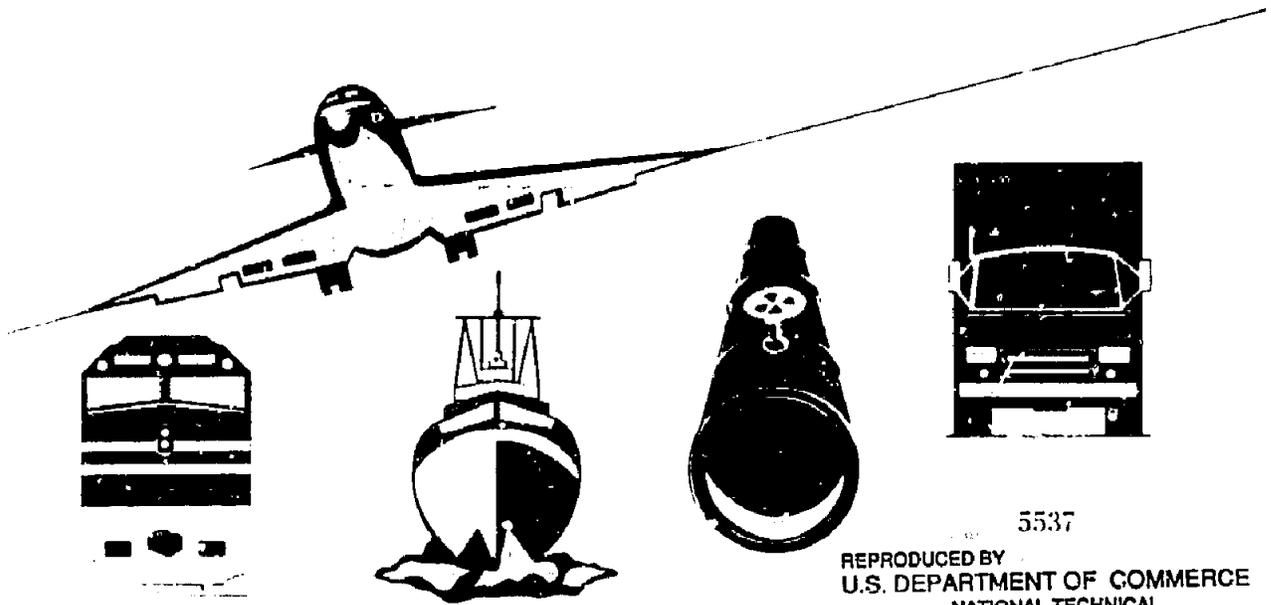


# NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

## SAFETY STUDY

### OVERSIGHT OF RAIL RAPID TRANSIT SAFETY



5537

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## SAFETY STUDY

### OVERSIGHT OF RAIL RAPID TRANSIT SAFETY

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**Abstract:** Annually, about 1.8 billion passengers ride on the rail rapid transit systems operating in the United States. Although this form of transportation is generally safe, the potential exists for a substantial loss of life in the event of a collision, derailment, fire, or other emergency. This safety study examines the adequacy of current oversight of rail rapid transit safety. The safety issues discussed are the effectiveness of current oversight activities exercised by the States in which rail rapid transit systems are operating; the preciseness of rail rapid transit accident/injury data; and the Federal Government's role in the oversight of rail rapid transit safety. Recommendations concerning these issues were made to the Department of Transportation, the Urban Mass Transportation Administration, the District of Columbia, and States in which rail rapid transit systems are currently operating.

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#### ACRONYMS FREQUENTLY USED IN THE REPORT

APTA	American Public Transit Association
BART	Bay Area Rapid Transit District
CTA	Chicago Transit Authority
DOT	U.S. Department of Transportation
FR	Federal Register
FRA	Federal Railroad Administration
GCRTA	Greater Cleveland Regional Transit Authority
LIRR	Long Island Rail Road
MTAMD	Mass Transit Administration of Maryland
MBTA	Massachusetts Bay Transportation Authority
MDTA	Metro-Dade Transit Agency
MARTA	Metropolitan Atlanta Rapid Transit Authority
MTA	Metropolitan Transit Authority [New York]
NTSB	National Transportation Safety Board
NYCTA	New York City Transit Authority
NYSPTSBS	New York State Public Transportation Safety Board
PATH	Port Authority Trans-Hudson Corporation
PATCO	Port Authority Transit Corporation
RSRB	Rail Safety Review Board
RSPA	Research and Special Programs Administration
SIRAS	Safety Information Reporting and Analysis System
SEPTA	Southeastern Pennsylvania Transportation Authority
UMTA	Urban Mass Transportation Administration
WMATA	Washington Metropolitan Area Transit Authority

## EXECUTIVE SUMMARY

Annually, about 1.8 billion passengers ride on the rail rapid transit systems operating in the United States. The 10,500 cars in use on these systems travel about 523 million miles annually. During peak operating hours, one rail rapid transit train can carry as many as 1,000 to 1,500 passengers. Although rail rapid transit is generally a safe form of transportation, the potential exists for a catastrophic loss of life in the event of a collision, derailment, fire, or other emergency involving the evacuation of passengers.

The Safety Board has been concerned about the safety of rail rapid transit operations and has addressed the issue of oversight responsibility during the past 2 decades as a result of its special studies and investigations of accidents involving rail rapid transit systems. Although the Safety Board had concluded in the early 1980s that regulation and enforcement of transit system safety could be handled by the States, with the Federal government providing a measure of oversight through the investigation of accidents, incidents, or conditions that could affect the safety of passengers, the lack of action taken by the State governments in response to Board recommendations and the occurrence of more accidents in the mid- and late 1980s in which safety oversight was raised as an issue prompted the Board to undertake a study to examine the adequacy of current oversight of rail rapid transit safety. The study addresses the additional actions needed to improve the oversight of rail rapid transit safety.

The safety issues discussed in this study are:

- the effectiveness of current oversight activities exercised by the District of Columbia and States in which rail rapid transit systems are operating;
- the preciseness of rail rapid transit accident/injury data; and
- the Federal government's role in the oversight of rail rapid transit safety.

As a result of this study, recommendations were issued to the Urban Mass Transportation Administration of the Department of Transportation, the Secretary of the Department of Transportation, and to the District of Columbia and States in which rail rapid transit systems are currently operating. The recommendations focus on an effective oversight program of rail rapid transit safety.

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594

SAFETY STUDY

OVERSIGHT OF RAIL RAPID TRANSIT SAFETY

INTRODUCTION

Annually, about 1.8 billion passengers ride on the rail rapid transit systems operating in the United States.<sup>1</sup> (See table 1.) The 10,500 cars in use on these systems travel about 523 million miles annually. Available data suggest that transportation by rail rapid transit is generally safe, but accidents resulting in injuries and fatalities continue to occur.

Although some of the existing rail rapid transit systems are relatively new, many are old.<sup>2</sup> These older systems require substantial expenditures to maintain their infrastructure and equipment. Eventually, the newer systems will also require additional attention as they begin to age. Further, most systems are having increasing difficulty meeting their funding needs and still keeping the cost of rides to a level that does not deter ridership. The deterioration in the maintenance of the infrastructure and equipment, inadequate inspections of the infrastructure and equipment, insufficient training of operating personnel, and inadequately staffed safety departments, create the potential for accidents.

The Safety Board has investigated accidents in the past that demonstrate that this potential can come to fruition (some of these accidents will be discussed elsewhere in the report). Further, during peak operating hours, one rail rapid transit train can carry as many as 1,000 to 1,500 passengers. Consequently, the Safety Board has been concerned that an accident could result in a catastrophic loss of life in the event of a collision, derailment, fire, or other emergency involving the evacuation of passengers. Therefore, the adequacy of the oversight of the safety of rail rapid transit systems has long been of concern to the Board.

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<sup>1</sup> The American Public Transit Association (APTA) defines a rail rapid transit system as "a type of electric transit vehicle railway with the capacity for a 'heavy volume' of traffic and characterized by exclusive rights-of-way, multi-car trains, high speed and rapid acceleration, sophisticated signaling, and high platform loading. Also known as 'subway,' 'elevated (railway),' or 'metropolitan railway (metro).'" See Chapter 2 for a discussion of APTA.

<sup>2</sup> For example, Miami's rail rapid transit system is only 7 years old, while the New York City's rail rapid transit system is more than 80 years old.

Table 1.--Rail rapid transit systems currently operating  
in the United States

Acronym <sup>1</sup>	Name of system and location
BART	Bay Area Rapid Transit District, San Francisco, California
CTA	Chicago Transit Authority, Chicago, Illinois
GCRTA	Greater Cleveland Regional Transit Authority, Cleveland, Ohio
MTAMD	Mass Transit Administration of Maryland, Baltimore, Maryland
MBTA	Massachusetts Bay Transportation Authority, Boston, Massachusetts
MDTA	Metro-Dade Transit Agency, Miami, Florida
MARTA	Metropolitan Atlanta Rapid Transit Authority, Atlanta, Georgia
NYCTA	New York City Transit Authority, New York, New York
PATH	Port Authority Trans-Hudson Corporation, New York City-New Jersey
PATCO	Port Authority Transit Corporation, Philadelphia, Pennsylvania, to Lindenwold, New Jersey
SEPTA	Southeastern Pennsylvania Transportation Authority, Philadelphia, Pennsylvania
WMATA	Washington Metropolitan Area Transit Authority, Washington, D.C., area

<sup>1</sup> The acronym as used by the transit authority typically refers to all modes of transportation operated by the authority including motor vehicle, street car, and rail rapid transit. For the purposes of this report, the acronym will be used to refer only to rail rapid transit operations.

Since 1970, when the Safety Board first addressed safety in rail rapid transit, the Board has published eight studies on rail rapid transit safety and conducted major investigations of 17 accidents involving rail rapid transit systems.<sup>3 4</sup> (See Appendix A.)

Some of the safety recommendations that have been issued in conjunction with its safety studies and reports of accident investigations reflect the Safety Board's concern over the years about the adequacy of the oversight of rail rapid transit safety. During the past 20 years, the Board has evaluated the need for safety oversight both at the State/local level and at the Federal level. The Board has also explored the need for individual transit systems to develop effective safety departments within the transit authority's organization.

One of the earliest recommendations<sup>5</sup> on the oversight of rail rapid transit safety was issued as a result of the Safety Board's 1971 special study (NTSB-RSS-71-1), which explored the role of the Urban Mass Transportation Administration (UMTA)<sup>6</sup> in the development of safe transit systems. The report urged the use of system safety techniques for the development of safe rail rapid transit systems and recommended that system safety plans submitted by applicants be one of the basic requirements for

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<sup>3</sup> The Safety Board has authority to investigate major transportation accidents, including accidents involving rail rapid transit systems, to study and evaluate significant transportation issues, and to issue safety recommendations for the purpose of preventing the recurrence of such accidents.

<sup>4</sup> Rail rapid transit systems are required to report accidents to the Safety Board, as outlined at Title 49 of the Code of Federal Regulations Part 840. Railroad, as defined in the regulations, means "any system of surface transportation of persons or property over rails. It includes, but is not limited to, line-haul freight and passenger-carrying railroads, and rapid transit, commuter, scenic, subway, and elevated railways."

<sup>5</sup> The Safety Board has issued many recommendations (other than the ones discussed in this report that highlight the Board's concern about the oversight of rail rapid transit safety) to address site specific problems that were in need of corrective action. The Board has issued about 300 safety recommendations to the transit systems, the American Public Transit Association, and Federal, State, and local government agencies. About 79 percent of these safety recommendations have been acted upon in a positive manner by the recommendation recipients, which is consistent with the percentage of recommendations acted upon positively in the other modes of transportation.

<sup>6</sup> The modal administration within the U.S. Department of Transportation that provides funding to States and local public bodies for transit projects.

obtaining funding assistance from UMTA (R-71-15).<sup>7</sup> The essence of this recommendation was reiterated to UMTA in the Safety Board's 1973 special study that was prompted by the derailment of a BART train in San Francisco, California, in October 1972.

As a result of its investigation in 1976 of the rear-end collision of two CTA<sup>8</sup> trains in Chicago, Illinois, the Board urged the CTA to:

Develop the full potential of the safety department, involve it in all phases of the system operation including operations, design, maintenance, and training, and provide it with more than advisory authority so that it can require implementation of system safety programs. (R-76-41)

The investigation of a rear-end collision of two GCRTA trains in Cleveland, Ohio, in the same year, prompted the Safety Board to recommend that the GCRTA:

Develop a system assurance and safety program that will provide and insure the following: (1) a set of operating rules and procedures that will provide objective requirements for safe and efficient operations, (2) a training program that will originally acquaint operating personnel with the rules and a system of reexamination to keep them current with the rule requirements, and (3) a system of supervision which will enforce the rules and will provide an efficient operation. (R-77-20)

in response to the recommendation, the GCRTA indicated that it was developing and implementing a comprehensive rules book, training procedures, and a system of supervision.

A year later (1977), the Board investigated the head-on collision of two GCRTA trains that resulted in injuries to 57 passengers. The investigation of the accident in 1977 revealed that the GCRTA had not implemented well defined and understandable operating rules--a safety problem that had been identified a year earlier. The problem had not been corrected although the Board had been assured by the transit authority after the first accident that the Board's recommendation for corrective action had been implemented. Consequently, because of growing concern about the safety of rail rapid transit operations, on March 6, 1978, the Board recommended that the Secretary of the U.S. Department of Transportation:

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<sup>7</sup> Because the intent in this section of the report is to highlight the Safety Board's concern regarding the adequacy of oversight of rail rapid transit safety, the status of a safety recommendation and the reasoning for assigning the status is not discussed in detail here. This information, however, is discussed in Appendix B.

<sup>8</sup> Names of the rail rapid transit systems discussed throughout the report are given in table 1.

Develop oversight capability to insure that the safety of rail rapid transit systems will be regulated and enforced by a responsible State or Federal agency. Within the Department of Transportation, accountability for the oversight should be assigned to the Administration that controls Federal grants to aid rail rapid transit. (R-78-10)

Within a month after the Board issued the recommendation, the Secretary of Transportation approved the delegation of complete responsibility for rail rapid transit safety within the Department to UMTA, and advised the Safety Board that a new rail rapid transit safety program was being developed.

In July 1980, the Safety Board convened a 2-day public hearing on rail rapid transit safety. The hearing was prompted by an increasing concern about the adequacy of safety oversight of rail rapid transit systems, particularly fire safety issues and emergency evacuation of rail rapid transit passengers from underground or underwater tunnel locations. Testimony from 25 witnesses at the public hearing was the basis for the Board's 1981 study on rail rapid transit safety (NTSB-SEE-81-1). Contrary to assurances by the Secretary in 1978 that a new rail rapid transit program was being developed, the hearing revealed that UMTA had developed a passive position with respect to the oversight of the safety of rail rapid transit operations. In conjunction with that study, the Board issued, among others, the following two safety recommendations to the Secretary, U.S. Department of Transportation (DOT):

Propose legislation to explicitly authorize the Secretary of Transportation to regulate the safety of rail rapid transit systems which receive Federal financial assistance. Such legislation should include the authority to establish Federal minimum safety standards, to enforce compliance, to conduct inspections, to conduct investigations of accidents and incidents, and such other general powers and duties as are necessary to provide for effective safety oversight. (R-81-01)

Pending the enactment of legislation conferring direct regulatory authority, require the Urban Mass Transportation Administration to establish Federal guidelines for equipment and operations, to aggressively utilize existing grant programs and investigative authority to promote conformance with Federal guidelines, and to conduct a program of substantially increased safety oversight of Federal assisted rail rapid transit systems. (R-81-02)

In response to these safety recommendations, the Secretary stated in April 1981 that there was no need for Federal regulatory authority and that "rail transit safety is a local responsibility that is best handled by the State and local decisionmakers who are accountable for the safe, effective, and efficient operation of the rail transit systems." In its 1981 report of eight NYCTA subway train fires that occurred during a 13-month period beginning in June 1980, the Safety Board concluded that "if the need for safety oversight of the NYCTA is to be met, it must be met at the State or

local level." Consequently, the Board recommended that the Governor of the State of New York:

Initiate legislative and/or executive action to authorize a new or existing independent agency to oversee and regulate the safety of the New York City Transit Authority. (R-81-116)<sup>9</sup>

Four derailments involving a traction motor falling from NYCTA cars to the track during a 15-month period beginning in January 1981, raised additional concerns regarding NYCTA maintenance and inspection practices, and supervision of these practices.

Although the Safety Board concluded that regulation and enforcement of a transit system could be handled by a responsible State agency, the Board also stated that it did not believe that a total abdication of responsibility at the Federal level for safety on these transit systems was desirable. Consequently, at the same time the Board urged the State of New York to address the oversight issue, the Board also recommended that the Secretary of the U.S. Department of Transportation:

Propose legislation to amend Section 107 of the National Mass Transportation Assistance Act of 1974 to substitute, for the Secretary's authority to investigate unsafe conditions in federally-funded mass transit systems, the authority to investigate any mass transit accident or incident in such systems, or any condition which affects or could affect the safety of passengers. (R-81-117)

During its investigation of the eight subway fires on the NYCTA, DOT informed the Safety Board that it had proposed that Section 107 of the UMTA Act be repealed "in an attempt to remove the Federal Government from an intrusive role in rail transit safety." The Safety Board questioned how the DOT could characterize the Section 107 investigative authority as "intrusive" particularly because UMTA had exercised this authority on only one occasion. However, the Safety Board was concerned with the wording of Section 107, not because the provisions of Section 107 were considered obtrusive but because Section 107 required the existence of an unsafe condition as a prerequisite to investigation.<sup>10</sup>

The Safety Board's investigations of several accidents in the mid- and late 1980's continued to raise concern about the adequacy of oversight of rail rapid transit safety. In its report of the rear-end collision of two CTA trains in Chicago, Illinois, on August 17, 1984, the Safety Board

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<sup>9</sup> See Chapter 1 for a detailed discussion on the creation of an agency in the State of New York to oversee public transportation safety.

<sup>10</sup> See additional discussion regarding UMTA's investigative authority under "Federal Initiatives" in Chapter 1. Section 107, which was later replaced by Section 22 of the Urban Mass Transportation Act, as amended, addressed UMTA's investigative authority.

concluded that: (1) the CTA did not regularly test its operating personnel to determine the extent of their knowledge and understanding of operating rules and procedures; (2) the CTA did not adequately train its motormen and conductors to respond to emergency situations; and (3) the safety deficiencies uncovered by the Board's investigation could have been identified by an active in-house safety department.

On March 17, 1984, an NYCTA train derailed in the Joralemon Street Tunnel because the track had not been adequately supported by the contractor making the repairs. The Safety Board concluded in its report of that accident that "the circumstances that led to the accident would not have occurred if the NYCTA had an effective system safety plan backed up by good inspection and supervision." On May 15, 1985, an NYCTA train derailed at a location where track work had recently been completed. The Board determined that the probable cause of that accident was the NYCTA's failure to supervise properly the employees replacing rail and adjusting signals and to require that the replacement of the rails was in conformity with NYCTA procedures. Contributing to the scope of the accident was the NYCTA's failure to supervise an unqualified power maintainer while restoring third-rail power, which resulted in an inadvertent energizing of the third rail at the accident site before the emergency was over and subsequent third-rail power removal which caused the stopping and evacuation of 16 additional trains.

In its report of the investigation of the rear-end collision of two NYCTA trains in New York on March 10, 1989, the Safety Board concluded that NYCTA management oversight was inadequate in that it did not correct the improperly displayed speed signs, allowed the operator of the striking train to be promoted without a record of a physical examination, failed to have the signal system repaired promptly or correctly, and did not enforce its own operating rules.

On December 28, 1990, a fire occurred at the south end of the Clark Street Station in downtown Brooklyn. Five NYCTA trains were affected by the fire and resulting smoke condition. On one train located in the immediate area, about 1,000 passengers were trapped onboard the smoke-filled cars for about 45 minutes before the train could be moved back to the station platform and the passengers evacuated. Two passengers died and 188 passengers received injuries as a result of the accident. This accident raised serious concerns regarding track maintenance and inspection procedures, experience and training of motormen, fan ventilation of the tunnels, communication capability between the dispatcher and trains, and emergency response procedures--problems that had been identified as a result of the Board's investigations of accidents 8 to 10 years earlier.

