problems and needs associated with detection and notification. Discussion will be reinforced by two group mini-exercises.

1700 Adjourn

1730 Reception **(Decatur Room)**

Tuesday, August 3

0830 Session B: Emergency Evacuation **(Conference Rooms 104; Dewey I, II, III)**

- Theme: Recognition of key factors in effective emergency evacuation. The emphasis is on anticipating the effects of human crisis response and "Murphy's Law," and on recognizing the role of training in effective decisionmaking.

- Meeting in small groups, participants will analyze factors that can facilitate rapid evacuation from a transit tunnel emergency. Groups will identify areas where coordination and training are needed.

1000 Break

1015 Session B: Continued **(Conference Rooms 104; Dewey I, II, III)**

- Small groups reconvene for further discussion of training needs associated with evacuation.

1130 Concurrent Spotlights

- Film: "Fire Down Below," **(James Room)**
  NYCTA training film on dealing with panic situations in subway fires.

- Demonstration: BART Automated Emergency Response System (AERS) **(Farragut Room)**

1200 Luncheon **(Decatur Room)**

1300 Session C: Fire Suppression and Rescue **(Conference Rooms 104; Dewey I, II, III)**

- Theme: Identification of appropriate training to facilitate fire suppression/rescue efforts.

- Small groups complete a cross-role decisionmaking activity designed to develop an awareness of transit and fire service needs for effective fire suppression and rescue. Returning to their real-life roles, groups then critique choices made by the other side.

1445 Break

1500 Session C: Continued **(Conference Rooms 104; Dewey I, II, III)**

- Groups respond to critiques, discussing factors in fire suppression/rescue not identified in the initial decisionmaking exercise. Participants identify training needs for effective fire suppression/rescue and discuss training currently being conducted by transit systems and the fire service.

1700 Adjourn

1730 Concurrent Spotlights (optional)

- Film: "PATHway To Safety" **(James Room)**
- Demonstration: BART Automated Emergency Response System (AERS) **(Farragut Room)**

1800 Tour of Washington METRO station and tunnel (optional).

Wednesday, August 4

0830 Session D: Emergency Planning **(Farragut Room)**

- Theme: How to coordinate emergency planning.
- After a general session featuring two "spotlight" presentations on emergency planning, participants break into small groups for discussion of comparative means of developing, documenting, and disseminating plans.

1000 Break

1015 Session D: Continued **(Conference Rooms 104; Dewey I, II; James)**

- Small groups analyze information and training needs related to key points in emergency incidents.
- Participants compare how needs related to emergency planning—information exchange, backup, coordination, training, and ongoing communication—are currently being met in various cities. Groups also discuss ways to meet these needs more effectively.

1200 Luncheon **(Decatur Room)**

1300 Wrapup Session: Planning to Meet Training Priorities **(Farragut Room)**

- Spotlight presentation on May 23 emergency simulation exercise conducted by Port Authority Trans-Hudson Corporation (PATH). Question and answer session follows.

1400 Wrapup Session: Continued **(Conference Rooms 104; Dewey I, II; James)**

- Participants break into small groups (composition is changed). Each participant reviews and categorizes a list of training needs identified in each workshop. Discussion ensues on directions to be followed to address training needs. Participants complete workshop evaluation forms.

1600 Closing Activities **(Farragut Room)**

- Participants reconvene in general session for closing remarks and presentation of Certificates of Appreciation.