In its report of the rear-end collision involving two GCRTA trains in Cleveland, Ohio, on July 10, 1985, the Safety Board concluded that "although the actions that GCRTA indicated it had taken or was taking appeared to be responsive to most of the Safety Board's recommendations of 1977 and 1978, they did not actually resolve the problems at Cleveland before the investigation of this accident. GCRTA has continued to experience passenger injury-producing collisions and derailments caused by improper operating practices....These accidents, and GCRTA's failure to carry through with the

Safety Board's recommendations, indicate that GCRTA needs oversight by an independent agency." Consequently, the Safety Board urged the Governor of the State of Ohio to:

Initiate legislative action to establish a new independent agency or authorize an existing agency to oversee and regulate the safety of rail rapid transit systems in the State of Ohio. (R-87-4)

A similar recommendation (R-87-38) was issued to the Governor of the State of Pennsylvania following the Board's investigation of an accident involving a SEPIA train on the Norristown High Speed Line (NHSL) near Upper Darby, Pennsylvania, on August 23, 1986. The investigation of that accident revealed that operating rules were not being uniformly and consistently enforced and that operators' training was deficient and needed prompt attention and correction for safe rail operations. The Safety Board concluded in its report of that accident that "State regulatory and enforcement authority for the NHSL is fragmented between the Pennsylvania Department of Transportation's Bureau of Public Transit, the Pennsylvania Public Utilities Commission, and the Pennsylvania State Police. There does not appear to be any clear delineation of authority." Neither State took positive action in response to the recommendations by the Safety Board.

Similar conclusions were reached following the Safety Board's investigation of the derailment of a SEPTA train on March 7, 1990, near Philadelphia, Pennsylvania. The investigation of that accident and four other serious accidents in the 90 days before the derailment of March 7, 1990, raised concerns about the effectiveness of SEPTA's management, supervision, training, and inspection and testing procedures. Consequently, Safety Recommendation R-87-38 was reiterated to the Governor of Pennsylvania.

Although the Safety Board had concluded in the early 1980's that regulation and enforcement of transit system safety could be handled by the States, with the Federal government providing a measure of oversight through the investigation of accidents, incidents, or conditions that could affect the safety of passengers, the lack of action taken by some State governments in response to Board recommendations, and the occurrence of additional accidents in which safety oversight was raised as an issue, prompted the Safety Board to undertake this study to address the current status of rail rapid transit safety and the adequacy of that oversight. The study addresses only the issue of oversight; it does not address any specific safety issue.

The first three chapters of this report present factual information on the current approach to the oversight of rail rapid transit safety. Chapter 1 addresses the activity of the Federal government to oversee rail rapid transit safety, including the promulgation of alcohol and drug regulations, the issuance of recommended guidelines in certain safety-related areas, the sponsorship of research on topics related to rail rapid transit safety, and the collection of safety-related data. The first chapter also highlights oversight activities exercised at the State/local level. The Board requested information regarding efforts initiated by the transit industry as a whole and by the systems individually to improve safety; these initiatives are discussed in Chapter 2. Chapter 3 examines Congressional

initiatives pertinent to oversight of the rail rapid transit industry. The final chapter evaluates the adequacy of the current approach to oversight of rail rapid transit safety and addresses the additional actions needed to improve oversight of rail rapid transit safety.

## CHAPTER 1

EXTENT OF EXISTING FEDERAL AND STATE INITIATIVES  
TO OVERSEE RAIL RAPID TRANSIT SAFETY

## Federal Initiatives

The Urban Mass Transportation Administration was established by the President's Reorganization Plan No. 2 of 1968 to administer Federal grants to mass transit under the Urban Mass Transportation Act of 1964.<sup>11</sup> UMTA was to provide Federal grants to all types of urban mass transit projects including the cost of acquisition, construction, and operations, and the improvement of existing facilities and equipment. According to UMTA officials, about \$7.5 billion in grants have been provided to the rail rapid transit systems in the last 3 years. As amended in 1968, the Act provided that the "Secretary shall assure...that the final decisions on the project are made in the best overall public interest, taking into consideration the need for fast, safe, and efficient transportation...." The Secretary was also authorized to "undertake research, development, and demonstration projects, to contract for and make grants for technical studies, to make grants for research in urban transportation problems and for training, and to prescribe requirements for reporting financial and operating information by transit systems."

UMTA's Investigative Authority.--Explicit safety authority was provided to the Secretary of Transportation in Section 107 of the National Mass Transportation Act of 1974 (Public Law 93-503). Section 107 of the Act provided:

The Secretary of Transportation shall investigate unsafe conditions in any facility, equipment, or manner of operation financed under this Act which creates a serious hazard of death or injury for the purpose of determining its nature and extent and the means which might best be employed to correct it. If the Secretary determines that such facility, equipment, or manner of operation is unsafe, he shall require the State or local public body or agency to submit to the Secretary a plan for correcting the unsafe facility, equipment, or manner of operation, and the Secretary may withhold further financial assistance to the applicant until such plan is approved or implemented.

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<sup>11</sup> As originally enacted, the Act vested urban mass transportation functions in the Administrator of the Housing and Home Finance Agency, which later became the Department of Housing and Urban Development (HUD). The Reorganization Plan No. 2 of 1968 transferred the urban mass transportation program from HUD to the Department of Transportation (DOT) and resulted in the organization of UMTA within DOT.

The UMTA exercised its investigative authority under Section 107 on only one occasion during the existence of Section 107. The NYCTA introduced a new fleet of 754 R-46 cars into service in July 1975. The cars subsequently began to develop safety problems, and, as a result, UMTA initiated a "Section 107" investigation in July 1979. The UMTA investigative team identified unsafe conditions associated with the cars--specifically the car trucks, which were a new and unique design, and were experiencing greater levels of vibration than they were designed to withstand--and recommended that these deficiencies be corrected. In October 1979, the NYCTA submitted to UMTA a plan for corrective action to eliminate the unsafe conditions that had been identified. Over the next 2 years, the NYCTA provided quarterly reports to UMTA on the progress being made to eliminate the unsafe conditions in the R-46 cars. However, the specific actions being taken were not addressed in detail in all subsequent quarterly reports. The Safety Board stated in its report of the investigation of the eight subway train fires on the NYCTA that, "in most respects it [UMTA's investigation] operated well, resulting in the identification of serious safety problems, the development of a corrective action plan, and implementation of the plan with UMTA's direct approval and oversight....[however,] UMTA approved NYCTA's planned corrective actions for the current collectors but failed to determine precisely what actions NYCTA was taking."

At the same time the NYCTA was providing quarterly reports to UMTA on efforts to eliminate the unsafe conditions on the R-46 cars, the Secretary of the Department of Transportation informed the Safety Board that it was seeking to repeal Section 107 of the National Mass Transportation Act of 1974 in an attempt to remove the Federal government from an intrusive role in rail transit safety.<sup>12</sup> The Safety Board did not agree with the Secretary's assessment that the investigative authority was intrusive, particularly because UMTA had exercised that authority only on one occasion. The Board further stated, "In any case, it is our view that repeal of Section 107 would not relieve the Department of its responsibility to the public to insure that the rail rapid transit systems which it funds with taxpayers' dollars, and whose use it encourages, operate safely. It would only make it more difficult for the Department to fulfill its safety oversight responsibility."<sup>13</sup> Although the Safety Board characterized the investigative authority as an important and valuable safety oversight tool, the Safety Board stated that it believed that the authority as worded in Section 107 was too narrow in that the existence of an unsafe condition creating a serious hazard of death or injury was a prerequisite to investigation. As a result, the Safety Board recommended that the Secretary of Transportation propose legislation to amend Section 107 to provide the Secretary the authority to investigate any mass transit accident or incident in federally funded mass

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<sup>12</sup> Letter from the Secretary of Transportation to the National Transportation Safety Board, dated April 22, 1981.

<sup>13</sup> Letter from the Safety Board to the Secretary of Transportation, dated July 22, 1981.

transit systems, or any condition that affects or could affect the safety of passengers.<sup>14</sup>

The Secretary did not propose legislation, as recommended by the Safety Board; however, Section 107 was ultimately repealed and replaced in 1982 by the following Section 22, as amended by Public Law 97-424:

The Secretary may investigate conditions in any facility, equipment, or manner of operation financed under this (Act), which the Secretary believes creates a serious hazard of death or injury. The investigation should determine the nature and extent of such conditions and the means which might best be employed to correct or eliminate them. If the Secretary determines that such conditions do create such a hazard, he shall require the local public body which has received funds under this (Act) to submit a plan for correcting or eliminating such condition. The Secretary may withhold further financial assistance under this (Act) from the local public body until he approves such plan and the local public body implements such plan.

UMTA has exercised its investigative authority under Section 22 on two occasions. In April 1987, the Administrator of UMTA informed the chairman of SEPTA that UMTA and the Secretary of Transportation "have become increasingly concerned about the recent series of accidents which have occurred on the Norristown High Speed Line (NHSL) as well as other commuter lines operated by SEPTA. The number and frequency of accidents on these rail lines have raised serious concerns about the safety of the SEPTA rail system, particularly the NHSL." As a result, UMTA initiated an investigation of SEPTA as authorized by Section 22. Battelle Memorial Institute was contracted by UMTA to perform the investigation to determine whether conditions existed that posed a serious hazard of death or injury and to describe their nature and extent. According to the report prepared by Battelle, a condition was broadly defined as "a precursor to a hazard." The investigative team concluded in its report, dated September 1987, that SEPTA management had failed to detect and react promptly to conditions at the NHSL as they arose. The report further stated that because of SEPTA's distribution of capital and operating funds, some NHSL safety conditions were unresolved or excessively delayed. The report identified 39 individual conditions of concern that, in combination, created the "potential for serious hazards." (See Appendix C.) The Safety Board in its report of the August 23, 1986, accident (which prompted the UMTA Section 22 investigation), stated that "UMTA's evaluation addressed the identical issues that were developed in the Board's investigation of the accident."

Because of growing concern about life-threatening incidents and other serious accidents in New York City's mass transportation system, on April 20, 1989, U.S. Senator D'Amato and Congressman Molinari requested that UMTA initiate a full investigation of the safety of the New York rail transit

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<sup>14</sup> The full text of the safety recommendation, R-81-117, is given in the Introduction of this report.

system, commuter rail, and bus operations under the authority and terms of Section 22 of the Urban Mass Transportation Act. The letter to UMTA stated that:

This investigation should be broad-based, thorough, and as rigorous as humanly possible. Every potential hazard should be revealed, corrective measures identified, and the necessary corrective action taken. Only with this sort of rigorous examination will confidence in the safety of the system begin to be restored.

The UMTA Administrator agreed to initiate a full and complete investigation of mass transit in New York City and subsequently notified the chairman of the Metropolitan Transit Authority (MTA) of UMTA's intentions to initiate an "extensive, detailed, and exhaustive investigation" that would target the New York City Transit Authority and later expand to other operating elements of the MTA, as appropriate. On January 29, 1990, UMTA published a report entitled "Comprehensive Plan for Safety Investigation of New York Metropolitan Transportation Authority" prepared by the Research and Special Programs Administration (RSPA) of the U.S. Department of Transportation at DOT's Volpe National Transportation Systems Center (VNTSC) in Cambridge, Massachusetts. The plan was developed by RSPA, in consultation with UMTA, to ensure that a complete, in-depth investigation was performed. A preliminary (or phase I) investigation was conducted by RSPA/VNTSC to identify and assess safety and security issues and recommendations associated with the operations of the MTA and its operating elements that have been previously identified by oversight agencies. The report of the preliminary investigation was published in March 1991. As stated in the report of the preliminary investigation, the principal objectives of the second phase of the Section 22 investigation are to identify safety and security hazards requiring MTA corrective actions; assure that MTA develops a corrective action plan to resolve identified hazards; ensure, upon approval by UMTA, that MTA implements the corrective action plan; and provide oversight of MTA's corrective actions to assure their conformance with the plan.

The second phase of the investigation is divided into three parts that will be performed by separate, competitively selected contractors and will be started sequentially. The first part addresses MTA management, the NYCTA (rail), and the Staten Island Rapid Transit Operating Authority; the second part focuses on the Metropolitan Suburban Bus Authority and the NYCTA (bus); and the third part will address the Long Island Rail Road (LIRR) and the Metro-North Commuter Railroad. The Federal Railroad Administration of the DOT will conduct, in coordination with the UMTA investigation, a separate safety investigation of the LIRR and Metro-North for the parts of those operating elements under its regulation and jurisdiction. According to UMTA officials, the contract for the first part of the second phase of the investigation has been awarded and the other contracts are to be awarded in the near future. It is anticipated that the contractors' reports of findings will be completed about 9 to 12 months after the contract award, which means that the first reports are expected to be completed during the spring of 1992. UMTA reserved \$10 million of available funds from Section 9 formula

money allocated to the New York portion of the New York-New Jersey urbanized area for the Section 22 investigation.<sup>15</sup>

UMTA's Position Regarding Regulation of the Rail Rapid Transit Industry.--The UMTA's position regarding the regulation of the rail rapid transit industry is well documented. UMTA considers itself to be a financial assistance agency rather than a regulatory agency, as are the other modal administrations within the DOT, and has steadfastly maintained that regulation of the rail rapid transit industry is not warranted. In correspondence to the Safety Board in 1981, UMTA maintained that:

The promulgation of national safety standards for rail rapid transit would be extremely difficult due to the various site-specific design and operational constraints of each system. The use of available resources to ensure compliance with the standards, at both the Federal and local levels, would result in decreased resource availability in other preventive safety activities such as hazard identification, analysis, and resolution; safety research; and safety training.<sup>16</sup>

This position has not changed since 1981 and was reiterated recently in UMTA's response to a recommendation in which the Safety Board urged UMTA to promulgate a uniform code of radio operating rules and procedures for use by the rail rapid transit industry. UMTA stated in its December 22, 1989, response to the recommendation:

UMTA remains convinced that the individual transit authorities are best positioned to make the final determinations as to their needs and to act accordingly. Transit authorities, not UMTA, have the final responsibility for the safety of their operations.... Specifically, with respect to the two NTSB [National Transportation Safety Board] recommendations, all authorities already require operable radios on trains prior to dispatch. Because of their individual needs and operating practices, any attempt to establish conformity in operating rules and procedures would be difficult to achieve, and if achieved would be so generalized that it would not result in improved safety.

The issue of alcohol and drug regulations was one area in which UMTA did proceed with the promulgation of regulations. However, as documented

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<sup>15</sup> Grants allocated to States and local public bodies by UMTA through Section 9 of the Urban Mass Transportation Act are made in accordance with criteria or a formula established by the Secretary of Transportation. The formula includes such factors as population and existing revenue vehicle miles. Section 9 is one of several sections of the Act under which federal assistance is allocated.

<sup>16</sup> Letter to the Safety Board from the Secretary of Transportation, dated August 24, 1981.

below, when the Safety Board first called on UMTA to issue regulations in this area, UMTA questioned whether it had the authority to do so.

In four rail rapid transit accidents investigated by the Safety Board over a 9-year period from 1977 to 1986, the issue of drug use (licit or illicit) was raised. In these accidents, 15 persons were killed, more than 350 persons were injured, and more than \$5 million in property damage was reported.<sup>17</sup> In two of the accidents, test results of the operators of the transit trains indicated illicit drug use. In two of the accidents, the rail rapid transit employees had taken legal prescription drugs that may have adversely affected their performance. In one of the accidents, the operator was taking several prescription drugs, but evidence did not indicate his performance was affected adversely. Because of the Safety Board's concern that the public and rail rapid transit employees were being placed in life-threatening situations by rail rapid transit employees whose performance may be adversely affected by licit or illicit drug use, the Safety Board, on August 13, 1986, issued the following safety recommendations to the UMTA:

Require that all employees involved in a rail rapid transit accident with a fatality, injury, or property damage be tested in a timely manner for alcohol and drugs. (R-86-34)

Require rail rapid transit systems to screen for drug and alcohol abuse all prospective and transferred employees prior to employment in safety-sensitive positions. (R-86-35)

Require rail rapid transit systems to institute procedures and information systems to inform employees of the deleterious effects on work performance of some over-the-counter and prescription drugs. (R-86-36)

Require the removal of employees from safety-sensitive positions if the rail rapid transit medical department determines that the employees' use of a prescription drug will affect their work performance. (R-86-37)

Encourage the creation of effective employee assistance programs to detect and treat substance abuse among rail rapid transit employees in safety-sensitive positions. (R-86-38)

In its initial response of January 12, 1987, to these recommendations, UMTA indicated that it was reviewing the Department's [DOT] safety

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<sup>17</sup> "Rear End Collision of Two Chicago Transit Authority Trains, Chicago, Illinois, February 4, 1977" (NTSB/RAR-77/10); "Rear End Collision of Two Chicago Transit Authority Trains near the Montrose Avenue Station, Chicago, Illinois, August 17, 1984" (NTSB/RAR-85/11); "Metropolitan Atlanta Rapid Transit Authority, Atlanta, Georgia, December 3, 1984" (ATL-85-PR004); and "Rear End Collision of Metro Dade Transportation Administration Train Numbers 172-171, 141-142, Miami, Florida, June 26, 1985" (NTSB/RAR-86/3).

responsibility and establishing a departmental working group that would address the drug problem in depth and recommend a course of action. On March 20, 1987, the Board replied that the time for review had long since passed and that the regulatory actions outlined in its safety recommendations were the proper course of action. The Board cited two additional accidents that occurred subsequent to the issuance of the safety recommendations:

On December 10, 1986, SEPTA train 0151, en route to Philadelphia International Airport, entered Suburban Station and struck the rear end of a four-car standing train (9843). Thirty-one passengers were treated for minor injuries and released; one was hospitalized. Results of postaccident toxicological testing, taken within 3 hours of the accident, indicated that three SEPTA employees tested positive for drugs: the operator on train 0151 tested positive for cocaine, one passenger attendant on train 9843 tested positive for marijuana, and a second passenger attendant on train 9843 tested positive for both marijuana and cocaine.

On January 26, 1987, SEPTA car 207, with about 20 passengers aboard, was struck in the rear by car 202 on SEPTA's Norristown High Speed Line. Eighteen passengers were injured; they were taken to local hospitals, treated, and released. Results of postaccident toxicological testing indicated that two SEPTA employees tested positive for drugs; the operator of car 202 tested positive for cocaine and marijuana, and the operator of car 207 tested positive for marijuana.

The Board stated in its letter of March 20, 1987, that it had hoped that the transit industry would have acted and adopted measures to combat alcohol and drug use by transit system employees. The reality at the time, however, was that the industry had not taken sufficient action to prevent the types of accidents outlined above.

In its letter of May 19, 1987, UMTA stated that its statutory authority to regulate safety matters in the transit industry was limited. The Safety Board responded on November 3, 1987, stating that if implementation of the intent of the Safety Board's recommendation required UMTA to seek the necessary legislation, UMTA should do so. Subsequently, UMTA drafted a notice of proposed rulemaking on the control of drug use in mass transportation, with no indication that it had sought any legislative authority to do so.

Finally, on November 21, 1988, (the regulations were issued on November 14, 1988) UMTA published its final rule "Control of Drug Use in Mass Transportation Operations."<sup>18</sup> The purpose of the regulations was to require recipients of Federal financial assistance to have an anti-drug program that is designed to detect the use of prohibited drugs by employees in safety-sensitive positions and to deter employees from using prohibited drugs. The major operators were to certify within 12 months of the issuance of the regulations that the anti-drug programs had been established and implemented.

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<sup>18</sup> 53 FR 47174, November 1988.

In 1989, the Transport Workers Union and the Amalgamated Transportation Union challenged the validity of the drug testing regulations. The U.S. District Court for the District of Columbia held that UMTA did have the authority to issue drug testing regulations. The unions appealed the decision, and on January 19, 1990, the Court of Appeals for the D.C. Circuit held that UMTA lacked statutory authority to address mass transit safety hazards by imposing a uniform national solution on local transit authorities. The Court determined that, unlike the other modal administrations within the DOT, Congress has chosen not to give UMTA direct regulatory authority over urban mass transit safety. "We believe that Congress intended for such matters to continue to be handled locally, with UMTA's guiding hand, not with an iron fist."<sup>19</sup>

Currently, an UMTA-funded study is being conducted to address substance abuse in the transit industry. According to the description of the project as outlined by UMTA:

The contractor will conduct a national survey of UMTA grantees concerning drug and alcohol use. The lack of substantive data on the extent of substance abuse by employees in the transit industry has made it difficult to document and justify the need for Federal regulations mandating drug and alcohol testing of sensitive safety personnel. The results of this project should provide that information.

The study is expected to be completed by the end of September 1991.

UMTA's Additional Research Activity.--UMTA provides funding for research on a wide range of topics related to the mass transit industry through various technical assistance programs and initiatives. UMTA publishes annually a directory of ongoing research projects to inform the public--and especially the transit industry--of the nature and scope of work underway to assist State and local agencies in improving services and reducing the cost of public transportation. The 1991 directory, for example, lists ongoing research according to UMTA-designated initiatives, such as the Safety and Drug Initiative and the Human Resources Initiatives, the latter of which includes the Managerial Training Grants and the University Research and Training Grants.

The introduction to the Safety and Drug Initiative states:

UMTA has a limited, but vital, role in assuring safety. First, it must rid the transit workplace of drugs and alcohol. Second, under safety, it must monitor and provide for the active oversight of transit operations, either directly or through others, and also continue its work in human factors through training, information exchange, and technical assistance to optimize the performance of the Nation's transit safety.