1630 Adjourn

APPENDIX C
COMMENTS ON WORKSHOP SESSIONS

Prevention/Detection/Notification Session: Benefits

Fire Service Comments:

- Recognized the need for understanding each other's terminology.
- A chance to participate in exchange of ideas between fire service and transit from various areas.
- Pretty well covered—detection, notification, prevention. Showed emphasis on fast communications to fire department.
- Good interface between old and new existing systems. Moderators maintained some control and preplanning was evident.
- Provided me with new ideas and information that can be utilized to improve our present procedures.
- The detection/notification phase was very important. It disclosed many weaknesses in our present thinking.
- Good to excellent exchange of information.
- This session brought out the great need for communications between the different agencies involved in rapid rail transportation.
- We are in the design and construction stage of an LRT system. The workshop provided much beneficial material to help me to meet with transit people to have and maintain a life safety operation.
- Provided an in-depth understanding of problems related to transit and the fire service—then provided direction as to means and ways for improvement.
- Brought out the need for a closer working relationship with transit people.
- I have learned of many problems of the transit people that I was not aware of.
- Detection portion was quite interesting, particularly with systems that have a lot of automatic detection equipment because of number of false alarms—to the point where many are ignored for periods of time.
- Not aware so many systems available within most transit systems.
- Started with very little knowledge—learned quite a bit.
- It gave me a better understanding of transit statistics and problems.
- I do not have much experience in this position. This has been beneficial to me.

Transit Authority Comments:

- Good points were outlined and the experienced people from other towns helped.
- Discussion exchange helpful. Baltimore description good.
- Although I have prior knowledge of this subject matter it was presented in a manner which would have benefited a layman.
- I have some knowledge, but some explanations were very enlightening.
- Fire service input improved perspective.
- It was well thought out and quite effective. (Same comment for other sessions.)
- Good response and exchange of ideas between transit and fire department personnel. Comments from participants were useful in learning what other properties and departments are doing and why. (Same comment for other sessions.)
- Good discussion with fire departments on the subject—good spotlight presentation.
- Refreshed my memory in past experiences in these areas.
- Good discussions.

Prevention/Detection/Notification Session: Suggestions for Improvement

Fire Service Comments:

- Needs better structure.
- Time constraints—confusion on areas under discussion.
- Possibly one more day for further discussion.
- Goals and objectives were not clearly defined. (Same criticism offered for other sessions.)
- Would have liked to have had time to see other types of transit notification plans.
- Left the track on many occasions.

Transit Authority Comments:

- Excellent topic, session too short and pace fast. (Same comment for other sessions.)
- Most of what was explained is already known and implemented on our system. (Same comment for other sessions.)
- Many of the issues are already in place or were known to me.

- More time could have been spent in notification and more time should have been spent in areas of prevention, an area which lends itself to training.
- OK, but lacking in detailed training on fire service technology techniques. Same vice versa, I'm sure.
- Information was primarily related to systems with different problems and situations--could not transfer info to our organization.
- More time needed to delve into this.
- Group session—need for small size working groups to develop scenario. This will permit a variety of situations in a short period of time.
- Not enough emphasis placed on training and reaction of train operators. Too much emphasis placed on roles of controllers and dispatchers.

Evacuation Session: Benefits

Fire Service Comments:

- Moderators got people interested in discussions.
- Good interface between old and new existing systems. Moderators maintained some control and preplanning was evident.
- Exchange of information and technical concerns with problem-solving techniques.
- Centralized discussion on role of transit personnel during evacuation proved enlightening.
- Good understanding in regard to each side's problems during evacuation above and below grade.
- Provided first-hand knowledge as to those problems associated with evacuation.
- Discussion of problems relating to crowd control and importance of calming passengers was interesting and informative.
- Slight increase in knowledge.
- Gained new ideas for methods of removing injured.
- I learned the problems are similar in many areas.

Transit Authority Comments:

- It was beneficial to learn how other properties conduct evacuation.
- We are working on an evacuation plan and were very impressed.

- Discussion illuminating between participants—format OK.
- Role playing exercise was excellent. Important question of evacuation of the elderly and handicapped was raised but was not resolved. Work on this specific topic needs to be done.
- Good discussion on possible error (Murphy's Law).
- Raised some good benefits and ideas that will be adapted.
- Helped in understanding the problems encountered in this area.
- Problems of both transit and fire service well understood.
- Playing the scenario forces both parties (transit authority and fire department) to realize that each one has its own problems.
- Helpful exchange of information. Good presentation.
- General subject matter—well covered.
- Good discussions of alternative scenarios and planning—applicable and useful.
- Good first attempt—with improvement will become better.