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<sup>19</sup> Amalgamated Transit Union v. Skinner, 894 F. 2d 1332 (D.C. Cir. 1990).

Specific projects being conducted under the Safety and Drug Initiative include the development of a manual to facilitate random drug testing of transit employees, the Section 22 safety investigation of the New York Metropolitan Transportation Authority (previously discussed), and a national survey of UMTA grantees concerning drug and alcohol use (also previously discussed).

The University Research and Training Grants are funded by authority of Section 11 of the Urban Mass Transportation Act of 1964, as amended. This section authorizes the Secretary [U.S. Department of Transportation] "to make grants to public and private nonprofit institutions of higher learning to assist in establishing or carrying on comprehensive research in the problems of transportation in urban areas." The specific aims of the fiscal year 1991 University Research and Training Grants are:

- to stimulate research and training that will be relevant to and supportive of the goals, mission and programmatic needs of the Urban Mass Transportation Administration, and will strengthen local and state capability to plan, construct and evaluate transportation systems and services;
- to promote greater interaction between academia and local transportation agencies by encouraging universities to become sources of ongoing advice and information on transportation programs and projects in their own community;
- to assist in the training of individuals already engaged in professional activities in public transportation; and,
- to attract more of the nation's young talent into careers in public transportation through practical experience during their academic studies.

Grant applications are reviewed and evaluated by UMTA staff on the basis of conformity with the topic areas and instructions provided by UMTA. Grant awards are based on "UMTA research criteria, balance among the topic areas, and equitable geographical distribution." The research and training areas announced as grants for application during the beginning of fiscal year 1991 were (1) Americans with Disabilities Act (ADA);<sup>20</sup> (2) equipment, facilities, and maintenance; (3) congestion pricing, passes, and parking; (4) homeless and transportation; (5) intelligent vehicle highway systems; (6) regional mobility; (7) safety and security; and (8) transit performance and benefits. UMTA provides an abstract for each topic title in its annual grant announcement package. For the topic "State Safety Oversight Role" (under the category of safety and security), the abstract states the following:

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<sup>20</sup> U.S. Congressional legislation was enacted July 26, 1990, that establishes broad rights for equal access to communication, employment, and transportation for those persons with disabilities. The legislation was titled the "Americans with Disabilities Act" (P.L. 101-336).

State oversight of safety is important in the implementation of system safety program plans at transit agencies, and UMTA's policy has been to encourage more state involvement in the local system safety process. UMTA is interested in a comprehensive review study of several states with established oversight programs, i.e., states such as California, Florida, Massachusetts, and New York. The purpose of such a review would be to compile their safety legislative mandates, rules, standards and regulations that could be considered useful to other states considering such a role. The product would be a handbook of existing state oversight programs for transit safety.

According to UMTA, no applications were received in response to this announcement. According to UMTA officials, the topic could be resubmitted by UMTA staff for inclusion in the announcements for fiscal year 1992 or the objective of the topic could be accomplished through research activity in other program areas.

UMTA has also issued recommended guidelines on various transit-related safety issues. For example, in 1981, UMTA published "Recommended Fire Safety Practices for Rail Transit Materials Selection Guidelines," primarily in response to the Safety Board's investigation of the 1979 BART fire and subsequent recommendation. With contributions from transit system and emergency response organizational personnel, UMTA published, in 1985, "Recommended Emergency Preparedness Guidelines for Rail Transit Systems." These guidelines addressed the development of emergency response procedures, training of both transit and emergency response personnel, and the facilities and equipment necessary for coping effectively with emergency situations. The guidelines address smoke and flammability criteria for interior materials used in rail transit vehicles. In August 1989, UMTA published the report "Evaluation and Testing of Rail Transit Undercar Fire Detection and Suppression Systems." According to UMTA, the recommendations contained in these guidelines provide "flexibility in the approach of implementing a fire detection and suppression system for rail cars, allowing for variation in the vehicle design and future technological advances." As stated in its March 23, 1990, letter to the Safety Board accompanying this last set of guidelines, "We believe we have adequately distributed the fire suppression guidelines within the context of our statutory authority. UMTA is primarily a grant-making agency--not a regulatory agency."

UMTA's Initiatives for Accident Data Reporting.--The Safety Board concluded in its 1971 "Special Study of Rail Rapid Transit Safety" that there was a lack of uniformity in the accident data compiled by the existing rail rapid transit systems. As a result, the Board issued the following safety recommendation to the Federal Railroad Administration (FRA) on June 16, 1971:

Establish by regulation, a uniform system of data gathering and accident reporting encompassing all the rail rapid transit operations in the United States from which statistics can be compiled to determine the status of safety in rail rapid transit operations. The Safety Board is aware that FRA is studying the existing accident reporting system for railroad accidents under the

Accident Reports Act, and recommends that the rail rapid transit accident reporting requirements be included in any new system of accident reporting. (K-71-19)<sup>21</sup>

In December 1974, FRA issued regulations revising the procedures under which railroads were required to submit monthly reports of accidents and incidents and, in response to the Safety Board's recommendation, extended the applicability of the reporting regulations for the first time to rail rapid transit systems. In its rulemaking notice, the FRA cited the Department's authority under the Federal Railroad Safety Act of 1970 to regulate "all areas of railroad safety," which it interpreted as including rail rapid transit.<sup>22</sup>

The American Public Transit Association (APTA) objected to the reporting requirements, and its members did not comply with the requirements initially. Although rail rapid transit systems eventually began submitting reports of accidents and incidents dating from January 1, 1975, the CTA ultimately challenged FRA's authority in the courts. The accident/incident reporting requirements were overturned by a court decision that held that FRA's regulatory authority with respect to railroad safety did not extend to rail rapid transit.<sup>23</sup>

Section 15 of the Urban Mass Transportation Act of 1964, as amended, provides for:

...the establishment of a uniform system of transit accounts and records plus a reporting system for the collection and dissemination of public mass transportation financial and operating data by uniform categories. All applicants and direct beneficiaries of Federal assistance under Section 9 of the UMTA Act are subject to the reporting system and the uniform system of accounts and records. The purpose of the Section 15 reporting system is to assist in meeting the needs for information on which to base planning for public transportation services and to make public sector investment decisions at all levels of government.

Section 15 annual reports were first published by UMTA in 1979. The following 12 systems that are required to do so have been reporting annually under the section 15 authority: BART, CTA, GCRTA, MARTA, MDTA, MBTA, MTAMD,

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<sup>21</sup> Even though the Safety Board was aware that UMTA had been established in 1968 to administer Federal grants to mass transit, the Safety Board believed in 1971 that regulation of rail rapid transit would ultimately rest with the Federal Railroad Administration (FRA). Consequently, the recommendation was issued to the FRA.

<sup>22</sup> 39 FR 43222, December 1974.

<sup>23</sup> Chicago Transit Authority v. Flohr, 570 F.2d 1305 (7th Cir. 1977).

NYCTA, PATCO, PATH, SEPTA, and WMATA.<sup>24</sup> The Section 15 annual report contains a wide range of information including sources of transit revenue; sources of public operating assistance; State and local taxes dedicated for transit operations; sources of capital assistance; transit operating expenses by mode and function; employer and employee paid fringe benefits; transit accidents, revenue vehicle maintenance, and energy consumption; transit way mileage; an employee count for each transit system; annual operating statistics; and a summary of the age distribution of the revenue vehicle inventory. (See Appendix D for an example of financial data reported by the transit systems and the age distribution of the revenue vehicle inventory.)

Through 1990, the data that summarize the number of accidents, fatalities, and injuries were presented in categories by size of mode or the number of vehicles operating in maximum service. The transit systems were not listed individually. To determine which rail rapid transit systems were primarily responsible for the fatalities or the accidents related to collision, it was first necessary to determine the total number of vehicles operated in maximum service by a given transit authority, which was contained in a different table. (See tables 2 and 3.)

The preface to the section in the annual report on non-financial operating data states: "...because the interpretation of what constitutes an accident or roadcall has not been uniform, these data are not entirely consistent from one transit system to another." Reporting thresholds for accidents or casualties are not defined in the Section 15 annual report.

The 12 systems that are required to report under Section 15 also reported data under the Safety Information Reporting and Analysis System (SIRAS), a voluntary safety reporting system developed by UMTA in cooperation with the APTA and the rail transit systems operating in the United States. These systems have been voluntarily reporting safety data to UMTA since SIRAS was implemented in January 1983. The transit systems submitted monthly data on car miles and the number of passengers and submitted information on reportable train accidents, fires, or casualties during the months they occur. Table 4 is an example of statistical data submitted under SIRAS.

Safety Board staff reviewed selected data from the 1988 and 1989 Section 15 annual reports and the 1988 and 1989 SIRAS reports. Table 5 summarizes the review of only four specific areas for the 12 rail rapid transit systems: number of accidents related to collision; number of injuries; number of fatalities; and car miles reported.

In August 1990, UMTA published an Advanced Notice of Proposed Rulemaking (ANPRM) to address the Section 15 reporting requirements. According to UMTA officials, the Administrator believed the reporting requirements could be streamlined, the result of which would be to provide a "more user friendly" annual report. Through the ANPRM, UMTA requested comments on the current or potential usefulness of the Section 15 reporting data and the overall

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<sup>24</sup> Names of the systems are provided in table 1.

Table 2.--Accident data on rail rapid transit by size of mode, from 1989 Section 15 annual report

TABLE 2.10 as of 11/16/90  
 TRANSIT ACCIDENTS, REVENUE VEHICLE MAINTENANCE & ENERGY CONSUMPTION: DETAILS BY SIZE OF MODAL REVENUE FLEET  
 RAIL RAPID

Fiscal year ending between 01/01/89 and 12/31/89

CATEGORY	SIZE OF MODE - NUMBER OF VEHICLES OPERATED IN MAXIMUM SERVICE										ALL SYSTEMS		
	UNDER 25	25 - 49	50 - 99	100 - 249	250 - 499	500 - 999	1000 & OVER						
<b>ACCIDENT CLASSIFICATION</b>													
NUMBER OF ACCIDENTS RELATED TO COLLISION	0	9	5	0	0	0	0	0	0	0	19	9433	9488
NON-COLLISION	0	68	76	62	469	214	1476	2365					
STATION	0	92	144	177	1428	518	0	2360					
TOTAL NUMBER OF ACCIDENTS	0	169	225	239	1520	751	10909	14213					
NUMBER OF FATALITIES RELATED TO COLLISION	0	1	0	1	2	2	8	14					
NON-COLLISION	0	0	0	1	2	1	0	4					
STATION	0	0	0	0	1	1	0	2					
TOTAL NUMBER OF FATALITIES	0	1	0	2	5	4	8	20					
NUMBER OF INJURIES RELATED TO COLLISION	0	5	5	0	23	35	1212	1281					
NON-COLLISION	0	51	76	61	530	315	1579	2612					
STATION	0	72	182	177	1396	640	0	2467					
TOTAL NUMBER OF INJURIES	0	128	263	238	1949	991	2791	6360					
TRANSIT SYSTEMS REPORTING THESE DATA	0	1	3	1	4	2	1	12					
<b>ROADCALLS AND FACILITIES</b>													
NUMBER OF ROADCALLS FOR MECHANICAL FAILURE	0	47	0	0	0	150	0	197					
FOR OTHER REASONS	0	10	0	0	0	224	0	234					
TOTAL ROADCALLS	0	57	0	0	0	374	0	431					
NUMBER OF LIGHT MAINTENANCE FACILITIES SERVING UNDER 200 VEHICLES	0	0	3	0	0	0	0	0					
SERVING 200-300 VEHICLES	0	0	0	0	0	0	0	0					
SERVING MORE THAN 300 VEHICLES	0	0	0	0	0	0	0	0					
TOTAL LIGHT MAINTENANCE FACILITIES	0	0	3	0	0	0	0	0					
<b>ENERGY CONSUMPTION</b>													
GALS OF DIESEL FUEL (MILLIONS)	0	0	0	0	0	0	0	0	0	0	0	0	0
GALS OF GASOLINE (THOUSANDS)	0	0	0	0	0	0	0	0	0	0	0	0	0
GALS OF LPG OR LNG (THOUSANDS)	0	0	0	0	0	0	0	0	0	0	0	0	0
GALS OF BUNKER FUEL (THOUSANDS)	0	0	0	0	0	0	0	0	0	0	0	0	0
KILOWATT HOURS OF ELECTRICITY (MILLIONS)	0	28.0	101.6	73.7	532.2	639.0	1911.5	3286.0					
TRANSIT SYSTEMS REPORTING THESE DATA	0	1	3	1	4	2	1	12					
TOTAL NUMBER OF TRANSIT SYSTEMS	0	1	3	1	4	2	1	12					

Table 3.--Data on individual transit authorities, from 1989 Section 15 annual report

TABLE 3.18.4 as of 11/16/90  
 TRANSIT PERFORMANCE INDICATORS: DETAILS BY TRANSIT SYSTEM  
 DIRECTLY OPERATED SERVICE  
 Fiscal year ending between 01/01/89 and 12/31/89

ID CODE	ST	TRANSIT SYSTEM	MODE	1000 & OVER VEHICLES OPERATED IN MAXIMUM SERVICE					
				VEHICLES OPERATED IN MAXIMUM SERVICE#	TRANS-PORTATION EMPLOYEES PER VEH. OPERATED IN MAX. SERVICE	MAINTENANCE EMPLOYEES OPERATED IN MAX. SERVICE	ADMINISTRATION EMPLOYEES PER VEH. OPERATED IN MAX. SERVICE	EMPLOYEES PER VEHICLE OPERATED IN MAXIMUM SER. VICE	
9021	CA	Los Angeles-SCRTD	MB	1939	2.55	0.98	0.44	4.07	
3030	DC	Washington, D.C.-WMATA	MB	1400	1.96	0.78	0.41	3.63	
5056	IL	Chicago-CTA	RR	576	1.51	3.38	1.08	5.98	
1003	MA	Boston-MBTA	RR	1803	2.59	1.02	0.20	3.96	
			RR	923	2.48	1.74	0.34	4.06	
			MB	814	1.82	0.79	0.43	3.27	
			RR	449	2.00	2.60	1.66	6.73	
			SC	6	14.33	28.17	8.00	54.50	
			TB	25	3.24	1.60	0.68	5.92	
2080	NJ	Newark-NJT Corp	CR	613	2.25	2.80	0.65	6.91	
			MB	1648	1.76	0.63	0.36	2.79	
2008	NY	New York CTA	SC	22	1.14	1.30	0.25	2.78	
			MB	3103	2.89	1.32	0.57	4.86	
2100	NY	New York-LIRR	RR	5024	1.29	2.74	1.66	6.38	
3019	PA	Philadelphia-SEPTA	CR	1040	1.48	2.03	0.83	5.79	
			CR	275	2.57	3.03	0.86	6.66	
			MB	1169	2.28	0.80	0.37	3.54	
			RR	297	2.61	3.32	0.80	7.01	
			TB	176	3.50	3.45	1.06	7.71	
			SC	62	1.90	2.40	0.81	6.68	
0001	WA	Seattle Metro	MB	832	1.90	0.66	0.42	3.22	
			SC	2	1.85	2.89	0.80	9.60	
			TB	106	2.55	0.64	0.52	3.90	
			VP	231	0.00	NR	0.13	0.13	

#Th. numbers for vehicles operated in maximum service are for those used for directly operated services only as reported on Form 003  
 P following the Reporter ID indicates a private carrier.  
 "NR" indicates data not reported by agency.

1 The mode of transportation operated by the transit authority is identified by the following codes: MB = motorbus; RR = rapid rail; SC = streetcar or light rail; TB = trolleybus; CR = commuter rail; VP = vanpool.

Adapted from 1989 Section 15 annual report.

Table 4.--Number of passengers, transit car miles, and casualties by rail rapid transit system, 1989

Rail rapid transit system	Number of passengers	Transit car miles	Casualties			
			Total for year Injuries	Fatalities	Per 1 million passengers Injuries	Fatalities
SEPTA	65,929,825	16,082,791	198	2	3.00	.03
MDTA	12,543,689	2,936,300	12	0	.96	0
MARTA	66,970,000	15,157,000	35	1	.52	.01
MTAHD	13,734,504	3,365,600	2	0	.15	0
GCRTA	5,423,230	2,136,661	47	0	8.70	0
BART	65,938,989	36,114,474	68	0	1.03	0
WMATA	144,828,519	36,016,116	62	1	.43	0
CTA	145,094,677	54,217,729	58	7	.40	.05
MBTA	126,112,400	15,975,154	138	0	1.09	0
NYCTA	1,069,963,024	324,916,291	2,172	34	2.03	.03
PATH	56,330,414	13,235,169	23	1	.41	.02
PATCO	11,032,398	4,216,688	29	0	2.63	0

Source: Safety Information Reporting and Analysis System

Table 5.--Summary of selected data on rail rapid transit systems from Section 15 annual reports and SIRAS reports for 1988 and 1989

Item	Section 15 <sup>1</sup>		SIRAS <sup>2</sup>	
	1988	1989	1988	1989
Number of accidents related to collision	12	9,488	77	86
Number of injuries	10,007	6,360	8,049	2,846
Number of fatalities	184	20	19	45
Number of transit car miles	517,444,100	532,088,000	510,533,367	523,359,973

<sup>1</sup> Urban Mass Transportation Administration annual reporting requirements for Section 15 information.

<sup>2</sup> Urban Mass Transportation Administration Safety Information Reporting and Analysis System.

strengths and weaknesses of the program. According to UMTA officials, the SIRAS reports will no longer be prepared, and the safety-related information that was being reported under Section 15 will be replaced with information to be collected on a new form (see Appendix E for new reporting form and definitions for reporting thresholds) and published as a separate report. UMTA officials acknowledged that there was duplication of and discrepancies in the information being reported under Section 15 and SIRAS. UMTA is currently preparing a Notice of Proposed Rulemaking (NPRM), based on comments received in response to the ANPRM. The Safety Board staff has been informed by UMTA staff that the safety-related data will not be a topic for comment in the NPRM.

### State Initiatives

In 1986, UMTA published a report entitled "State Regulation and Oversight of Public Transit Safety." The understanding of State oversight of rail rapid transit operations that can be gained from this report is limited because it does not always clearly delineate between bus and rail operations. For example, the report cited Georgia and New Jersey as two States that not only require a transit system to obtain a permit to operate but also require the system to meet safety criteria to obtain and retain the permit. The report, however, did not provide details of the safety criteria nor indicate if the criteria applied equally to bus and rail operations. The report also noted that the States of California, Ohio, New Jersey, and Georgia, among others, conduct investigations of transit accidents. Again, the report did not indicate if the investigations were of both bus and rapid rail accidents. Further, information obtained by Safety Board staff suggests that although some States, through their public utilities commission, have investigative functions "on the books," the accident investigation activity is minimal. In summary, although the 1986 UMTA report provides a good general overview of State oversight activity, it is not sufficiently detailed to be useful in determining the details of State oversight activity of rail rapid transit operations.

Because of the lack of details about oversight of rail rapid transit operations in the available research, the Safety Board requested information from the States and the transit agencies about oversight as it specifically related to rail rapid transit systems and followed up with interviews of both State and transit officials.

The extent of oversight exercised at the State level varies among States. The District of Columbia and the States of Virginia, Maryland, Illinois, Ohio, New Jersey, and Georgia exercise no regulatory or oversight activity with respect to the rail rapid transit operations in those localities and States. As discussed earlier, the Safety Board has previously directed correspondence to the State of Ohio recommending that legislation be enacted to establish a new agency or authorize an existing agency to oversee rail rapid transit operations (R-87-4). Despite requests for information, the Safety Board did not receive a positive response from the State of Ohio. The information below highlights the oversight activities of the States of New York, California, Massachusetts, Florida, and Pennsylvania. Because of

the uniqueness of the New York State Public Transportation Safety Board and because of the Safety Board's past position that similar agencies should be created in those States in which rail rapid transit systems are operating, a detailed discussion of its evolution, in addition to its ongoing activities, has been included.

New York.--As stated in its 1989 annual report, "the responsibility of the Public Transportation Safety Board [New York State Public Transportation Safety Board (NYSPTS)] is to oversee the safe transportation of nearly two billion passengers who annually commute on the largest public transportation fleet in the United States. This fleet is comprised of approximately 16,000 buses, 6,200 subway cars and 2,100 commuter rail cars operated by 141 different public transportation systems throughout New York State."

The NYSPTS is empowered, by State legislative authority, to:

- investigate accidents occurring on or involving public transportation systems, whether publicly or privately owned;
- establish an accident investigation reporting and analysis procedure to improve public transportation safety;
- review, approve and monitor a system safety plan to be submitted by each transportation system which is eligible for Statewide Transportation Operating Assistance;
- conduct systematic audits of system safety programs; and
- recommend the establishment of rules, regulations, or equipment and safety standards.

The NYSPTS may consist of seven members and a chairperson. The Commissioner of the State Department of Transportation serves as the chairperson for the NYSPTS. The Inspector General for the Metropolitan Transportation Authority is also a member of the board. Other board members are appointed by the Governor. The investigative staff of the NYSPTS consists of six transportation safety specialists for rail operations and seven specialists for bus operations.<sup>25</sup> The investigative staff is supported by a General Counsel's office and three staff members in an Information System Section.

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<sup>25</sup> Rail properties under the NYSPTS jurisdiction include: the Long Island Rail Road, the Metro-North Commuter Railroad, the New Jersey Transit, the New York City Transit Authority, the Niagara Frontier Transportation Authority, and the Staten Island Rapid Transportation Authority. There are 129 bus systems that fall under the jurisdiction of the NYSPTS.

In 1989, the NYSPTSBS investigated 65 rail accidents and 115 bus accidents that met the NYSPTSBS's reporting criteria.<sup>26</sup> Of the 65 rail accidents, 25 involved the NYCTA. Other than the number of accidents, there is no further breakdown of accident, injury, or fatality data by property. In addition to accident investigations, activities of the NYSPTSBS involving the NYCTA in 1989 included the following:

- review of the NYCTA's system safety plan;
- inspection of the new 63rd Street line of the NYCTA (various track and operational deficiencies were noted involving emergency exits, high voltage cables, fire extinguishers, emergency ladders, and ventilation fans); and
- monitoring of recommendations issued by the NYCTA Rail Car Door Task Force to improve rail car door design and safety.<sup>27</sup>

The origin of the New York State Public Transportation Safety Board dates back to 1974 when the New York State Select Committee on Transportation convened a hearing to focus attention on public transportation safety. National Transportation Safety Board (NTSB) staff testified at the hearing in support of creating a State agency, stating that an oversight agency for the State of New York would not conflict with the NTSB, and citing a number of cases in which there has been cooperation between the NTSB and various State agencies. However, very little transpired during the next few years. In 1979, the State Senate committee on transportation proposed three legislative recommendations, including that:

An independent state public transportation board be established with investigatory and review powers over public transportation programs and procedures.

This legislative recommendation was based on the rationale that a State level agency was necessary:

...due to the lack of the NTSB's involvement in bus transit, as well as the fact that New York State generates 25% of all public transit in the nation. To expect the federal government to expand programs that would primarily benefit one state is unrealistic....

It is imperative that this state board be independent from both [New York's] DOT and DMV [Department of Motor Vehicles]. Experience at the national level has indicated that federal

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<sup>26</sup> The accident information is based on the NYSPTSBS's 1989 annual report. The NYSPTSBS has established reporting criteria similar to that of the National Transportation Safety Board in terms of property damage, passenger evacuation, and passenger injuries and fatalities.

<sup>27</sup> Additional highlights of NYSPTSBS's 1989 activities, as noted in its annual report, are listed in Appendix F.

regulations have, at times, been a contributing factor to accidents so that to have the same agency that promulgates regulations investigate accidents can lead to a strong conflict of interest. Further as a corollary to this argument, a State Public Transportation Safety Board should not have the power to promulgate regulations, but should have the authority to:

- investigate accidents, report the results and make recommendations on the prevention of future mishaps,
- monitor safety and maintenance programs and make adjustment recommendations,
- periodically review managerial and operational safety standards,
- hold hearings, issue reports and subpoena witnesses and records regarding matters of public transportation safety,
- undertake safety research either independently or in conjunction with other state or federal agencies or non-profit organizations, and
- report annually to the Governor and Legislature on its activities and findings.

Enabling legislation was first introduced in the State Senate in 1980; the bill, however, was vetoed by the Governor because of concerns about creating a new State agency. A similar bill was introduced in 1982, but again the bill was vetoed by the Governor. However, the Governor suggested at this time that if the NYSPTSB were put under the control of the New York State Department of Transportation, he would sign the legislation. Subsequently, another bill was introduced in 1983, and the New York State PTSB finally came into existence in May 1984. The NYSPTSB was placed under the jurisdiction of the New York State Department of Transportation.

Safety Board staff contacted the PTSB to determine the status of its current activities. The executive director of the NYSPTSB provided the following information to summarize current activities:

Budget cut backs have affected the [NYS]PTSB. We have modified our approach to maximize the effectiveness of what we can do with available resources. Our enabling legislation calls for the submission of SSP's [system safety plans] and the supporting work required to approve such documents. We have reduced the level of accident investigation and reassigned available staff to the safety audit and SSP approval process. We still conduct full investigations of the most serious accidents that meet our criteria.

The CRSSS [commuter rail and subway safety section] reviews the conditions of car equipment, rails, signal systems and other areas of rail operations. These reviews have been reduced and are often

conducted as the result of an accident. Whenever an accident occurs, the CRSSS compares the circumstances surrounding the accident with the contents of the SSP. We are strong supporters of the theory that when an accident occurs: the SSP didn't address the cause; the SSP procedure or policy wasn't followed; or human error was involved. Operating conditions are also routinely monitored.

The CRSSS also reviews maintenance and inspection procedures. The CRSSS has maintained a regular program for the inspection of car rehabs, track replacements and repair programs. Staff visit the car rehab plants in Elmira and Hornell, NY and local rehab sites each year. As time permits, staff visit work sites and travel around the systems monitoring work practices and suggesting corrective actions where necessary.

The merits of State oversight agencies being within the States' departments of transportation and the merits of oversight agencies being independent were evaluated in a 1987 study by UMTA.<sup>28</sup> The study found that the primary benefits of being within the State department of transportation were: (1) low-cost access to many administrative and support services including bookkeeping, secretarial, janitorial, and office equipment and facilities; and (2) the ability to stay in close daily contact with the other divisions of the State department of transportation with which the safety agency must interact. According to the study, the merits of being independent "seem much stronger." "Independence brings the ability to promote ideas, build a strong public image, exercise budgetary control, make independent training decisions, set salaries, and decide on employment practices."

The 1987 report made no attempt to determine if the lack of independence affected the capability of the NYSPTB to perform its function. The report did state, however, that, "so far, the Board has been quite successful in accomplishing [its] mission and in winning the acceptance of the transit operators in the state. It is always difficult when a new layer of bureaucracy is introduced for the members of that bureaucracy to demonstrate that they really have a purpose in existing, that they really are adding value to the overall system of checks and balances."

Among the recommendations that were issued as a result of the 1987 UMTA study were the following:

--to the Urban Mass Transportation Administration:

Continue to push for greater state-level transit safety oversight. While some critics argue that UMTA should assume a regulatory role nationwide, we think the states are in a better position to carry out this function. They are closer to the transit agencies,

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<sup>28</sup> Transit Safety: "A Case Study of New York State's Public Transportation Safety Board." Department of Civil Engineering, Rensselaer Polytechnic Institute, UMTA-NY-11-0038-88-1, DOT-TSC-UMTA-88-6.

understand their problems better, and can be more effective, both in terms of time and cost, in maintaining a local presence.

--to the state legislatures:

Examine the status of transit safety in the state and determine whether the state's safety record is better or worse than the national average and that of comparable states. Also, determine whether significant popular support exists for a safety oversight program. If either of these conditions pertain, take steps to initiate a program like the one in New York State. Make the agency pro-active, not reactive in emphasis. Make it independent from the state DOT. Preferably place it within an agency whose overriding mission is to promote safety. Give the agency the power to close down operations, directly or indirectly, if they fail to meet acceptable standards of safety performance.

Regardless of whether it seems prudent to create a safety oversight agency or not, insist on three things from the transit operators: system safety plan covering all facets of their safety programs, special training and certification for the vehicle operators and state-certified inspection of all vehicles (and fixed facilities, as appropriate). Some of the inspections should be performed directly by the state. This can be done on a random, sampling basis with the remainder being performed by the transit agencies themselves or by state-certified inspection stations equipped to handle trucks.

In any event, do not leave the issue of transit safety open ended, unaddressed by any state statute. Give one state agency the responsibility for transit safety, even if it is only to be performed on an as-needed, emergency basis.

According to UMTA, there is no documented followup activity on these recommendations or other recommendations that have been issued in conjunction with UMTA funded or sponsored research.

California.--The State of California has vested in the California Public Utilities Commission (CPUC) the authority to regulate and oversee rail rapid transit safety in that State. The authority covers the heavy rail rapid operations of the BART in San Francisco, and the Southern California Rapid Transit District, in Los Angeles, which now has heavy rail operations under construction. The regulatory authority is specifically described in several different sections of the California Public Utilities Code enacted by the State legislature. The most pertinent of these sections is Section 99152 which reads, in part, as follows:

...public transit guideways are subject to regulations of the Public Utilities Commission relating to safety appliances and procedures. The Commission shall develop an oversight program employing safety planning criteria, guidelines, safety standards,

and safety procedures to be met by operators in the design, construction, and operation of those guideways.

The Rail Transit Safety Branch of the Safety Division of the CPUC has developed procedures for its accident investigation activities. The CPUC approach to accident investigations on rail rapid transit systems was illustrated in a letter of June 26, 1990, from the CPUC to the Southern California Rapid Transit District. The letter stated, in part:

Certain accidents may be judged by the California Public Utilities Commission to require an independent investigation by CPUC staff personnel. However, normally we will fulfill our accident investigation responsibilities as a part of the Rail Transit Safety Branch's overall operational safety oversight program for the Metro Blue Line. We plan to do this by actively monitoring the investigative work performed by RTD staff and any supporting RTD consultants or contractors. We have chosen this method of fulfilling our accident investigation responsibilities in recognition of RTD's overall responsibility for the safety of Blue Line operations, and to minimize duplication of effort.

In addition to its procedures for conducting accident investigations, the CPUC, through State legislation, has established safety standards for vehicles and equipment. For example, General Order No. 127 addresses regulations governing the construction, reconstruction, maintenance and operation of automatic train control systems with respect to train detection and separation, route interlocking, speed enforcement and right-of-way hazard protection on rail rapid transit systems. In response to Safety Board staff questions, the Chief of the Rail Transit Safety Branch stated that the CPUC regularly inspects vehicles, rails, signal systems, and other fixed guideways; reviews maintenance and inspection practices and procedures of the transit agency; and reviews the various training programs of the transit agency. The Rail Transit Safety Branch has developed general guidelines for the design, construction, and operation of public transit guideways, and an oversight plan specifically for the extension of the BART system.

Massachusetts.--Oversight legislation for all mass transit operations has been enacted by the State legislature of Massachusetts and is administered through the Massachusetts Department of Public Utilities (DPU). The MBTA, operating in Boston, is the only heavy rail rapid transit system in the State of Massachusetts. According to information received from the Governor's office, the State of Massachusetts, through the DPU, has established stringent certification standards for operators of public transit systems. According to the State, the DPU "monitors transit operator activities throughout the procurement and implementation of any new system or vehicles: from concept and design reviews, inspection and testing, to operating procedure and training curricular reviews." The two DPU inspectors conduct weekly inspections and tests of randomly selected MBTA vehicles, subway systems, including signals, switches, and stations, and report any findings to the appropriate MBTA managers. The DPU inspectors also conduct monthly audits of randomly selected vehicle maintenance and repair records and observe work practices of MBTA maintenance personnel. All transit

operator training programs are reviewed by the DPU, and the DPU mandates that transportation personnel be trained annually and that all motorpersons pass an annual physical examination. Also, the DPU, as a result of State legislation, limits the number of hours a transit operator or motorperson may work during and between shifts. Although the DPU has no written accident investigation program, it is notified of all collisions and does participate in and oversees postaccident investigations conducted by the MBTA.

DPU inspectors in conversations with Safety Board staff indicated that because of State budget constraints, DPU inspectors have recently been furloughed for 2 weeks.

Pennsylvania.--State legislation enacted in 1980 requires the inspection of subway cars, buses, trolleys, and trackless trolleys. The heavy rail rapid transit operations of SEPTA, operating in Philadelphia, is covered by this legislation. The Pennsylvania Department of Transportation (PADOT) and the State police are charged with the responsibility for carrying out the electric mass transit vehicle inspection program. The Safety Board's investigation of the derailment of a SEPTA train on March 7, 1990, in Philadelphia revealed that the primary role of the PADOT and State police representatives is to verify that the State inspection files are complete and that the vehicle inspection stickers are properly affixed to the cars. These representatives did not oversee the inspection activity. The actual inspections were performed by SEPTA employees.

On March 14, 1991, the Governor of Pennsylvania announced that \$340,000 had been allocated to "initiate an Expanded Rail Safety Inspection Program." According to the Governor, "this program is intended to expand the [State] Department of Transportation's existing electric mass transit vehicle inspection program to include more extensive supervision of rail vehicle inspections, as well as oversight of track and structures, signal and power systems, operating rules and procedures, employee training and qualifications, rail system safety plans, and accident investigations." Although the funds would not be available until July 1, 1991, the Department of Transportation has already begun to establish program objectives and procedures to minimize implementation time. No other agency within the State of Pennsylvania performs any regulatory or oversight activity with respect to rail rapid transit operations, including the Port Authority Transit Corporation which operates between Philadelphia, Pennsylvania, and Lindenwold, New Jersey.

Florida.--Legislation enacted by the State of Florida requires that the Metro-Dade Transit Agency, the only transit agency within the State of Florida that operates a heavy rail rapid transit system, develop and implement a system safety program plan in compliance with Florida statute, "Transit Safety Standards; Inspections and System Safety Reviews." The Florida Department of Transportation (FDOT) is the agency responsible for the enforcement of this statute and FDOT "Fixed Guideway Transportation Systems Safety Criteria" and "Equipment and Operational Safety Standards Governing Public-Sector Bus Transit Systems."

According to the system safety program plan developed by the MDTA, "certain criteria documents have been incorporated into Florida Law by reference or by submission to and acceptance by the FDOT." These documents include UMTA's "Recommended Emergency Preparedness Guidelines for Rail Transit Systems," and the FDOT's "Minimum Requirements for Transit Coaches & System Equipment."

The FDOT regularly conducts "compliance reviews" to determine if the MDTA is operating in accordance with Florida State statutes and the FDOT regulations. The Chief of the MDTA's Transit Safety and Assurance Division stated to Safety Board staff that his safety division is in continual contact with representatives of the FDOT and that the compliance reviews conducted by the FDOT are "quite helpful" to the transit agency.

## CHAPTER 2

## INDUSTRY INITIATIVES TO IMPROVE SAFETY IN RAIL RAPID TRANSIT OPERATIONS

## The American Public Transit Association

The American Public Transit Association (APTA), a cooperative, nonprofit international organization headquartered in Washington, D.C., represents the urban transit industry. APTA's members include motor bus and rapid transit systems; organizations responsible for planning, designing, constructing, financing, and operating transit systems; businesses that supply products and services to the urban transit industry; academic institutions; and public interest groups. The 12 rail rapid transit systems are members of APTA. APTA establishes committees that address matters of common interest and that plan and carry out APTA activities. According to APTA, its objectives are:

- to assist the operators of public transit in representing the public interest through the development of common policies, requirements, and purposes;
- to provide a medium for exchange of ideas and experiences;
- to promote research and investigation;
- to aid members in dealing with special interests;
- to encourage cooperation among its members, their employees, and the general public;
- to collect, compile, and make data available to members; and
- to act as the members' voice in Washington.

In 1982, the APTA board of directors created the Rail Safety Review Board (RSRB) whose purpose is "to provide the rail transit industry with the support necessary to maintain adequate self-regulation programs and a high level policy development forum for all matters concerning system safety." The general manager or chief operating officer of each APTA member transit system operating, constructing, or planning rail transit is eligible for membership in the RSRB. To achieve the above-stated purpose, the RSRB directs the following activities:

- Rail Safety Audit Program
- Rail Accident Investigation Service
- Rail Safety Review Service
- Annual safety policy forum (RSRB annual meeting)
- Direction and support of Rail Safety Committee

- Consideration of special issues arising on transit safety and subsequent direction of action on such issues and/or development of industry-wide policy
- Support of APTA training programs relative to system safety
- Provision of required resources and support to ensure implementation and maintenance of these efforts by APTA staff.

In August 1989, the RSRB released its first edition of the Rail Safety Audit Program Manual. This manual contains, among other items, procedures for the development of a system safety program plan, a sample format of a system safety program plan, and a master schedule of audits to be conducted on the transit system. The manual was developed to provide the basis for conducting the Rail Safety Audit Program (RSAP, mentioned above), to provide guidance with respect to the preparation and content of a System Safety Program Plan (SSPP), and to offer a sample format for an SSPP (see Appendix G).

APTA states in the preface to the manual:

Throughout the evolution of the RSAP, cognizance has been taken of the fact that the participating systems operate in widely disparate geophysical, political, demographic, regulatory, and financial environments. In recognition of this reality, it must be stressed that the recommendations and guidance contained herein are suggested methods of approach for use by the respective systems in the preparation of their SSPP's. Over a period of time, however, a valid goal for this Program could be the attainment of a degree of standardization, throughout the industry, with respect to SSPP format and content, as a means of demonstrating a disciplined approach to the identification and resolution of transit safety issues. This approach would also allow the rail transit industry to provide for itself a degree of proactive safety management and enhancement that would not be attainable through any other means.

Although any transit system that is currently operating, building, planning, or contemplating a rail transit system is eligible for membership in the RSRB, only those transit systems that are currently operating a rail transit system may request to participate in the Rail Safety Audit Program. Requirements for participation in the Rail Safety Audit Program, as outlined in the Rail Safety Audit Program Manual, are:

1. Development and implementation of a System Safety Program Plan according to the format and provisions of the APTA document entitled Manual for the Development of Rail Transit System Safety Program Plans,
2. Adoption of the principles of System Safety as contained in the above referenced manual,

3. Agreement to be audited for conformance with the prescribed System Safety Program Plan once during the 36 month program cycle, and
4. Payment of the Annual Participation Fee and the one time Initiation Fee as determined by APTA and the RSRB to defray the costs of program administration.

When a transit system has completed its system safety program plan, the plan is submitted to the RSRB to determine if it conforms with the Manual for the Development of Rail Transit System Safety Program Plans. After the individual system safety program plans have been approved as being in conformance, an audit of that system is then scheduled. According to the master schedule, a rail transit system will be audited once during a 3-year period.

APTA has conducted an audit of the following rail transit systems since the program was implemented: MDTA in February 1990, MTAMD in June 1990, WMATA in July 1990, CTA in October 1990, MBTA in December 1990, PATCO in February 1991, MARTA in April 1991, and GCRTA in May 1991.

The Safety Board has received copies of the final audit report of the MDTA and WMATA, the only two audit reports that have been released to the public. The audit report of the MDTA highlighted several areas of the system safety program plan that needed improvement. Deficiencies in these areas were primarily attributed to insufficient resources in the safety department to perform the tasks required of it. A summary of the audit, as contained in the report, noted the following:

The System Safety Program Plan submitted by Metro-Dade Transit Agency to APTA for review and approval was by and large one of the most thoroughly developed plans presently in use. The APTA audit staff was indeed impressed with the fact that all essential areas of operational safety were addressed and coordinated into the ongoing System Safety program.

Perhaps more impressive than the Plan itself was the level of implementation found by the audit team during the field audit. Metro-Dade has a thoroughly implemented Program, with very few areas showing need for improvement. In fact the only major obstacle to full program implementation discovered by the auditors was due to the fact that in the last agency-wide reorganization, the safety staff was reduced by 67 percent. Accordingly, those elements of the Program assigned to the System Safety Department are not being fully implemented.

This deficiency, which Metro-Dade is fully aware of, manifested itself in several check list items calling for internal audit and inspection processes. These areas are by and large being covered by temporary reassignment of the responsibility to other departments. Metro-Dade is currently working on permanent solutions to this problem area, as it fully realizes the present

arrangement does not satisfy the requirement of the System Safety Program Plan, nor does it provide the same level of assurance that these tasks are being accomplished.

The summary of the audit performed of WMATA noted the following:

The audit team found the WMATA System Safety Program Plan to be in good order with a high degree of implementation. No exceptions to plan implementation were noted on the check lists. In general, all departments were aware of the SSPP and understood the specific requirements contained in the Plan for each respective department. Administration and Implementation of the System Safety Program were relatively easy to verify, with clear documentation available on all aspects of the program through the System Safety Department. Inspection of certain field items indicated the System Safety Department is conducting the audits and inspections prescribed by the System Safety Program Plan. WMATA appears to be following accepted practice to System Safety Program in transit.

As outlined above, APTA's Rail Safety Review Board also provides a rail safety review service and an accident investigation service. A participating transit system may request a review of its safety program or any specific element of its safety program. Likewise, any participating transit system that experiences an accident may request that the accident be investigated. In both instances, APTA convenes a panel of rail transit experts from the transit community. Following the review or investigation, the panel will issue findings and/or recommendations to the transit authority outlining safety improvements that can be made to the safety program and to prevent future occurrences.