Evacuation Session: Suggestions for Improvement

Fire Service Comments:

- Still have questions on best order of operation or procedures.
- Was not specifically addressed.
- Routine
- Not much stated, in my opinion, for evacuation, type of evacuation, occupant content of stations, exits, type or means of egress, units of exit width, travel distance, etc. (much more discussion needed).
- Believe this to be a most important item and more time should be devoted to it.
- Sessions seemed to get a little too hypothetical, and we never did get our people evacuated.
- It is my opinion that the workshop did not go deep enough into evacuation problems, crowd control, and panic situations.

Transit Authority Comments:

- Could have addressed development of written SOPs more. Session could be extended.

- There were different approaches discussed which had some common interest. However, site specifics had to be considered.

- This discussion did not bring the various properties closer in agreement on passenger information provided during an evacuation.

Fire Suppression/Rescue Session: Benefits

Fire Service Comments:

- New insights on modes of rescue and problems of extinguishment.

- Seriousness of time for responses explained well. Also equipment used. Communications of agencies.

- Good interface between old and new existing systems. Moderators maintained some control and preplanning was evident.

- Stressed system design, major criteria so we don't get stuck putting in systems afterwards. Good to look at other views.

- Problem solving and communication exchange.

- Good understanding provided through first-hand descriptions of actual fire/rescue situations.

- Information obtained from larger departments who have established systems was beneficial. Cities without established systems can offer very little on this topic.

- Transit authorities weren't aware of fire departments problems generally—awareness seemed to come about by the end of the session though.

- Put us in transit's position from the designing stage. Also looked at it from their standpoint and also discussed options in ways to evacuate and ventilate. Kept the interest of everyone—made us think and consider alternatives.

- Know better how to approach our new system.

- I know now that many problems are unique in different areas.

- Enjoyed designing a system with reversed roles.

Transit Authority Comments:

- Fire service and transit folks learned a great deal about each other's motivations and attitudes.

- Transit authority personnel gained an understanding of fire service procedures and concerns.

- Able to see/appreciate the fire department's point of view via role reversal. Will be able to discuss with our fire department (in attendance).
- I believe I learned a great deal about the problems faced by fire service personnel.
- Added perspective from fire service.
- The role playing raised issues I had never before considered.
- It was good to get the other side of the problem to deal with.
- Enabled me to better understand these areas from the viewpoint of the fire bureau.
- Interesting session with beneficial sections.
- Exchange of information between transit and firefighters was very interesting.

Fire Suppression/Rescue Session: Suggestions for Improvement

Fire Service Comments:

- Need definitive structure.
- Not enough discussion time was available on this subject. Fire departments should have been given time to review other fire department's fire suppression and rescue techniques and procedures for future training purposes.
- Routine—argumentation.
- A lot of redundant talk.
- More discussion needed, especially from fire service. I personally heard very little relating to rescue in detail.
- I gained no new knowledge.
- Time not permitted to think it over and debate. Know what to do prior to fire situation.
- Didn't allow enough time to formulate good procedures.
- Discussion format not conducive to effective exchange of comments.

Transit Authority Comments:

- It would have helped for fire service to have a way to understand our need to continue moving trains.
- Visual aids needed and better use of scenarios.

- There were some differences in the area of fire suppression by transit employees that I did not agree with. Fire suppression should be for the most part a fire department function.

- Group focused on design problems, not subject. Role playing not executed very well.

Emergency Planning Session: Benefits

Fire Service Comments:

- Better understanding of total picture concept to utilize available means for meeting goals.

- Good. The need for cooperation between agencies brought out.

- I have been remiss in some areas of emergency planning. This has really opened my eyes to areas not previously considered.

- Various excellent points to prioritize necessary for planning.

- The workshop identified many of the emergency planning training needs.

- Spotlight presentations preceding this session were very informative and appropriately scheduled.

- The committee established a good workable program for our department to use.

- Provided many examples of methods and/or emergency planning procedures, pointed out the need for documents produced jointly by fire and transit to ensure adequate operational procedures.

- Very good coverage.

- Gained some great ideas for redeveloping emergency plan.

- It has given me many ideas to take home and develop.

Transit Authority Comments:

- It proved that we need drills.

- This exercise demonstrated a continuity of thought when our group was broken up and we both returned with similar proposals.

- Very informative.

- Able to take many ideas from this workshop and apply them within the planning of (my system).

- Identified additional planning requirements.

- All participants agreed that emergency planning is a must. This is something that transit systems did not consider a decade ago.
- The best one—on account of the very good spotlight presentations.
- Brought out some new ideas in emergency planning.
- I picked up new ideas and/or innovations from these sessions.
- Helpful in emphasizing need for extensive planning.
- Robert Pawlak paper was excellent.
- Produced a product, focused discussion on one objective.

Emergency Planning Session: Suggestions for Improvement

Fire Service Comments:

- Outline format not followed by moderators. Poor control and preplan.
- More knowledge needed.
- Session I was involved in turned into a forum for people who liked to talk but said very little that was relevant to this topic.
- We never agreed as to what should be part of Emergency Planning—more input needed by both agencies.

Transit Comments:

- The exercise was a bomb. A general discussion on emergency planning would have been better.
- Pawlak paper good—discussion format poor for effective discussion.
- The moderator killed effective communication by wanting to inform the group of his ideas on what those present should be doing.
- Refinement needed in use of aids.
- Covered too fast—not enough open discussion. One-sided.
- Lack of direction from moderator contributed to a lot of confusion, although teams came up with good results.
- Not nearly enough time to exchange ideas.
- Need for work session—with role playing.

- Concerned itself primarily with properties not yet in operation. It was interesting but of little use to old existing properties.

Transit/Fire Service Relationship: Benefits

Fire Service Comments:

- A much better understanding of fire service problems in other areas. Will try to be more open to transit authority problems.
- My participation in the workshop will improve my relationship with the transit system. The reverse role exercise showed need to recognize the other agency's problems, and the key problem to both is funding.
- I now have a much greater understanding of what has to be done in case of an emergency within a transit system—I feel that the transit system needs the fire department immensely.
- Helped to better understand the transit system's problems.
- Understand the transit authority's needs and functioning in times of emergencies, and planning for them.
- Better cooperation, closer ties.
- Better understanding of transit/fire common problems.
- Much more insight to other system problems. Also how good our relationship is with our transit agency.
- Better idea how transit people place their priorities.
- Better understanding as to how they view us.
- Have got to know transit officials better and understand their problems.
- Although an excellent relationship presently exists, exchanging concerns affords us the opportunity for greater understanding.
- It was very enlightening. The dialogue between both services was very informative. Also, the dialogue between fire members helped me get some new innovations that I will implement soon.
- Coordination and cooperation.
- I recognized that the newness of this type arrangement would not produce a panacea for transit and fire personnel. It did, however, oblige us to listen to each other's point of view and clearly enlightened many of the participants.
- I feel that I've learned what must be done is to continually press through my own organization the need to address public safety transit issues. If I can be successful and my counterpart on the transit side can influence his organization's conceptions, then success will most surely follow.

- A breakthrough in dialogue by both agencies in the group that I participated in.
- Understand the problems of both fire and transit agencies better and will be able to understand the operations better.
- Found a need for better communication between the agencies. Training between two parties needed and also ideas and recommendations are needed and evaluated procedures have to be acted on in shorter time than what has been done in past.