As a result of the derailment of a SEPTA train on March 7, 1990, at the 30th Street Station in Philadelphia, the general manager of SEPTA requested a safety review to examine maintenance standards and practices in effect at SEPTA. This examination was conducted to (1) determine whether SEPTA was substantially equal to its peer rail operating systems in North America in rail vehicles maintenance, (2) identify those functions in which SEPTA rail vehicle maintenance is inferior to that of its peers or is in need of early attention for any reason, and (3) suggest improvements in rail vehicle maintenance that would most enhance SEPTA's safety and reliability. The panel members spent 4 days on SEPTA property (about a month after the accident) touring maintenance facilities and interviewing employees at the facilities. The panel noted in the report of its examination that "it is important to understand that the limited time spent on the review did not allow for in-depth analysis of the procedures and practices that were observed....However, while this study was brief, it was intense. We believe that the overview it provides does 'feel the pulse' of SEPTA's current rail vehicle maintenance program and offers independent views of strengths and weaknesses observed." The report of the panel further stated: "SEPTA is

substantially equal to its peer operating systems in North America in rail vehicle maintenance, although there is much that needs improving."<sup>29</sup>

Specific findings in the report included the following:

- procedures for common tasks do not seem to be standardized between shops;
- quality assurance needs bolstering;
- maintenance information system needs bolstering;
- parts shortages is a common complaint throughout the shops visited;
- specifications for remanufacturing of Silverliners [transit cars] by contract need review;
- specific responsibilities in safety matters, now spread over more than one department, need to be more clearly delineated.

At the requests of the general managers of the WMATA, GCRTA, and MDTA, APTA convened a panel of inquiry to investigate the accidents that occurred on those systems on January 13, 1982, July 10, 1985, and April 28, 1986, respectively. These accident investigations were conducted at the same time Safety Board investigations were being conducted of these accidents. Safety Board staff found that findings and recommendations in the APTA accident investigation reports were similar to findings and recommendations made by the Board in its reports.

### Operating Transit Systems

The Safety Board requested information from the 12 rail rapid transit systems regarding their overall safety program, their views on the APTA's rail safety audit program, and an update on the systems' alcohol and drug testing programs.

System Safety Program Plans.--All 12 rail rapid transit systems currently operating in the United States participate in APTA's Rail Safety Audit Program. As previously discussed, one of the requirements for participation in this program is that the transit system develop a system safety program plan in accordance with the format provided by APTA; consequently, all systems have attempted to do so. A review of these programs indicate that although many of the systems have developed a system safety program plan that mirrors to a large extent the sample format provided by APTA, others have yet to develop a plan that provides the details

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<sup>29</sup> The peer review panel considered the peer systems of SEPTA to be those systems operating in Boston, New York, Chicago, and Toronto, primarily because elements of each system have been in operation for a half-century or more. [The committee report did not define these elements.]

envisioned by APTA's sample format. (See Appendix H for a brief overview of the physical characteristics of each rail rapid transit system.)

Role of the Safety Department.--Based on information received from the transit systems and on interviews with safety department personnel, in general, the supervisor of the safety department has direct access to the general manager. The extent of this access varies among systems. In some instances, the supervisor of the safety department has access through weekly meetings. In other cases, the supervisor of safety interacts with the general manager on a daily basis. Only a couple of transit safety officials expressed concern about the lack of direct access to the general manager and believed that the lack of direct access created problems in terms of safety concerns not being promptly addressed.

All transit safety officials interviewed praised APTA's programs, specifically the audit program. The safety officials considered the audit program to be thorough and that the audits highlighted deficiencies in the safety departments that had been overlooked.

Implementation of alcohol and drug testing programs.--All 12 rail rapid transit systems have an alcohol and drug testing program in place. Even though some of the programs were implemented directly in response to the UMTA regulations, all have continued with the program in spite of the court ruling that UMTA did not have the authority to issue these regulations. Some transit system programs were implemented before UMTA's regulations were issued. For example, WMATA implemented its program in 1985 and the MDTA implemented its program in 1987. Officials of these systems stated that with the exception of random drug testing that was implemented in response to the UMTA regulations, little change occurred as a result of the UMTA regulations. One transit official stated that because random testing had proven to be effective, they continued to conduct random testing even after the UMTA regulations were withdrawn. A review of the programs suggests, however, that the testing programs are not uniform throughout the industry. WMATA, for example, does not conduct reasonable cause testing, although the other systems do. Some systems conduct alcohol and drug testing while some systems limit their programs to drug testing.

All systems provide employee education on the effects of alcohol and drugs, and provide training to supervisors on the detection of alcohol and drug abuse. All systems have implemented employee assistance and employee referral programs.

## CHAPTER 3

## CONGRESSIONAL INITIATIVES

Congressional initiatives in the form of proposed legislation, if enacted, would address the issue of safety oversight of the rail rapid transit industry. Although the outcome of the proposed legislation is uncertain at this time, one bill (H.R. 954) would require State responsibility for safety regulation and inspection of fixed guideway transit systems to receive Federal funds, and another bill (H.R. 955) would reinstate the DOT's antidrug program rule for recipients of Federal mass transit assistance struck down by the court.

With respect to State responsibility for safety, a State would meet the requirements of the legislation, as drafted, if:

(1) the State establishes and is implementing a safety program plan for each fixed guideway mass transportation system in the State which establishes, at a minimum, safety requirements, lines of authority, levels of responsibility and accountability, and methods of documentation for such system, and

(2) the State designates an agency of the State with responsibility to:

- (a) require, review and approve, and monitor implementation of such plans; and
- (b) investigate hazardous conditions and accidents on such systems and require actions to correct or eliminate such conditions.

With respect to the antidrug rule, the legislation in essence authorizes the Secretary of Transportation to issue the final rule, "Control of Drug Use in Mass Transportation Operations," which was originally issued on November 21, 1988, and make appropriate adjustments to the implementation dates.

Additional proposed legislation (S. 1160) would amend Section 22 of the Urban Mass Transportation Act of 1964 by adding the following new subsection:

The Secretary shall, within 180 days of enactment of this subsection, make a report to Congress to include:

- (1) actions taken to identify and investigate conditions in any facility, equipment, or manner of operation as part of the findings and determinations required of the Secretary in providing grants and loans under this Act;
- (2) actions taken by the Secretary to correct or eliminate any conditions found to create a serious hazard or death or injury as a condition for making funds available through grants and loans under this Act;

- (3) a summary of all passenger-related deaths and injuries resulting from unsafe conditions in any facility, equipment, or manner of operation of such facilities and equipment financed in whole or in part under this Act;
- (4) a summary of all employee-related deaths and injuries resulting from unsafe conditions in any facility, equipment, or manner of operation of such facilities and equipment financed in whole or in part under this Act;
- (5) a summary of all actions taken by the Secretary to correct or eliminate the unsafe conditions to which such deaths or injuries were attributed;
- (6) a summary of those actions taken by the Secretary to alert transit operators of the nature of the unsafe conditions which were found to create a serious hazard of death or injury; and
- (7) recommendations to the Congress by the Secretary of any legislative or administrative actions necessary to ensure that all recipients of funds under this Act will institute the best means available to correct or eliminate hazards of death or injury, including:
  - (a) a timetable for instituting corrective actions;
  - (b) an estimate of the capital and operating costs to take such actions, and
  - (c) minimum standards for establishing and implementing safety program plans by recipients of funds under this Act.

## CHAPTER 4

## DISCUSSION

The Safety Board has addressed the issue of oversight of rail rapid transit safety in the last few years only on the systems on which the Safety Board has conducted accident investigations. The Safety Board has not recently addressed the broader issue of the adequacy of safety oversight of rail rapid transit systems in general. Based on its recent investigations of accidents that have occurred on SEPTA and the NYCTA; its previous (mid-1980s') investigations of accidents on SEPTA, NYCTA, CTA, and GCRTA; and the findings of this study, the Board believes that there is a need to address the issue of safety oversight of the rail rapid transit industry in general. The potential for substantial loss of life through collisions and derailments at high speeds, and through fire and smoke conditions necessitates continual oversight of rail rapid transit safety, especially given the economic difficulties of maintaining these systems as they age and begin or continue to deteriorate.

**Accident Data**

The transit industry has pointed to the safety record of rail rapid transit when the possibility of Federal regulation or oversight of the industry has been discussed. Indeed, Safety Board experience through accident investigations and the available data do suggest that transportation by rail rapid transit is generally safe. Nevertheless, according to SIRAS, there were 9,017 injuries and 98 fatalities reported during a 3-year period from 1987 to 1989. This level of injuries and fatalities clearly undercuts any contention that external oversight is not needed. Further, it is difficult to accurately measure the safety of rail rapid transit because of imprecise data collection and analysis methods that have been used in the past. The disparity between the number of accidents and fatalities/injuries reported during a 2-year period in the Section 15 data and the information reported to SIRAS attests to the need for improvements in the methods for collecting and analyzing safety-related data. Based on Section 15 data, the number of fatalities reported decreased from 184 to 20 from 1988 to 1989; yet, during the same period, the SIRAS data indicate that the number of fatalities increased from 19 to 45.

UMTA, through rulemaking, is attempting to improve the preciseness of data reported under Section 15, including safety data, and to streamline the number of reports required. UMTA is eliminating the SIRAS reports and has revised the form used in reporting safety data under the Section 15 requirements.

Although the Safety Board commends UMTA for its efforts to improve the preciseness of data reported under Section 15, the Board is concerned that the new form for safety data, which the Safety Board understands is now being used to collect data annually and which will not be a topic for comment in the NPRM that is to be issued regarding Section 15 reporting requirements, is

not the appropriate vehicle to obtain precise safety data for several reasons. First, the form does not distinguish between passenger injuries and fatalities and employee injuries and fatalities. The Safety Board believes that the pending legislation that would require passenger injuries and fatalities and employee injuries and fatalities to be reported separately has merit, as the failure to report the data separately in the past may well account for the disparity that existed between Section 15 and SIRAS information. Second, the form provides for the reporting of limited data (the gross number of accidents, injuries, and fatalities); the form does not provide for the reporting of data about the nature of the accidents/incidents. An accident/incident reporting form, similar to that used in other modes of transportation, should be developed and should be submitted by the transit systems periodically. This requirement will not place an undue burden on the transit systems, which have in the past been required to submit both monthly and annual data, and will result in the provision of vital information in analyzing accident/incident trends. Third, rates, based on exposure, should be published for each system in the annual reports in order to accurately reflect the level of safety of transportation by rail rapid transit. For example, the number of injuries and fatalities per million passengers that had been calculated and published in the SIRAS reports should be continued.

#### Oversight of Rail Rapid Transit Safety

Comprehensive and continual oversight of rail rapid transit safety is needed in addition to the Safety Board's selective investigations of accidents and occasional studies. Further, UMTA's initiation of Section 22 investigations is not considered a comprehensive and effective oversight program. An effective oversight program should reveal deficiencies long before they deteriorate to the point they did in the SEPTA operations, as the Section 22 investigation of that system's operations revealed. Moreover, for Section 22 investigations to be of maximum value, they must be accomplished more rapidly than the 3 years that is anticipated for completing the Section 22 investigation of the MTA in New York.

The courts have held that UMTA does not have unlimited regulatory authority over urban mass transit safety. However, continual and effective oversight does not require the promulgation of massive Federal regulations by UMTA or other Federal agencies. The Safety Board continues to believe, as it stated over a decade ago, that the primary responsibility for oversight of rail rapid transit safety rests with State and local governments in which the systems operate. The Safety Board also continues to believe, however, that the Federal government, primarily through UMTA, should play a role in assuring that the oversight responsibility is met by the State and local governments.

Information received from State and transit officials indicates that current oversight activities by State agencies vary among States. The State of New York, for example, through its State Public Transportation Safety Board, conducts accident investigations, requires the development of a system safety program plan, regularly reviews the transit system's adherence to this

plan, and collects and disseminates accident and injury data. The New York State program appears to be a sound program, although the Safety Board has some concerns regarding the adequacy of resources provided to the New York program. At the other extreme, some States--such as Maryland and Virginia (with respect to the Washington Metropolitan Area Transit Authority) and Illinois, Ohio, New Jersey, and Georgia--exercise no regulatory or oversight activity. Other States, such as Massachusetts, conduct weekly inspections of vehicles and equipment and routinely audit maintenance and repair records, but do not conduct independent investigations of accidents. Although some States may have oversight activities well documented "on the books," the Safety Board is concerned that there may be little actual effort to effectively exercise those activities because the State agencies either have experienced reductions in personnel and funding or do not perceive a need to oversee rail rapid transit operations, as compared to other modes of transportation for which the State agency also has responsibility. The Safety Board believes that the States and localities in which rail rapid transit systems operate have a responsibility to assure that the systems are operated safely. However, the Safety Board is concerned that this responsibility is not being met by all the States. Consequently, the Safety Board urges all States in which rail rapid transit systems operate to develop or revise, as needed, existing programs to assure comprehensive and effective oversight of rail rapid transit safety.

The variations in the existing oversight activities exercised by the States suggest that State and local governments need guidance that describes the elements of an effective oversight program, including the frequency with which inspections, audits, and reviews of documents, records, the physical plant, and equipment should take place. The provision of such guidelines, in the Safety Board's view, is a proper function of UMTA. UMTA has long advocated that oversight responsibility is best handled by State and local authorities. The Safety Board believes that UMTA should play a more active role in seeing that this oversight responsibility is met. Consequently, the Safety Board urges UMTA, in cooperation with APTA and State and local governments, to develop guidelines that address the critical elements of an effective oversight program.

UMTA appears to have recognized the need to document State oversight activities in that the topic "State Safety Oversight Role" was listed as an area for research in UMTA's published announcements for fiscal year 1991 University Research and Training Grants. Although no applications were received, UMTA should proceed to address this issue. In addition to documenting State oversight activities, UMTA should evaluate the effectiveness of these activities. This evaluation will aid UMTA's development of the guidelines for States to use in the implementation of their oversight programs. Previous research has been conducted on State oversight activities, but it did not clearly delineate between various modes of transportation. For example, some States were cited for having effective accident investigation and vehicle inspection programs, but it was not clear if these programs applied equally to bus and rail operations. Consequently, in documenting and evaluating State oversight activities, UMTA should address specifically rapid rail operations. UMTA's evaluation of existing State oversight programs and the promulgation of guidelines to be used by States in

implementing oversight programs should be conducted expeditiously. Because much of the information for the guidelines is available through existing State programs, UMTA should be able to accomplish this objective readily. Further, once these guidelines have been developed, UMTA should work with the State and local authorities to revise existing programs to assure that the programs are in conformance with the guidelines.

The guidelines for State oversight responsibility should focus on items that will highlight safety deficiencies in operations such as reviews of maintenance and inspection records, accident investigation activities, audits of system safety program plans, reviews of the resources and activities of a transit system's safety department, reviews of training programs, monitoring of accident data, and periodic inspections of equipment and infrastructure. A discussion of a few of the elements of a State oversight program is in order.

With respect to transit system safety departments, an effective State oversight program should review and determine the extent of involvement of a transit system's safety department in operations, maintenance and inspection procedures, and training. The State oversight program should determine if sufficient resources are made available to safety departments to accomplish their missions and if the concerns of safety departments are being addressed by upper management in a timely manner. The safety department at a transit system is typically charged with addressing safety matters in all modes of transportation operated by the transit system. A safety department could be accomplishing its mission with respect to one mode of transportation but falling short in another mode simply because of insufficient resources. A State oversight program would highlight these deficiencies and call for corrective action.

The State oversight programs should utilize the activities of APTA to address the issue of safety. APTA's efforts to develop and implement system safety program plans throughout the industry and to audit the systems' conformance to these program plans are to be commended and can provide an excellent source of information for State authorities in exercising their oversight responsibility. The results of APTA's audits, which are to be conducted every 3 years, highlight deficiencies in internal safety activities of the transit systems. The State oversight program should determine if the deficiencies highlighted by these audits are being adequately addressed by the transit systems.

State oversight programs should monitor accident and injury rates at the transit systems, and, if necessary, initiate accident investigations to determine the cause of accidents. Maintenance and inspection records should be regularly reviewed and on-site visits to maintenance and inspection facilities may be necessary, if discrepancies in the records are noted.

Although the oversight by all State and local governments should focus on similar items, the mechanism by which these items are reviewed and the frequency with which they are reviewed (audited or inspected) should be a function of the characteristics and features of the transit system in question. These features include the age of the vehicles, bridges, tunnels,

tracks, and signals. The size of the system, including the number of passengers and vehicles and the track mileage, should also be considered in determining the appropriate mechanism for achieving oversight responsibility. The complexity of the system is also a factor to consider, including the variety of signal systems, whether operations are conducted automatically or manually, and the variety of equipment in operation. Consequently, the mechanism employed by State or local authorities for achieving oversight may vary from State to State. In a State where a larger, older, and more complex system is operating, a separate independent agency may be advisable or it may be satisfactory to assign an existing agency the oversight responsibility. In a State where a smaller and newer system is operating, the satisfactory mechanism for achieving oversight could be an independent contractor, a commission or board, or the department of transportation. The Safety Board recognizes that this may not lead to completely independent oversight in all cases. However, this may suffice for some systems, although the Safety Board believes that UMTA should encourage the States to make every effort to achieve independent oversight.

The Safety Board believes that it is the proper role of UMTA to ensure the implementation of effective safety oversight programs by State and local governments. The Board believes that when oversight is lacking or insufficient, UMTA should use its funding authority to ensure independent safety oversight for UMTA-funded projects and UMTA-assisted systems. For example, UMTA could require that a percentage of the funds it makes available to State and local authorities be used to implement oversight programs and to correct deficiencies noted as a result of these oversight programs. Thus, UMTA should monitor the safety oversight programs implemented by the State and local governments to determine if the elements of a proper program are in place and if the mechanism through which the oversight is being accomplished is appropriate given the nature of the particular transit system. Finally, if UMTA's monitoring of State and local programs indicates that the programs are not being effectively implemented, further financial assistance could be withheld until the State or local authorities take action to implement an effective oversight program.

#### Alcohol and Drug Testing Programs

All major rapid transit rail systems operating in the United States have drug and alcohol testing programs in place. In conjunction with this study, the Safety Board received details of the programs from each of the transit systems. Although the Safety Board commends the transit industry for implementing testing programs, the information received also indicates that there are some inconsistencies in the testing being conducted among the systems. For example, some systems conduct random testing while others do not. WMATA does not conduct reasonable cause testing while the other systems do. Although the inconsistencies within the transit industry cause the Safety Board concern, the Board has expressed its concern to the Secretary, U.S. Department of Transportation, about the broader issue of inconsistencies in testing in all transportation modes. Through Safety Recommendations I-89-4 through -12, issued in 1989, the Safety Board will continue to address the uniform implementation of testing programs in all

modes of transportation. However, the Safety Board urges the Secretary of Transportation to include rail rapid transit in its ongoing efforts to address these safety recommendations and, if necessary, seek the legislative authority to do so.

**CONCLUSIONS**

1. Available information suggests that transportation by rail rapid transit is generally safe. However, because of the potential for catastrophic accidents, external oversight is necessary.
2. Precisely measuring the safety of transportation by rapid rail and accident trends is difficult because of inadequate data collection and analysis.
3. Primary responsibility for oversight of rail rapid transit safety properly resides with the State and local governments in which the systems operate.
4. The Urban Mass Transportation Administration (UMTA) has a legitimate role in assuring safety on rail rapid transit systems; UMTA can do so by providing guidelines to State and local authorities for their development of effective oversight programs.
5. The Urban Mass Transportation Administration's evaluation of existing State oversight programs will aid it in the development of guidelines for use by State and local authorities.
6. The guidelines for State oversight responsibility should focus on items that will highlight safety deficiencies in operations such as reviews of maintenance and inspection records, accident investigation activities, audits of system safety program plans, reviews of transit systems' safety departments, reviews of training programs, monitoring of accident data, and periodic inspections of equipment and infrastructure.
7. Existing State oversight programs vary greatly in their effectiveness and scope because the Urban Mass Transportation Administration has not provided guidelines to assist the State or local authorities in implementing their oversight programs.
8. The Urban Mass Transportation Administration's monitoring of safety oversight programs implemented by the States has been limited because no guidelines exist to determine if the elements of a proper program are in place and if the mechanism through which the oversight is being accomplished is appropriate given the nature of the particular transit system.
9. The Urban Mass Transportation Administration (UMTA) lacks a methodology to ensure independent safety oversight for UMTA-funded projects and UMTA-assisted systems.
10. There are differences among the alcohol and drug testing programs of the transit systems resulting in inconsistent testing of operating employees of the various systems.