Transit Comments:

- Better understand the motivations and attitudes of fire service and transit resources.
- It is always good to hear the "other guy's" point of view in a neutral, constructive environment.
- I have a greatly improved appreciation of roles of fire departments; it was evident that other fire departments benefited likewise.
- Better recognition of mutual problems.
- I observed a growing understanding between transit properties and the fire service as the session progressed. By Day 3 the transfer of information was noticeable as the participation had increased.
- I believe that the safety officer will better understand the role of the fire service and their impact on the operation of the transit system, and he will better understand my perspective of my own position within the safety office function.
- This workshop explains the problems encountered between fire service and transit so as to help better understanding.
- Being more aware of the others concerns, understandings and problems. Should be able to assist fire department with additional familiarization and safety information.
- Developed interrelationship with fire service personnel. Created better understanding. (Better able to recognize fire service needs.)
- It gave me insight into how the fire department thinks.
- It allowed me to witness the degree of understanding that exists or doesn't exist with other properties and fire service and, during the workshop, to see these forces grow in their understanding of each other. It gave my fire service a better understanding of transit and helped give me a better understanding of fire service problems; this makes my job easier.
- Probably the one most important benefit was that for future contacts—i.e. transit/fire department—a voice on the phone is associated with a face and the rapport should be much better and the results more beneficial.
- First time for face-to-face transit authority-fire department discussions on so many subjects.

- Will alleviate a great deal of animosity from the fire bureau.
- I believe both of us gained more insight into each other's views. I have a much better feeling for the priorities and attitudes of the firefighting forces.
- Joint attendance of transit and fire officials, same city, kicked off a better local relationship.
- Better understanding of fire service; made contacts that will be helpful in the future; all interaction is helpful in working toward solutions and common ends.

Training Benefits:

Fire Service Comments:

- Will be most helpful to aid through formulating our training requirements prior to our system going into operation (1986).
- Improved job performance without any doubt. This workshop provided indepth knowledge that can be adapted to any system training procedure.
- As the officer on the fire department responsible for liaison with the transit authority, I will be proceeding with both our own training division and the transit people to reinject some more dialogue and energies into combined training exercises.
- I will work to improve the fire department training program.
- The experience I gained here will allow me as training officer to plan and train our people in rail emergencies.

Transit Authority Comments:

- This meeting brought the fire department closer to the transit authority, knowing that the training is available to them—even though we notify them of the training needs.

Other Workshop Benefits

Fire Service Comments:

- Gained a better understanding of other systems and their workings.
- I got to find out what other cities are doing, and how incidents have changed procedures as our city has from experience.
- Didn't realize the many aspects of a mass transit rail system. Learned a lot that will help me understand and appreciate the complexities involved.
- Contact with numerous and varied transit and fire personnel.

- Many of the points covered over the last three days have certainly jogged my thought process; although . . . we have an excellent relationship with the (transit agency) we have been ignoring some areas that we should be concerned about.
- I now have a better understanding of industrywide problems.
- Allowed exchange of problems and ideas with multiple agencies.
- Better working knowledge of common problems.
- Gave great chance for cities to exchange ideas.
- Through exchange of methods picked up new ideas.
- Exchange of information, problems, and similar activities and trends.
- I came for ideas to bring back to my fire department and got not only ideas but insight into other's problems.
- A better understanding of our transit authority's problems, which are not unique—we will all benefit from exposure to universal problems.
- Increased knowledge of transit operation. Expanded peer group.
- I now have a better understanding of rapid rail systems.
- Able to better understand needs of fire/life safety in the transit system.
- At this time I have a better overall picture of other parties' involvement.
- Also, understand better the rail system and how it works—from mechanical to procedural.
- A good exchange of information—greater awareness.
- Gained ability to measure my effectiveness in comparison to others.
- The workshop improved my understanding of transit problems and gave me the opportunity to discuss similar transit emergency problems with other fire departments. This was a first for the fire service to be included into a national rail safety workshop. I intend to pass on to the jurisdictional fire departments, as well as my own fire department, the information and training needs identified here at the workshop. I shall copy and distribute to the fire departments the list of training needs developed during the workshop. I shall increase communications to fire departments serving other rapid transit systems to increase the exchange of ideas and procedures.

Transit Authority Comments:

- Gained better understanding of how others perform like functions.
- I have not been deeply involved in this area before and this has been a real education.

- Learned about other transit/fire procedures and problems.
- Needs were identified and good, positive communications were encouraged.
- My expectations to gain insight into fire department problems and how authorities have addressed them were met. I believe I have a better understanding of what can reasonably be included in system design.
- I have fire service and transit service experience and I could relate to both sides. I have made some good contacts and I intend to exchange information with them.
- It gave existing systems a chance to relate some of the problems they have had, which new systems will benefit from. It also gave existing systems information on the technology being put into newer systems. I think everyone benefited from it, and it was what I expected.
- I was able to retain insight from other cities on their opinions and reasons.
- I picked even more ideas from other properties and/or personnel than I had originally anticipated.
- It gave me an opportunity to meet and exchange information with others.
- Experiences of other properties and information presented served to trigger review of "How we do it today."
- New input from other properties and better understanding of fire control needs.
- A number of areas of my work will be improved due to discussions at meeting. I was very pleased with all we covered in three days.
- Better understanding of need for emergency plan.

Some Workshop Applications

Fire Service Comments:

From cities with developing systems:

- We are in the process of building an LRT system and gained a great deal of knowledge in transit operation.
- We are building a new system due to be put in service in 1984. I will research what I have learned and incorporate in our fire department. Fire codes, preplanning, system design, fire hazards, control, improve, change where need be.
- Being in the design stage, I appreciate the exchange of ideas and insight into potential difficulties.

Transit Authority Comments:

- My transit property will experience an increased awareness of the need for professional fire protection and life safety planning and policy development.
- Several areas of improvement in various joint and in-house programs will be realized.
- I have obtained information that will make our system better; and by implementing some of this information, my job will in turn be easier to perform.

Topics On Which Additional Information or Programs Are Needed

Fire Service Comments:

- Always need additional information—results of this workshop—future workshops, possibly a little more structured.
- Critiques on actual incidents.
- What special health and stress factors does this type of construction present that is different from known stress and hazards to present-day firefighters.
- Safety design features that are now available. Ventilation control information.
- Technical information on car construction and types in use.
- Design criteria.
- More information on any and all rapid rail fires that are informative to help assist any fire department to resolve future problems.
- Being new to these different situations in rapid transit, I feel I need more training or information on rescue and evacuation and more understanding of transit language.

Transit Comments:

- Panic control—a national program should be developed and implemented.
- Crowd control in various emergency circumstances.
- Operational procedures and plans.
- Stress management, passenger training.
- Accident investigation and evaluation.
- Presentations of actual incidents where emergency evacuations and firefighting had taken place on a cross section of properties.
- Construction of vehicles. Fire protection and fire detection of vehicles.

- Maintenance of inplace systems.

Types of Followup Suggested

Fire Service Comments:

Workshops and Courses

- More courses—seminars, annual meetings, workshops, etc.
- Workshops and courses—published bibliography, previous case studies, etc.
- Future workshops and available information; hands-on type programs.
- I will contact my transit authority representative to discuss. Please continue this type of workshop or conference to bring us together to solve our problems.
- I believe this dialogue between fire and transit services should be encouraged with future workshops. We can all use additional information on most topics that were covered in this workshop.
- Courses to be developed by National Fire Academy with all data received from these workshop sessions.
- Would hope this workshop provided a constructive base for continuing related information.
- Future workshops.
- Same type of seminar on regular basis.
- Training on fire/transit emergency communications. Training on fire/transit video taping techniques. Training on organizing liaison meetings and solving interagency problems. Training on the investigation of fire and accidents on transit properties. Training to overcome fire/transit language barriers. A national fire/transit committee should be established to provide information and guidelines to assist in training all transit systems new and old, as well as future ones.
- Fire service should have time (workshop) to exchange ideas and find out what our needs are. Discuss these ideas to eliminate problems between some departments involved with same transit agency.