## RECOMMENDATIONS

As a result of this safety study, the National Transportation Safety Board made the following safety recommendations:

--to the Urban Mass Transportation Administration:

Document and evaluate the effectiveness of existing State oversight activities of rail rapid transit safety and develop guidelines for use by State and local governments that address the critical elements of an effective oversight program. (Class II, Priority Action) (R-91-33)

Monitor safety oversight programs implemented by the State and local governments to determine that the elements of an effective program are in place, that adequate financial resources are available, and that the mechanism through which the oversight is being accomplished is appropriate given the nature of the particular transit system. (Class III, Longer Term Action) (R-91-34)

Use your funding authority to ensure independent and effective safety oversight for UMTA-funded projects and UMTA-assisted systems. (Class III, Longer Term Action) (R-91-35)

Develop an accident/incident reporting form for rail rapid transit systems that distinguishes between passenger and employee injuries and fatalities and require transit systems to file these reporting forms periodically. Publish this information and exposure rate data for each system annually. Regularly analyze the data to determine trends in accidents and injuries. (Class II, Priority Action) (R-91-36)

--to the District of Columbia and all States in which rail rapid transit systems operate:

Develop or revise, as needed, existing programs to provide for continual and effective oversight of rail rapid transit safety. The elements of the oversight program should include reviews of maintenance and inspection records, accident investigation activities, audits of system safety program plans, reviews of the transit system safety department, reviews of training programs, monitoring of accident data, and periodic inspections of equipment and infrastructure. (Class II, Priority Action) (R-91-37)

--to the Secretary, U.S. Department of Transportation:

Include rail rapid transit in the standardized consistent drug/alcohol testing procedures requested by the National Transportation Safety Board in Safety Recommendations I-89-4 through -12. If necessary, seek legislative authority to do so. (Class II, Priority Action) (R-91-38)

**BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

**JAMES L. KOLSTAD**  
Chairman

**SUSAN M. COUGHLIN**  
Vice Chairman

**JOHN K. LAUBER**  
Member

**CHRISTOPHER A. HART**  
Member

**JOHN A. HAMMERSCHMIDT**  
Member

Adopted: July 23, 1991

## APPENDIX A

NATIONAL TRANSPORTATION SAFETY BOARD'S SPECIAL REPORTS  
AND ACCIDENT INVESTIGATIONS OF RAIL RAPID TRANSIT

Table 6.--Special reports by the Safety Board of rail  
rapid transit issues

Report title	Report No.
Study of Washington Metropolitan Area Transit Authority's Safety Procedures for the Proposed Metro System	NTSB/RSS-70/1
Special Study of Rail Rapid Transit Safety	NTSB/RSS-71/1
Safety Methodology in Rail Rapid Transit System Development	NTSB/RSS-73/1
Safety Effectiveness Evaluation of Rail Rapid Transit Safety	NTSB/SEE-81/1
Eight Subway Train Fires on New York City Transit Authority with Evacuation of Passengers	NTSB/SIR-81/5
Accidents Involving Passengers Between Coupled Cars on the New York City Transit Authority	NTSB/SIR-82/1
Derailment of New York City Transit Authority Trains Involving Traction Motor Mount Failures	NTSB/SIR-82/2
New York City Transit Authority Subway System Fires	NTSB/SIR-85/4

Table 7.--Major investigations conducted by the Safety Board of rail rapid transit accidents<sup>1</sup>

System	Accident date	Accident type	Report No.
MBTA	August 1, 1975	rear-end collision	NTSB/RAR-76/5
CTA	January 9, 1976	rear-end collision	NTSB/RAR-76/9
GCRTA	August 18, 1976	rear-end collision	NTSB/RAR-77/5
CTA	February 4, 1977	rear-end collision	NTSB/RAR-77/10
GCRTA	July 8, 1977	head-on collision	NTSB/RAR-78/2
NYCTA <sup>2</sup>	December 12, 1978	derailment	NTSB/RAR-79/8
BART	January 17, 1979	onboard fire	NTSB/RAR-79/5
NYCTA	July 3, 1981	rear-end collision	NTSB/RAR-82/2
WMATA	January 13, 1982	derailment	NTSB/RAR-82/6
NYCTA	March 17, 1984	derailment	NTSB/RAR-85/7
CTA	August 17, 1984	collision	NTSB/RAR-85/11
NYCTA	May 15, 1985	derailment	NTSB/RAR-86/1
MDTA	June 26, 1985	rear-end collision	NTSB/RAR-86/3
GCRTA	July 10, 1985	rear-end collision	NTSB/RAR-87/1
SEPTA	August 23, 1986	collision	NTSB/RAR-87/4
NYCTA	March 10, 1989	rear-end collision	NTSB/RAR-90/1
SEPTA	March 7, 1990	derailment	NTSB/RAR-91/1

<sup>1</sup> The severity of some accidents is such that the Safety Board conducts comprehensive investigations that result in more detailed information than is collected from the investigations of less severe accidents. These more comprehensive investigations are called major investigations.

<sup>2</sup> During the investigation of the NYCTA derailment of December 12, 1978, three subsequent derailments on the NYCTA occurred. All four derailments were discussed in one accident report.

## APPENDIX B

OVERVIEW OF RAIL RAPID TRANSIT SAFETY RECOMMENDATIONS  
DISCUSSED IN THE REPORT

Safety Recommendation No.: R-71-15  
Date Issued: June 16, 1971  
Recipient: UMTA  
Status: Closed--Acceptable Action  
Date Closed: September 10, 1976

**Subject:**

Require that all rail rapid transit applications for capital improvement, demonstration, and research and development grants include a system safety plan for the project for which funds are being requested. This plan might include, but not be limited to, such items as: (a) a description of the safety organization and its position in the total organization, (b) identification of the tasks to be accomplished by the safety organization, (c) the technical methods to be used for accomplishment of these tasks, (d) a schedule for task completion, keyed to major program milestones, (e) a description of the output from the safety effort, (f) the methods for applying this output to identify the hazards, to evaluate the risks, and to determine the alternatives to assumption of these risks, (g) the documentation to be developed.

**Brief Narrative of Status Assignment:**

In December 1973, UMTA awarded a contract to the Transit Development Corporation to provide technical support to UMTA in its research and development programs for urban rapid rail vehicles, systems, and system safety. Based on this contract, it appeared that UMTA was working with the transit systems, particularly the new systems being developed in Atlanta and Baltimore, to address system safety plans. As a result, the recommendation was classified as "Closed--Acceptable Action."

Safety Recommendation No.: R-71-19  
Date Issued: June 16, 1971  
Recipient: Federal Railroad Administration  
Status: Closed--Acceptable Action  
Date Closed: November 17, 1975

**Subject:**

Establish, by regulation, a uniform system of data gathering and accident reporting encompassing all the rail rapid transit operations in the United States from which statistics can be compiled to determine the status of safety in rail rapid transit operations. The Safety Board is aware that FRA is studying the existing accident reporting system for railroad accidents under the Accident Reports Act, and recommends that the rail rapid transit accident reporting requirements be included in any new system of accident reporting.

**Brief Narrative of Status Assignment:**

As discussed in the text of the report, the FRA in 1974 issued regulations that revised reporting requirements for the railroad industry and extended the applicability of these requirements to the rail rapid transit industry. As a result, the recommendation was classified as "Closed--Acceptable Action" even though the courts ultimately decided that FRA's authority did not extend to the rail rapid transit industry.

Safety Recommendation No.: R-76-41  
Date Issued: August 23, 1976  
Recipient: Chicago Transit Authority  
Status: Closed--Unacceptable Action  
Date Closed: October 16, 1985

**Subject:**

Develop the full potential of the safety department, involve it in all phases of the system operation including operations, design, maintenance, and training, and provide it with more than advisory authority so that it can require implementation of system safety programs.

**Brief Narrative of Status Assignment:**

Even though CTA's initial response to this recommendation indicated that the safety department was reporting directly to the General Manager and that it was developing a comprehensive safety and system assurance study, the Board classified the recommendation as "Open--Unacceptable Action" stating that "a change in organizational structure and initiation of a study alone does

little to improve the status and function of the safety department. The recommendation was not addressed again until the Board's investigation of an accident on the CTA in August 1984. The testimony of the CTA's manager of safety at the Board's public hearing of that accident indicated that the safety department was not a key element of CTA's safety program. As a result, the recommendation was classified as "Closed--Unacceptable Action" and a new recommendation was issued to the CTA regarding the role of the safety department (R-85-95, which currently is being held in an "Open--Acceptable Action" status based on recent information that suggests that the CTA has assigned more responsibilities to its safety department).

**Safety Recommendation No.:** R-77-20  
**Date Issued:** August 19, 1977  
**Recipient:** Greater Cleveland Regional Transit Authority  
**Status:** Closed--Acceptable Action  
**Date Closed:** March 22, 1979

**Subject:**

Develop a system assurance and safety program that will provide and insure the following: (1) a set of operating rules and procedures that will provide objective requirements for a safe and efficient operation, (2) a training program that will originally acquaint operating personnel with the rules and a system of reexamination to keep them current with the rules requirements, (3) a system of supervision which will enforce the rules and will provide an efficient operation.

**Brief Narrative of Status Assignment:**

Based on information received in 1977 that a comprehensive rules book, training procedures, and a system of supervision were being developed and implemented, the recommendation was classified as "Closed--Acceptable Action." (The GCRTA was apparently informed of this action by telephone.)

**Safety Recommendation No.:** R-78-10  
**Date Issued:** March 6, 1978  
**Recipient:** Secretary, U.S. Department of Transportation  
**Status:** Closed--Unacceptable Action  
**Date Closed:** January 12, 1987

**Subject:**

Develop oversight capability to insure that the safety of rail rapid transit systems will be regulated and enforced by a

responsible state or Federal agency, within the Department of Transportation, accountability for the oversight should be assigned to the administration that controls Federal grants to aid rail rapid transit.

**Brief Narrative of Status Assignment:**

In a letter dated July 28, 1986, addressing Safety Recommendations R-81-1 and -2 (see discussion of those recommendations below), the Board pointed out to UMTA that there had been no followup activity with respect to R-78-10. UMTA subsequently responded stating that it believed its existing oversight capability was adequate and that UMTA was exercising that capability. The Board responded stating that UMTA's oversight capability consisted primarily of Section 22 investigative authority and that authority had been exercised on only one occasion. It appeared that further dialogue would prove futile, and, consequently, the recommendation was classified as "Closed--Unacceptable Action."

**Safety Recommendation No.:** R-81-1  
**Date Issued:** February 11, 1981  
**Recipient:** Secretary, U.S. Department of Transportation  
**Status:** Closed--Reconsidered  
**Date Closed:** October 1, 1982

**Subject:**

Propose legislation to explicitly authorize the Secretary of Transportation to regulate the safety of rail rapid transit systems which receive Federal financial assistance. Such legislation should include the authority to establish Federal minimum safety standards, to enforce compliance, to conduct inspections, to conduct investigations of accidents and incidents, and such other general powers and duties as are necessary to provide for effective safety oversight.

**Brief Narrative of Status Assignment:**

Less than 1 1/2 years after the Board issued R-81-01, the Board concluded that detailed regulation of the rail rapid transit safety should not lie with the Federal government. Consequently, the recommendation was closed as reconsidered in a letter to UMTA dated October 1, 1982.

Safety Recommendation No.: R-81-02  
 Date Issued: February 11, 1981  
 Recipient: Secretary, U.S. Department of Transportation  
 Status: Closed--Reconsidered  
 Date Closed: July 28, 1986

**Subject:**

Pending the enactment of legislation conferring direct regulatory authority, require the Urban Mass Transportation Administration to establish Federal guidelines for equipment and operations, to aggressively utilize existing grant programs and investigative authority to promote conformance with Federal guidelines, and to conduct a program of substantially increased safety oversight of Federal assisted rail rapid transit systems.

**Brief Narrative of Status Assignment:**

In a letter to UMTA dated July 28, 1986, the Safety Board noted that there had been no followup activity with respect to R-81-2. The Board stated in that letter that R-81-2 should have been classified as "Closed--Reconsidered" at the time R-81-1 was so classified. That action was then taken.

Safety Recommendation No.: R-81-116  
 Date Issued: December 30, 1981  
 Recipient: Governor, State of New York  
 Status: Closed--Acceptable Alternate Action  
 Date Closed: July 25, 1986

**Subject:**

Initiate the legislative and/or executive action to authorize a new or existing independent agency to properly oversee and regulate the safety of the New York City Transit Authority.

**Brief Narrative of Status Assignment:**

With the creation of the New York State Public Transportation Safety Board in May 1984, the intent of the recommendation was met. The alternate action stems from the fact that the Governor's office at the time opposed proposed legislation to create an independent agency to oversee and regulate the safety of the NYCTA, but supported action by the State Department of Transportation to accomplish the same objective using the resources of the Department.

Safety Recommendation No.: R-81-117  
 Date Issued: December 30, 1981  
 Recipient: Secretary, U.S. Department of Transportation  
 Status: Closed--No Longer Applicable  
 Date Closed: March 11, 1985

**Subject:**

Propose legislation to amend Section 107 of the National Mass Transportation Assistance Act of 1974 to substitute, for the Secretary's authority to investigate unsafe conditions in federally-funded mass transit systems, the authority to investigate any mass transit accident or incident in such systems, or any condition which affects or could affect the safety of passengers.

**Brief Narrative of Status Assignment:**

As discussed in the text of the study, Public Law 97-424 added Section 22 to the Urban Mass Transportation Act of 1964 and repealed Section 107 of the National Mass Transportation Assistance Act of 1974. Consequently, the intent of Safety Recommendation R-81-117 was no longer relevant, and the recommendation was classified as "Closed--No Longer Applicable."

Safety Recommendation Nos.: R-86-34 through -38  
 Date Issued: August 13, 1986  
 Recipient: Urban Mass Transportation Administration  
 Status: Open--Acceptable Action (all)

**Subject:**

Require that all employees involved in a rail rapid transit accident with a fatality, injury, or property damage be tested in a timely manner for alcohol and drugs.

Require rail rapid transit systems to screen for drug and alcohol abuse all prospective and transferred employees prior to employment in safety-sensitive positions.

Require rail rapid transit systems to institute procedures and information systems to inform employees of the deleterious effects on work performance of some over-the-counter and prescription drugs on work performance.

Require the removal of employees from safety-sensitive positions if the rail rapid transit medical department determines that the employees' use of a prescription drug will affect their work performance.

Encourage the creation of effective employee assistance programs to detect and treat substance abuse among rail rapid transit employees in safety-sensitive positions.

**Brief Narrative of Status Assignment:**

UMTA followed through with the issuance of regulations regarding alcohol and drug testing in the transit industry. The courts, however, ruled that UMTA did not have the authority to do so. In conjunction with this study, staff requested information regarding the alcohol and drug testing programs implemented by the transit systems. A review of this information indicated that all major rail rapid transit systems have a testing program in place, although there are some inconsistencies among the programs. The Board is addressing the broader issue of uniform testing programs in all modes of transportation through Safety Recommendations I-89-4 through -12. The Safety Board believes that rail rapid transit programs should be addressed in conjunction with these recommendations; therefore Safety Recommendations R-86-34 through -38 are classified as "Closed--Acceptable Action/Superseded" by I-89-4 through -12, issued to the Secretary, U.S. Department of Transportation, in 1989.

Safety Recommendation No.: R-87-4  
 Date Issued: May 11, 1987  
 Recipient: State of Ohio  
 Status: Closed--Unacceptable Action  
 Date Closed: May 19, 1989

**Subject:**

Initiate legislative action to establish a new independent agency or authorize an existing agency to oversee and regulate the safety of rail rapid transit systems in the State of Ohio.

**Brief Narrative of Status Assignment:**

Despite followup efforts by Safety Board staff, the State of Ohio never provided a substantive response to the recommendation. Consequently, it was classified as "Closed--Unacceptable Action."

**Safety Recommendation No.:** R-87-38  
**Date Issued:** December 8, 1987  
**Recipient:** State of Pennsylvania  
**Status:** Open--Acceptable Action

**Subject:**

Initiate legislative action to establish a new independent agency, or authorize an existing agency, to regulate and enforce the safety of rail rapid transit systems in Pennsylvania.

**Brief Narrative of Status Assignment:**

The Safety Board was informed in March 1991 that the State of Pennsylvania has allocated funds to initiate an expanded rail safety inspection program. Based on that information, the status of "Open--Acceptable Action" has been assigned.

## APPENDIX C

## CONDITIONS OF CONCERN IDENTIFIED FROM A

## 1987 INVESTIGATION OF SEPTA

In 1987, the Urban Mass Transportation Administration exercised its investigative authority under Section 22 of the Urban Mass Transportation Act, as amended, and conducted an investigation of the Southeastern Pennsylvania Transportation Authority operations. The investigation identified the following conditions of concern:

**Management**

- The extent of change needed on the Norristown High Speed Line (NHSL) is not fully appreciated by SEPTA.
- SEPTA does not have enough qualified managers to meet its needs.
- Some NHSL safety conditions are not being promptly addressed.

**Human Resources**

- Employee medical programs have some major deficiencies.

**System Safety**

- The SEPTA system safety organization is largely reactive in its operation.
- Line safety support at the NHSL is essentially nonexistent. No one at the NHSL is specifically designated a line safety person to monitor operation and plant conditions for compliance with safety standards.
- Not all SEPTA employees received a copy of the 1986 employee "Safety Rules" book.
- Contributing causes to accidents may be obscured; correction of unsafe conditions may be precluded. After an accident, if substance abuse is detected, there is a tendency to presume that it predominates over other possible mechanical or medical causes.

**Security**

- The lack of right-of-way fencing inhibits securing the system and detecting trespassers and vandals.

### Operation

- Safe operation is inordinately dependent upon each operating employee fully comprehending and strictly complying with approved rules and procedures.
- Instruction is constrained by a lack of accurately documented rules and procedures.
- Operators do not always comply with speed limits.
- Few checks are conducted to determine whether or not operators are observing operating rules and signals; supervision is minimal.
- NHSL standards, rules, and procedures are poorly documented and not all concerned employees have been given copies.
- The present operating plan contributes to the potential for hazards.

### Track and Wayside Structures

- The NHSL track right-of-way is not secure from public access and constitutes a temptation for vandals and a hazard for casual trespassers.
- Some NHSL employees do not observe good third-rail safety practices.

### Vehicles

- The antiquated Strafford and Bullet cars require excessively frequent inspection and maintenance to compensate for their age, technical deficiencies, and past poor maintenance practices.
- The Strafford and Bullet cars lack many of the safety features found on modern heavy-rail transit cars.
- There is a lack of accurate drawings and descriptive information about car equipment.
- The mismatch between the height of the anticlimbers on the cars could allow major damage should these cars collide.

### Signals

- The level of safety provided by the signaling system does not conform to modern transit practice.
- Some characteristics of the signaling system are unorthodox, necessitating reliance on unique rules and procedures.

- The signaling maintenance program is deficient.

#### Communications

- The nature and capabilities of the radio system are not in keeping with the vital role it plays in the operation of the NHSL.
- The inability of train operators to hear messages between the Controller and other trains precludes them from becoming immediately aware of problems or assisting in their resolution.
- The line telephone system serves as a backup for the radio system, but has limited capabilities for dealing with emergency situations.
- There is no well-defined preventive maintenance program for the communications systems.

#### Stations

- Some stations and appurtenances are in poor condition.
- Station stairways and railings, in addition to some deterioration, are of poor design and are a constant problem for the handicapped and the elderly.
- Gaps between station platforms and car floors present hazards for passengers.

#### Structures

- The condition of some NHSL bridge structures is marginal; highway overpasses are worse than rail bridges.
- Current structural maintenance does not address basic problems that could deteriorate into real safety problems.
- Inspection/maintenance responsibilities for many of the NHSL structures are not clearly defined where there is involvement of other agencies (city, county, State, or even Federal governments).

#### Traction Motor Distribution

- The third rail and other power equipment along the line constitute a safety hazard.
- Present control of NHSL traction power unnecessarily constrains response to emergencies.
- The Controller does not have clearly defined and documented instructions relative to the control of substation power.

- Documentation relative to traction power maintenance is all but nonexistent.
- The supply of spare and replacement parts for the solid-state rectifier units is very limited.

#### In Summary

- Management is inadequate for the needs of the NHSL; for example, there are not enough qualified managers, coordination among managers and with staff is weak, and responsibilities are not always clearly understood.
- The obsolete NHSL equipment results in excessive dependence on each employee fully comprehending and strictly complying with rules and procedures.
- The NHSL has neither clearly written, up-to-date operation and maintenance rules and procedures nor sufficient training, supervision, and enforcement.
- SEPTA safety specialists have limited influence on the NHSL. The SEPTA system safety organization is largely reactive and does not engage in significant preventive work. Line safety support at the NHSL is essentially nonexistent.
- Some NHSL accidents appear to be attributed to drugs and alcohol to the exclusion of other factors. This may obscure contributing causes and, thereby, preclude the correction of unsafe conditions.
- Security on the right-of-way, vehicle safety features, signaling/switches, and similar aspects of the NHSL are not in conformance with modern transit practice. Taken together, these conditions provide a unique environment conducive to potential hazards.
- Inadequate inspection/maintenance of the deteriorated NHSL facilities, equipment, and physical plant results in an inordinate number of opportunities for hazards.