Other Suggestions

- Tours of different systems and first-hand conversations with chiefs and line officers who respond to rail emergencies.
- APTA meeting with fire departments. APTA to provide bulletins and directives etc. to fire service. APTA to assist coordination of fire service and transit activities.

Transit System Comments:

Workshops and Courses

- I was under the impression that we would swap information from other fire departments and transit authorities to come up with a uniform training program for fire departments.
- Once the dust settles and training topics are definite, a second session of fire service and transit authority folks should be held. A second meeting could develop actual course outlines.
- Suggest future conferences between rail transit, fire services personnel. May want to change format to optimize exchange of information on preselected subjects—perhaps more "papers" submitted.
- Future meetings with local fire officials and some program development by UMTA.
- Future workshops with more detailed training on both sides.
- Future workshops.
- Reduce number of sessions and hold workshops quarterly.
- Future workshops designed with the assistance of all who attended quarterly workshops with reduced number of topics.
- Continue meeting with cross pollination for valuable input from various properties and organizations.
- See great potential to get further past the getting acquainted stage.

Other Suggestions

- A copy of the final report on the workshop should be distributed to all participants.
- Workshop report copy.
- Need feedback re: analysis of information generated. Update attendance list to all attendees.
- List of resources available for training.
- Think a followup after comments are received and evaluated might be beneficial to further develop some of the best ideas.

Suggestions For Improvements or Additions in Future Workshops

Fire Service Comments:

- In future one workshop should be set aside to let fire people interface with each other to discuss both problems and solutions already arrived at.
- More time should be devoted to the fire service officers of the various communities present. Separate sessions should be held for these agencies.
- More "hands on" information and training.
- Suggest use of lesson plans and exercise involvement.
- Confined groupings—not aware of many (other) fire department(s) and transit (systems).
- More of an explanation of handouts (workshop books).
- I would have liked to have had the opportunity to get deeper into fire/transit problems with more discussions with other fire departments and transit authorities for exchanging ideas and experiences on past emergencies.

Transit Agency Comments:

- A bit too structured. A block of free time (1-1/2 hours) each day would allow for one-to-one discussions.
- The concept for the workshop is excellent. The execution was poor. If role reversal and role playing are to be employed they should be employed in a highly structured environment and not with a "rag-tag, let's wing it" environment. The discussion topics should have been met "head on" by each side with the session moderator in full control.
- Learned a great deal, but would have liked to get a more comprehensive summary or inventory of experience from all of the participants.
- The sessions were too short and pace had to be fast.
- Content good but Tuesday was very full day, when WMATA tour is included.
- Arrange for proper room size re: group size; schedule for last day of meetings should consider travel arrangements of participants. Recommend 2:00 p.m. end of session.
- Evaluation form could have been distributed at start of workshop for better evaluation of individual sessions and conference leaders.
- Eliminate repetition.
- Small groups were too big—should limit to 8 to 10 people for more effective interchange.
- Seemed disorganized; significant time wasted in moot issues.

Other Comments

Fire Service Comments:

- My first workshop—did not know exactly what to expect. Enjoyed it and feel I benefited and as a result my department will benefit.
- In meeting face to face, transit and fire people realize that discussion eases many tensions and helps to create understanding.
- Any time I can exchange any ideas, learn from others, see my mistakes as well as know that what I am doing is correct, I'll buy that.

Transit Authority Comments

- Excellent choice of hotel.
- Offered opportunity to focus exclusively on topic with key and experienced people without distraction.
- Personal exchanges and discussion participation made experience very worthwhile.
- Topic selection was excellent and the selection and quality of the moderators excellent also.
- Workshop was an excellent step forward in an area neglected for decades due to various other priorities.
- Organization and content of entire meeting were great! Thanks!

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