APPENDIX D

EXAMPLE OF FINANCIAL DATA REPORTED BY TRANSIT SYSTEMS UNDER SECTION 15  
OF THE URBAN MASS TRANSPORTATION ACT OF 1964  
AND THE AGE DISTRIBUTION OF THE REVENUE VEHICLE INVENTORY

Table 8.--Example of financial data on transit systems in Section 15 annual report

TABLE 3.04 as of 11/16/90  
 SOURCES OF PUBLIC CAPITAL ASSISTANCE FOR TRANSIT: DETAILS BY TRANSIT SYSTEM  
 Fiscal year ending between 01/01/89 and 12/31/89

ID CODE	ST	TRANSIT SYSTEM	VEHICLES OPERATED IN MAXIMUM SERVICE #	TOTAL PUBLIC ASSISTANCE \$ IN THOUSANDS	PERCENT OF TOTAL PUBLIC FUNDING														
					FEDERAL						STATE						LOCAL		
					UNITA			OTHER DOT	OTHER FED	GENL REV	DEDICATED			GENL REV	DEDICATED				
					SEC 3	SEC 5, 9A, AND/OR 9	OTHER				TAX	TOLL	OTHER		TAX	TOLL	OTHER		
<b>1000 &amp; OVER VEHICLES OPERATED IN MAXIMUM SERVICE</b>																			
9021	CA	Los Angeles-SCRTD	1939	321037.4	31.3	27.1	0.5	0.0	0.0	0.0	0.0	19.6	0.0	0.0	0.0	18.5	0.0	2.9	
3030	DC	Washington, D.C.-WMATA	1976	283611.5	0.1	9.2	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	0.0	0.0	
5066	IL	Chicago-CTA	2888	49003.6	23.7	43.8	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.5	0.0	0.0	
1003	MA	Boston-MBTA	1459	142428.4	26.0	23.5	24.8	0.0	3.3	21.3	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	
2080	NJ	Newark-NJT Corp	2461	194349.9	11.2	33.0	1.2	0.0	0.0	0.3	8.0	0.0	46.3	0.0	0.0	0.0	0.0	0.0	
2008	NY	New York CTA	8127	792295.3	13.3	43.3	1.9	0.0	0.9	7.3	0.0	0.0	0.0	0.0	22.6	0.0	10.8	0.0	
3019	PA	Philadelphia-SEPTA	2040	135655.2	46.0	24.1	1.0	1.3	0.0	23.2	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	
0001	WA	Seattle Metro	1414	97219.1	35.4	20.7	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.3	42.7	0.0	0.0	
<b>500-999 VEHICLES OPERATED IN MAXIMUM SERVICE</b>																			
9014	CA	Alameda-Contra Costa TD	657	34581.1	2.0	65.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0	
9015	CA	San Francisco-MUNI	812	48573.0	1.0	73.6	2.5	0.0	0.0	0.0	0.0	13.9	8.0	0.0	0.0	0.0	0.0	0.0	
8006	CO	Denver-RTD	689	17505.3	57.3	42.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4034	FL	Miami-Dade Cnty TA	530	21997.7	2.2	25.1	1.5	0.0	0.0	47.5	0.0	0.0	0.0	0.0	23.7	0.0	0.0	0.0	
4022	GA	Atlanta-MARTA	732	100259.3	14.8	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5113	IL	Chicago-Suburban Bus Div	618	17300.0	11.7	58.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	79.2	0.0	0.0	
3034	MD	Baltimore-MTA	880	69037.4	1.3	9.5	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	10.9	0.0	10.6	
5027	MI	Minneapolis MTC	837	22793.2	10.9	41.6	0.0	0.0	21.8	0.0	0.0	0.0	0.0	0.0	62.5	0.0	0.0	0.0	
7006	MS	St Louis-B-State	636	18049.5	7.6	73.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.7	0.0	0.0	
5015	OH	Cleveland RTA	758	40617.7	36.5	0.8	54.4	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	18.7	0.0	-3.5	
0008	OR	Portland-Tr County MTD	518	21090.1	37.8	43.8	0.0	0.0	1.7	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3022	PA	Pittsburgh-PAT	646	21517.8	36.2	51.4	0.0	0.1	0.0	1.1	-0.5	0.0	15.9	0.0	0.0	2.8	0.0	0.0	
6008	TX	Houston-MTA	805	33519.0	41.1	35.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.3	0.0	0.0	
6056	TX	Dallas Arca Raprd	753	7361.7	3.0	97.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<b>250-499 VEHICLES OPERATED IN MAXIMUM SERVICE</b>																			
9003	CA	San Francisco-BART	380	148562.3	36.4	3.8	0.1	0.5	0.0	0.0	10.1	4.0	0.0	0.0	8.0	37.2	0.0	0.0	
9009	CA	San Mateo County Dsmct	259	7040.0	0.0	29.2	0.0	0.0	60.6	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

\* The numbers for vehicles operated in maximum service are for those used for both directly operated services and purchased transportation services operating less than 50 vehicles as reported on Form 9003 and 004  
 \*\* following the Reporter ID indicates a private carrier

Table 9.--Age distribution of rail rapid transit cars by transit system, 1989

Transit system and year service began	Cars in active fleet	Distribution of cars by age						Average age of fleet
		5 years or less	6-10 years	11-15 years	16-20 years	21-25 years	More than 25 years	
Number	Percent	Percent	Percent	Percent	Percent	Percent	Years	
SEPTA, 1907	383	0	32.6	0	0	0	67.4	22.7
MDTA, 1984	134	100	0	0	0	0	0	5.0
MARTA, 1979	236	50	50	0	0	0	0	5.9
MTAND, 1983	100	100	0	0	0	0	0	4.4
GCRTA, 1955	37	0	100	0	0	0	0	6.0
BART, 1972	526	17.1	0	33.3	49.6	0	0	13.1
WMATA, 1976	638	48.9	4.4	46.7	0	0	0	7.9
CTA, 1982	1,217	30.3	18.7	15.8	11.8	14.1	9.3	12.0
MBTA, 1894	296	18.9	64.2	0	16.9	0	0	9.8
NYCTA, 1904	6,106	23.7	5.3	12.3	11.0	26.4	21.2	17.2
PATH, 1908	376	25.3	0	0	12.2	53.5	9.0	18.1
PATCO, 1969	121	0	38.0	0	0	62.0	0	16.8

Adapted from UPTA's 1989 Section 15 annual report.

APPENDIX E

NEW UMTA REPORTING FORM FOR SAFETY-RELATED DATA

**Form 405  
Transit Safety**

Transit

Level

Fiscal Year      
Month Day Year

Mode

a		b	c	d
Line	Items	Incidents	Fatalities	Injuries
<b>Collisions</b>				
01	Collisions with other vehicles			
02	Collisions with objects			
03	Collisions with people			
03a	(Attempted/successful suicides)	( )	( )	( )
<b>Non-collisions</b>				
<b>Derailments</b>				
04	Derailments/buses going off road			
<b>Personal casualties</b>				
05	Inside vehicle			
06	Boarding and alighting vehicle			
06a	(Associated with lifts)	( )	( )	( )
07	In Stations/bus stops			
07a	(Associated with escalators)	( )	( )	( )
<b>Fires (no thresholds)</b>				
08	In vehicles			
09	In stations			
10	Right of way & others			
11	<b>Total</b>			
	<b>Total patrons</b>			
12	<b>Transit property damage</b>	<b>Dollar Amount</b>		

Date Prepared \_\_\_\_\_

Date Updated \_\_\_\_\_

## Form 405: Transit Safety

The purpose of Form 405 is to collect information about the safety of your transit system.

### General Information

Report data by mode for directly operated transit service only.

Report data based on your agency's accident and incident reports, not claims filed.

Report all incidents resulting in an injury or fatality, and all incidents with property damage in excess of \$1,000. Include incidents involving revenue vehicle operations, and incidents occurring in a yard or non-revenue service area involving work vehicles and service equipment. The only exception is for fires; report all fires even if there are no fatalities, injuries or property damage and which may be the result of arson.

Do not report injuries or deaths resulting from illness, robberies, assaults, and other crimes and misdemeanors.

### Definitions

**Incident:** An unforeseen occurrence resulting in casualty (injury/fatality), collision or property damage in excess of \$1,000.

**Incident Reporting Thresholds:** For an incident to be reportable, it must involve a transit vehicle or occur on transit property, and result in death, injury, or property damage in excess of \$1,000.

**Fatality:** A death confirmed within 30 days after an incident which occurs under the collision, derailment, personal casualty, or fire categories.

**Injury:** Any physical damage or harm to a person. There are no thresholds.

**Collisions with Other Vehicles:** An incident involving one or more transit agency vehicles and any other vehicle. Fatalities or injuries reported in this category should include all fatalities or injuries that occur as a result of a vehicular collision. Report fatalities or injuries that occur inside the transit vehicle as well as fatalities or injuries that occur inside other involved vehicles.

***Collisions with Objects:*** An incident involving one or more vehicles from a transit agency with an obstacle (e.g., buildings, shopping carts and other objects on rail tracks, etc.) other than vehicles or persons.

***Collisions with People:*** An incident in which one or more persons are involved in a collision with a transit agency vehicle or attempted/successful suicides.

***Derailments/Bus Going off Road:*** A non-collision incident which occurs as a result of rolling equipment leaving the rail, or buses leaving the roadway, and for roll overs. Report all incidents regardless of severity.

***Personal Casualties:***

***Inside Vehicle:*** A non-collision incident in which one or more persons within a transit vehicle are casualties not as a result of collisions, derailments, or fires.

***Boarding and Alighting Vehicle:*** A non-collision incident in which one or more persons become a casualty (injury/fatality), in boarding or alighting any transit agency's revenue vehicle as it relates to slips and falls, and incidents related to door closings or lifts.

***In Stations/Bus Stops:*** A non-collision incident in which one or more persons become a casualty (injury/fatality) within a transit facility. This is associated with escalators, stairs, passageways, platforms, etc. It includes all individuals on the transit agency property (authorized personnel, trespassers, patrons).

***Fires:*** A fire is the phenomenon of combustion manifested in flame and/or smoke that requires extinguishment by fire suppression equipment or person. Report all fires in vehicles, stations, rights-of-way even if there are no fatalities, injuries or property damage and which may be the result of arson.

***Patron:*** A person after paying fare and/or getting on board transit vehicles.

***Trespasser:*** An unauthorized person who places him/herself in an unauthorized area.

***Transit Property Damage:*** Refers to the amount paid to repair or to replace a vehicle of a transit agency to a state equivalent to that which existed prior to the incident. Property damage does not include the cost of clearing wreckage.

## **Instructions**

***Collisions with Other Vehicles:*** Report all collisions involving transit agency vehicles if there is either a death, injury or property damage in excess of \$1,000. For revenue vehicles report collisions, whether the vehicle is in revenue service or not, and include collisions between rail cars from coupling operations. Report fatalities or injuries occurring inside the transit vehicle as well as fatalities or injuries occurring inside other involved vehicles.

**Number of Incidents:** Report the number of incidents occurring from collisions, derailments, personal casualties or fires of the transit agency's vehicles. Report incidents on lines 3, 6, and 7 and on lines 3a, 6a, and 7a when associated with suicides, lifts, and escalators.

**Number of Fatalities:** Report the number of fatalities occurring from collisions, derailments, personal casualties or fires of the transit agency's vehicles. Report fatalities on lines 3, 6, and 7 and on lines 3a, 6a, and 7a when associated with suicides, lifts, and escalators.

**Number of Injuries:** Report the number of injuries occurring from collisions, derailments, personal casualties and fires of the transit agency's vehicles. Report injuries on lines 3, 6, and 7 and on lines 3a, 6a, and 7a when associated with suicides, lifts, and escalators.

**Total:** Report the total number of all fatalities and injuries occurring from collisions, derailments, personal casualties, and fires.

**Total Patrons:** Report the total number of patrons involved when a fatality or injury occurs as the result of a collision, derailment, personal casualty, or fire. This category is a subset of the Total reported on line 11.

**Transit Property Damage:** Report the total dollar (\$) figure expended for the repair of the transit property damage. This figure should represent the amount paid during the fiscal year.

**Form 405 Check List:**

- ✓ Have you based your data on accident/incident reports, not on filed claims?
- ✓ Have you reported all collisions, derailments and personal casualties involving transit vehicles or occurring on transit property that meet the reporting thresholds (injury, fatality, or property damage in excess of \$1,000)? Have you included incidents involving revenue vehicles and incidents occurring in a yard or non-revenue service area involving work vehicles and service equipment?
- ✓ Have you reported all fires even if there were no injuries, fatalities, or property damage and that may have been the result of arson?
- ✓ Have you reported all injuries, fatalities, and damage from collisions between rail cars resulting from coupling operations?
- ✓ Does the total on line 11 equal the sum of lines 01 through 10 minus lines 3a, 6a, and 7a?
- ✓ Have you reported on line 11a all transit patron fatalities and injuries occurring from collisions, derailments, personal casualties, and fires?

**Form 405: Transit Safety  
(All Reporters)  
Form Completion**

Enter all data based on the first occurrence. For example, if a fatality results from a collision involving a transit agency vehicle, enter the fatality under the Collision category rather than the Personal Casualty category. Or, if an injury results from a fire inside a transit agency vehicle, enter the injury under the Fire category.

**Line 01**

- col b: Enter collisions involving transit agency vehicles on or off the transit system property if they result in a fatality, injury, or property damage in excess of \$1,000.
- col c: Enter fatalities resulting from collisions involving transit agency vehicles (include persons in both vehicles).
- col d: Enter injuries resulting from collisions involving transit agency vehicles (include persons in both vehicles).

**Line 02**

- col b: Enter collisions of transit agency vehicles with objects if they result in a fatality, injury, or property damage in excess of \$1,000.
- col c: Enter fatalities resulting from a transit agency vehicle collision with an object.
- col d: Enter injuries resulting from a transit agency vehicle collision with an object.

**Line 03**

- col b: Enter collisions of transit agency vehicles with people if they result in a fatality, injury, or property damage in excess of \$1,000.
- col c: Enter fatalities resulting from a transit agency vehicle colliding with a person.
- col d: Enter injuries resulting from a transit agency vehicle colliding with a person.

**Line 03a**

- col b: If any of the collisions with people were a result of an attempted or successful suicide, enter the number of incidents.
- col c: If any of the collisions with people were a result of an attempted or successful suicide, enter the number of resulting fatalities.
- col d: If any of the collisions with people were a result of an attempted or successful suicide, enter the number of resulting injuries.

**Line 04**

- col b: Enter all incidents of transit agency vehicles leaving the road or track.

col c: Enter all fatalities resulting from transit agency vehicles leaving the road or track.

col d: Enter all injuries resulting from transit agency vehicles leaving the road or track.

**Line 05**

col b: Enter non-collision incidents of transit agency vehicles which result in a fatality, injury, or property damage in excess of \$1,000 inside the vehicle.

col c: Enter fatalities resulting from non-collision incidents inside transit agency vehicles.

col d: Enter injuries resulting from non-collision incidents inside transit agency vehicles.

**Line 06**

col b: Enter incidents where someone is hurt or becomes a fatality when boarding or exiting a transit agency vehicle.

col c: Enter fatalities resulting from boarding or exiting a transit agency vehicle.

col d: Enter injuries resulting from boarding or exiting a transit agency vehicle.

**Line 06a**

col b: If any of the personal casualties which occurred in boarding or alighting transit agency vehicles were associated with lifts, enter the number of incidents.

col c: If any of the personal casualties which occurred in boarding or alighting transit agency vehicles were associated with lifts, enter the number of resulting fatalities.

col d: If any of the personal casualties which occurred in boarding or alighting transit agency vehicles were associated with lifts, enter the number of resulting injuries.

**Line 07**

col b: Enter all non-collision incidents of personal casualties in transit stations or at bus stops.

col c: Enter all non-collision fatalities in transit stations or at bus stops.

col d: Enter all non-collision injuries in transit stations or at bus stops.

**Line 07a**

col b: If any of the personal casualties which occurred in transit stations were associated with escalators, enter the number of incidents.

col c: If any of the personal casualties which occurred in transit stations were associated with escalators, enter the number of resulting fatalities.

col d: If any of the personal casualties which occurred in transit stations were associated with escalators, enter the number of resulting injuries.

## APPENDIX F

## HIGHLIGHTS OF NYSPTSB'S ACTIVITIES IN 1989

The following highlights have been excerpted from the New York State Public Transportation Safety Board's (PTSB) 1989 annual report:

- In January, the Rail Safety Advisory Committee (RSAC), a group consisting of PTSB staff and transportation system safety officials, met at the Long Island Rail Road (LIRR) and discussed the 1988 annual accident statistics; the safety plan reviews and followups; the structural inspection procedures for rail properties; the PTSB Management Information System (MIS) and its relationship to the rail properties; the consultant contract for developing PTSB's system safety program plan compliance audit procedures; and the issue of drugs and alcohol in the workplace.
- In January, Board Member Kroll testified on behalf of the PTSB before the New York State Assembly's Subcommittee on Mass Transit Finance and Operations. The testimony was related to the emergency preparedness of the Metropolitan Transit Authority (MTA) and its subsidiaries.
- In February, the staff testified before the Federal Railroad Administration (FRA) in regard to the LIRR's petitions for relief from certain cab signal testing requirements and certain locomotive safety standards. At the hearing, the staff reiterated the PTSB's support of existing FRA rules pertaining to cab signal testing and locomotive safety.
- In February, the staff along with other DOT [State of New York] employees met with the LIRR and reviewed the scope of services for a proposed railroad contract to develop a strategic grade crossing plan. The intent of the plan is to systematically identify improvements needed to reduce the high incident [sic] of fatalities and injuries occurring at LIRR grade crossings. The PTSB assisted in coordinating the development of the contract to establish the strategic plan.
- In February, through a DOT [State of New York] contract with ICF Kaiser Engineers, Inc., the PTSB initiated the development of the system safety program plan compliance audit procedures. The procedures are the first of their kind to be developed in the Nation and will enable the PTSB to systematically measure the properties' compliance to their individually approved system safety plans. The contract with Kaiser Engineers was partly funded by the Urban Mass Transportation Administration (UMTA). The staff completed test audits of the procedures on various properties during the year.

- In May and October, the PTSB staff assisted the New York State Division of Criminal Justice Services in their training seminars for State and local police officers by providing detailed instruction in the discipline of accident reconstruction.
- In May, the Bus Safety Advisory Committee (BSAC), a group consisting of PTSB staff and transportation property safety officials, met at the NYCTA and discussed electrical adjusted heated right side flat and convex bus mirrors, bus rear end conspicuity taping, bus cyclops rear lighting, and bus rear door interlocks. The concept of bus rear end conspicuity taping was introduced to the NYCTA by the PTSB staff as a result of accident analysis and the need to decrease rear end accidents. During 1989, the NYCTA implemented a bus rear end conspicuity tape and rear cyclops lighting test program involving over 250 buses. In 1987, the PTSB staff completed a special study on bus rear door interlock safety and recommended that the NYCTA conduct a study to improve bus rear door interlock safety features. As a result, a fail-safe bus rear door interlock system was developed by the NYCTA and during 1989, over 300 buses were equipped with the new interlock system.
- In May, the staff visited rail car equipment overhaul facilities in Hornell and Elmira, New York. The staff reviewed the overhauls being conducted by the contractors and assessed the improvements in track testing of overhauled equipment.
- In May, the PTSB was notified that UMTA would be conducting a safety study of the MTA and its subsidiaries. The PTSB was requested to assist by providing factual accident and safety data.
- In June, based on historical accident data, the PTSB recommended to the New York State Department of Motor Vehicles that the Vehicle and Traffic Law be amended to require public transportation busdrivers to wear seatbelts.
- In July, the Board issued a Drug Safety Advisory to all transportation properties. The advisory reinforced the need to implement the UMTA guidelines relating to anti-drug programs in mass transit. The issue of drugs and alcohol in the public transportation work place has always been a concern of the PTSB, and during 1989, the PTSB tracked and monitored the transportation properties implementation of the UMTA drug rules and the Drug Free Workplace Act.
- In July, L.A. Kimball, the General Manager of the Metropolitan Suburban Bus Authority (MSBA), gave a presentation to the PTSB. The presentation included a review of PTSB concerns relating to the property's maintenance procedures and practices.

- In October, the BSAC met at Utica Transit and discussed the bus brake adjustment warning device, the Commercial Driver's Licensing Program effecting some 540,000 NYS drivers, the Federal anti-drug regulations, and the proposed busdriver seatbelt and rear cyclops lighting legislation. The BSAC was instrumental in supporting the design and testing of the brake adjustment warning device at Utica Transit. The device provides busdrivers with a visual indication warning that the bus brakes are out of adjustment.
- The staff completed safety plan reviews on the following transportation systems: LIRR, New Jersey Transit (Rail), NYCTA Rapid, and Upstate Transit.
- As part of the Department's Goal Oriented Management process, the PTSB continued to commit itself to its mission of reducing the number, rate and severity of public transportation accidents. During 1989, the PTSB developed performance measures which assisted the Board in monitoring and tracking the progress of the PTSB staff in accomplishing its mission and goals.

APPENDIX G

APTA'S SAMPLE FORMAT FOR A SYSTEM SAFETY PROGRAM PLAN

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    - 2. Objective
    - 3. Scope
    - 4. Outline of a Typical Plan
  
  - II. DETAILED INSTRUCTIONS FOR SYSTEM SAFETY PROGRAM PLAN DEVELOPMENT
    - 1.0 Introduction
    - 1.1 Authority
    - 1.2 Purpose
    - 1.3 Scope
    - 1.4 Goals
    - 1.5 Policies
    - 1.6 Update Procedures
  
    - 2.0 System Description
      - 2.1 History
      - 2.2 Scope of Service
      - 2.3 Organizational Structure
      - 2.4 Physical Plant
      - 2.5 Operations
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    - 3.0 System Safety Unit Activities
      - 3.1 Management
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-

- 3.3 Safety Tasks
- 3.4 Task Matrix
  
- 4.0 Safety-Related Activities of Other Units
- 4.1 Safety-Related Tasks
- 4.2 Task Matrix
  
- 5.0 SSPP Implementation and Maintenance
- 5.1 Program Schedule
- 5.2 SSPP Update
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- 6.0 SSPP Verification
- 6.1 New System
- 6.2 Operational System
- 6.3 Occupational Safety and Health
- 6.4 Construction Safety
- 6.5 Fire Protection
- 6.6 Safety Information and Reporting
- 6.7 Safety Training

APPENDIX - References

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FIGURE 1.1

Recommended  
 Table of Contents for a System Safety Program Plan  
 (Operational Phase)

TABLE OF CONTENTS (SAMPLE)	
<b>1.0 INTRODUCTION</b>	
1.1	Executive Approval (Policy Statement)
1.2	Authority
1.3	Purpose
1.4	Scope
1.5	Goals
1.6	Policies
1.7	Update Procedures
<b>2.0 SYSTEM DESCRIPTION</b>	
2.1	History
2.2	Scope of Service
2.3	Organisational Structure
2.4	Physical Plant
2.5	Operations
2.6	Maintenance
2.7	System Modifications
<b>3.0 SYSTEM SAFETY UNIT ACTIVITIES</b>	
3.1	Management
3.2	Methodology
3.3	Safety Tasks
3.4	Task Matrix
<b>4.0 SAFETY-RELATED ACTIVITIES OF OTHER UNITS</b>	
4.1	Safety-Related Tasks
4.2	Task Matrix
<b>5.0 SYSTEM SAFETY PROGRAM PLAN IMPLEMENTATION AND MAINTENANCE</b>	
5.1	Program Schedule
5.2	SSPP Update
5.3	Safety Audits
<b>6.0 SYSTEMS SAFETY PROGRAM PLAN VERIFICATION</b>	
6.1	New Systems
6.2	Operational Systems
6.3	Occupational Safety & Health
6.4	Construction Safety
6.5	Fire Protection
6.6	Safety Information and Reporting
6.7	Safety Training
<b>APPENDICES</b>	

Figure 1.1

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## II. RECOMMENDED GUIDELINES FOR SYSTEM SAFETY PROGRAM PLAN DEVELOPMENT

This Chapter presents recommendations for the preparation of each section of a System Safety Program Plan. Each section of the Plan is discussed separately in the following manner:

- Objectives of the section
- Synopsis of the section
- Outline of the section
- Subsection content

### SECTION 1.0 INTRODUCTION

#### Objectives of Section 1.0

The objective of Section 1.0 is to explain the Plan and describe how it is intended to be used in sustaining a safe system.

#### Synopsis of Section 1.0

This section of the Plan contains a basic definition of system safety along with specific elaborations of that definition that are applicable to the operating fixed guideway transit system. It also provides a brief description of the System Safety Program Plan document.

The INTRODUCTION should contain the following subsections:

- ▣ Identification of the statutory basis for the transit system operation
- ▣ System Safety Program Plan Policy Statement
- ▣ The purpose, scope and objectives of the System Safety Program Plan
- ▣ The transit system's policies to attain those objectives
- ▣ The procedures for periodically updating and correcting the System Safety Program Plan

#### The Outline of Section 1.0 is:

- 1.1 Authority
  - 1.2 Purpose
  - 1.3 Scope
  - 1.4 Goals
  - 1.5 Policies
  - 1.6 Update Procedure
-

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### Subsection Content

#### 1.1 Authority

The Subsection 1.1, the transit system should establish the System Safety Program Plan as an operating document that has been prepared for, and approved by, transit system top management. Reference should be made to management's approval, either by referencing the enabling signature on the title page or by other means.

The body empowered to develop the fixed guideway transit system should be identified by its legal name. Any authorizing and implementing legislation which may have been required to establish that body should be cited. This information should include federal, state and local statutes enacted to establish the transit system as the operating and/or developing entity for the transportation system or systems in the area. If the area served has multiple political jurisdictions, the interface responsibilities among these jurisdictions should be defined.

#### 1.2 Purpose

Subsection 1.2 should address the intent of the System Safety Program Plan and define why it is being written. The transit system should emphasize that the System Safety Program Plan establishes the safety philosophy of the transit system and provides the means for implementing that philosophy throughout the operational phase. For example, a System Safety Program Plan might be developed to:

- ▣ Establish a safety program on a systemwide basis
- ▣ Provide a medium through which a property can display its commitment to safety
- ▣ Provide a framework for the implementation of policies and the achievement of goals and objectives
- ▣ Satisfy federal and state requirements
- ▣ Meet accepted industry standards

In addition, the relationship of system safety to transit system operations should be defined.

This subsection should also contain system safety definitions applicable to the operating system and provide reference where appropriate, to other related terms which should be defined in the appendix.

#### 1.3 Scope

Subsection 1.3 describes the parameters of the Plan and should answer the questions of who, what and when. For example, those participants who are expected to use and be cognizant of the Plan should be identified. In addition, the specific system or systems to which the Plan applies should be named. (NOTE: Transit systems which operate both Rapid Rail, Light Rail and/or bus service may find it more effective to develop a System Safety Program which applies to all modes. If this is done, reference should be made to what sections of the plan apply to which modes.)

Also included should be a statement that the Program Plan is to be applied on a systemwide basis throughout the operational phase.

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#### 1.4 Goals

In specifying system safety goals, the transit system should be guided by the following:

- A goal must by nature be long-term. Inasmuch as the System Safety Program extends throughout the life of the transit system, the goal must have broad and continuing relevance.
- A goal must be qualitative. Goals are characterized by their broadness and continuing relevance. But they must not be so broad as to be meaningless. Specific desired results must be identified.
- A goal must be realizable. Any goal that meets the first two criteria listed above but cannot be reached is meaningless. A goal in some real sense must be attainable.

For example, a goal might be to establish and maintain a high level of safety comparable to other fixed guideway transit systems in the U.S. This goal is long-term, qualitative and realizable. Likewise other goals might be: (1) to identify, eliminate, minimize, and/or control all safety hazards; and (2) to provide appropriate actions and measures to obtain necessary safety-related agreements, permits and approvals from outside agencies, where applicable.

#### 1.5 Policies

While goals specify the needs or aims of the System Safety Program, policies specify how in general the transit system intends to reach those goals. Subsection 1.5 should present a summary of the transit system's safety policies.

Policies are central to the System Safety Program and must be established by top management. The transit system should therefore be guided by the following:

- Policies set the framework for guiding the safety program, on a relatively long-term basis
- Policies should be qualitatively and quantitatively assessable
- Policies are methods for reaching a specified objective

An example of a safety policy would be to establish a safety program incorporating public, patron, employee and equipment safety, including fire protection, loss prevention, and life safety requirements. The policies established by a specific transit system should depend on the goals defined by that system and on its system safety philosophy. These policies in turn will influence the safety objectives and tasks that comprise the System Safety Program Plan.

#### 1.6 Update Procedures

The transit system should use Subsection 1.6 to establish the frequency of review for the System Safety Program Plan and to describe the method by which updates, corrections or modifications can be made to the Plan. The procedure should state whether the Plan will be updated on demand or at selected intervals. The subsection should also include a description of the steps required for developing and issuing a change. Top management approval of the change should be included as a step when appropriate. Any change in safety goals or safety policies should be considered a top management decision.

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## SECTION 2.0 SYSTEM DESCRIPTION

### Objectives of Section 2.0

The objectives of Section 2.0 are to define the fixed guideway transit system and to describe the system's organizational structure.

### Synopsis of Section 2.0

Section 2.0 should briefly summarize the system description. The information presented should be sufficient to allow non-technical and non-transit persons to understand the system and its basic operations.

### The Outline of Section 2.0 is:

- 2.1 History
- 2.2 Scope of Service
- 2.3 Organizational Structure
- 2.4 Physical Plant
- 2.5 Operations
- 2.6 Maintenance
- 2.7 System Modification

Detailed criteria for preparing each of the subsections are as follows:

### Subsection Content

#### 2.1 History

In Subsection 2.1, the transit system should provide a chronology of key events in the fixed guideway transit system's history and a general overview of the transit system.

#### 2.2 Scope of Service

Subsection 2.2 should describe the scope of service provided by the fixed guideway transit system. The transit system should reference the general operators characteristics of the system.

#### 2.3 Organizational Structure

In Subsection 2.3, the transit system should provide or reference:

- Detailed organizational diagrams along with the title of each position
- A separate chart that details the structure of the system safety unit and identifies the key positions at all levels
- Diagrams showing the relationship and lines of communications between the system safety unit and other units of the organization

In addition, the organization charts may show the relationship of the transit system to the representatives of the various political jurisdictions through which the fixed guideway transit system operates.

#### 2.4 Physical Plant

In Subsection 2.4, the transit system should provide a brief description of the fixed guideway

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transit system. Included should be such information on the system as:

- Descriptions of aerial, at-grade and subway sections for each segment of the system
- The locations and a general description of the maintenance facilities and storage yards
- Data on the number and types of vehicles
- Built-in safety capabilities (such as emergency ventilation and sprinkler systems).

The description should also include a map of the total system.

### 2.5 Operations

In Subsection 2.5, the transit system should address operating rules and procedures and briefly describe the type of operation conducted. Some of the elements which should be referenced are emergency and disaster contingency plans, and training procedures.

A general description of operating schedules should be included, with approximate headways, dwell times and consist sizes. Also detailed should be methods of vehicle control, and procedures for selecting the methods to be used at any particular time in the operating schedule. Specific failure recovery philosophies should also be emphasized.

### 2.6 Maintenance

Subsection 2.6 should provide an overview of the maintenance practices used by the transit system.

The transit system should define the purpose and use of scheduled maintenance for all equipment and identify those maintenance tasks to be performed by transit system personnel and those that may be contracted out. Maintenance philosophy, scheduled maintenance activities, and provisions for corrective maintenance and emergency repairs should be detailed. Emphasis should be placed on any special maintenance practices, rules and procedures utilized for safety critical equipment. The rules/procedures for assuring that vehicles are safe for use in revenue service should be addressed.

### 2.7 System Modification

Subsection 2.7 should provide an overview of the manner in which safety is assured in connection with modifications and changes to the system.

The transit system should describe the process for system modification. This could include how changes are developed, implemented, documented, and evaluated for their impact on the safety of system elements and the overall system. It would also include a description of the lines of authority, levels of responsibility, and inter- and intra-organizational interfaces during the change process.

The modification and change process should be addressed from the hardware and software as well as capital and operating perspectives. This is to assure that the impact on safety is not overlooked regardless of whether modifications are being made to such elements of the system as, for example, train control, and rules and procedures. Any modification to the system has the potential for impacting safety. Thus an important part of subsection 2.7 will be a description of how the transit organization evaluates proposed modifications for their safety critical-

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ity. This initial evaluation often determines the subsequent attention that is given to safety in the modification process.

## SECTION 3.0 SYSTEM SAFETY UNIT ACTIVITIES

### Objectives of Section 3.0

The objectives of Section 3.0 are to define and describe the activities of the unit within the fixed guideway transit system responsible for system safety, including the qualifications of its staff.

### Synopsis of Section 3.0

This Section describes the system safety unit's responsibilities and how it is organized and staffed to carry them out. It states job requirements of staff members and the scope of their responsibilities. It describes some of the techniques and methodologies that should be utilized in fulfilling safety responsibilities. This Section also sets forth the tasks that are responsibility of the system safety unit, and presents a schedule, or matrix, for their accomplishment.

Sections 3.0 and 4.0, together, present an optimal approach to assuring a transit system's safety responsibilities are fulfilled. While local conditions and requirements may dictate variations in organization and division of responsibilities, every system must be able to demonstrate that these responsibilities are being met.

### The Outline of Section 3.0 is:

- 3.1 Management
- 3.2 Methodology
- 3.3 Safety Tasks
- 3.4 Task Matrix

Detailed instructions for preparing each of these subsections are as follows:

### Subsection Content

In Subsection 3.1, the responsibilities of the system safety unit are set forth and the relationship of the unit to the transit organization as a whole is described. Interfaces are delineated, as are chain-of-command and authority.

The internal organization of the safety unit is shown, and the responsibilities of the various elements of the safety staff are stated. The position descriptions for each staff member are given.

#### 3.2 Methodology

Subsection 3.2 describes the methods utilized by the system safety unit to accomplish its assigned responsibilities, which include the identification, analysis, and resolution of hazards. This description includes identification of any system safety analytical techniques, such as Hazard Resolution Procedure or fault-free analysis (FTA), used in the process. Also identified are the types of data that provide the foundation for analysis. For uniformity, transit systems should utilize the hazard severity and probability categories described in MIL-STD-882B (1984).

#### 3.3 Safety Tasks

In Subsection 3.3, the transit system identifies the specific tasks of its safety unit designed to achieve the appropriate level of safety.

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An effective System Safety Program Plan includes, but is not limited to, the following tasks of the safety unit:

- ▣ Conduct transit system safety coordination to ensure that safety information is passed to all sections of the organization.
- ▣ Represent the transit system at safety meetings seminars and other transit systems, and ensure that the information gained at these meetings is made available to other affected divisions or sections of the transit system's organization.
- ▣ Conduct or participate in all accident and incident investigations to ensure that the safety implications of accidents or incidents are investigated.
- ▣ Collect and exchange safety data with other transit systems.
- ▣ Review maintenance records and failure reports and analyses to identify safety problems related to maintenance actions. Formal safety analysis techniques are often used in such reviews.
- ▣ Develop corrective actions and assist in the evaluation of solutions to the safety problems uncovered through analyses and failure report data. Such corrective actions should be tracked to completion.
- ▣ Participate in training activities to assure that safety elements are part of the curriculum, and that safety information is disseminated to all affected employees.
- ▣ Perform appropriate analyses to assist in identifying and resolving hazards, involving those related to maintenance, operation, and Accident/Incident Investigation.
- ▣ Update the System Safety Program Plan on a periodic basis.
- ▣ Conduct safety inspections and perform system safety audits on a regular basis to monitor system-wide compliance with the Program Plan.
- ▣ Provide liaison with outside emergency response organizations and assist in such activities as familiarization training and emergency preparedness drills.
- ▣ Develop/update safety rules/procedures and emergency preparedness plans.
- ▣ Assure awareness of and compliance with pertinent legislation, regulations, and standards.
- ▣ Evaluate proposed system modifications from the safety perspective.

### 3.4 Task Matrix

In this subsection the transit system should give the following information for each task listed in Subsection 3.3:

- Interfaces with other units in the transit system
- Reports and/or key actions required, and when

Table 3.4.1. is a sample matrix showing how the information could be presented.

TABLE 3.4.1  
Sample Interfaces and Key Activities:  
Safety Unit Tasks

	INTERFACES				ACTION	FREQUENCY			
	Opns.	Maint	Admin	Other		day	month	Qr/An	other
Coordination/ Coord. Comm. Mtgs.	X	X	X	X	RPT/ REC			QTR (min)	
Interagency Coord./ Seminars, info exchng	X	X	X	X	RPT/ REC				as reqrd
Accident/Incident Investigation	X	X	X	X	RPT/ REC				as reqrd
Data Exchange	X	X	X	X	RPT		X	QTR ANNL	
Review Maintenance & Failure Data	X	X		X		X			
Hazard Identification & Resolution	X	X	X	X	RPT/ REC				as reqrd
Training	X	X	X	X			X	ANNL	
Deductive Analyses	X	X		X	RPT/ REC				as reqrd
Inductive Analyses	X	X		X	RPT/ REC				as reqrd
System Safety Program Plan Revision	X	X	X	X	REC			ANNL (min)	
Inspections/Audits	X	X		X	RPT/ REC		X		
Emergency Response Liaison	X	X		X	RPT/ REC				as reqrd
Develop/Update SOP's & Emergency Plans	X	X		X	RPT/ REC				as reqrd
Assure Compliance with Regs & Standards	X	X		X	RPT/ REC		X		
Review Proposed System Modifications	X	X	X	X	RPT/ REC				as reqrd

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## SECTION 40 SAFETY RELATED ACTIVITIES OF OTHER UNITS

### Objective of Section 40

The objective of Section 40 is to identify and schedule the activities required from other sections of the transit system in order to assure the system's safety responsibilities are fulfilled.

### Synopsis of Section 40

This section may include the safety-related tasks for all other units within the transit system, or separate sections may be developed for each of the units. In making this decision, the transit system should be guided by such factors as size and the number of the organizational elements and the complexity of the system and its operation.

Specific safety-related tasks should be assigned to various transit system elements, such as training, maintenance, operations, medical, procurement, public relations and management. These task assignments may include some activities that have routinely been performed by these elements. However, they are formalized through the System Safety Program Plan and should require preparation of documents to confirm their accomplishment.

### The Outline of Section 40 is:

- 4.1 Safety Related Tasks
- 4.2 Task Matrix

Detailed criteria for preparing each of these subsections are as follows:

### Subsection Content

#### 4.1 Safety Related Tasks

In this subsection, the transit system should identify the safety-related tasks which are to be accomplished by other units of the organization. Included are training, personnel, procurement, management oversight, security, operations and maintenance. Safety is the responsibility of all, and each segment of the organization should be continuously contributing to the total System Safety Program.

The following list represents the types of task the transit system should assign to other sections of the organization. Tasks should be developed for each unit if they are treated separately in the Program Plan.

### Tasks

- Prepared failure and unsatisfactory condition reports on problems, failures and unsatisfactory conditions encountered during normal operations to ensure that appropriate elements are notified of the problem and corrective actions are undertaken.
  - Conduct analyses of failures to determine the cause or causes for the failure... and to identify where corrective actions are warranted.
  - Develop corrective action requirements by determining trends or failure patterns.
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- ▣ Conduct operator training and refresher training to ensure that all operator personnel are continuously aware of the hazards in the system and of the correct actions to take in an emergency.
- ▣ Conduct maintenance training and refresher training to ensure that all maintenance personnel are aware of the safety hazards in performing maintenance tasks.
- ▣ Participate in investigations of accidents and incidents by assigning a qualified representative to the accident/incident investigations.
- ▣ Conduct emergency and disaster plan evaluation and training to identify problems in implementing the plans, to ensure knowledge of these plans by the transit system staff, and to maintain the proficiency of appropriate emergency personnel.
- ▣ Develop/update operating, maintenance and emergency rules and procedures.
- ▣ Implement and maintain compliance with pertinent legislation, regulations, and standards.
- ▣ Maintain configuration control for all safety-critical systems and subsystems.
- ▣ Evaluate proposed system modifications from the safety perspective.

#### 4.2 Task Matrix

In this subsection the transit system should give the following information for each task listed in Subsection 4.1:

- Responsible unit
- Interfaces with other units
- Reports and/or key actions required

Table 4.2.1. is a sample matrix showing how this information could be presented.

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TABLE 4.2.1  
 Sample Responsibilities, Interfaces, and Key Activities  
 Safety Related Tasks of Other Organizational Units

	RESPONSIBILITIES				ACTION	INTERFACES			
	Opns	Maint	Admin	Other		Opns	Maint	Admin	Other
Safety Coordination/ Coord. Comm. Mtgs.	X	X	X	X	RPT/ REC	X	X	X	X
Unsatisfactory Cond./ Failure Reports	X	X			RPT	X	X	X	X
Failure Analyses	X	X		X	RPT/ REC	X	X	X	X
Hazard Identification & Resolution	X	X	X	X	RPT/ REC	X	X	X	X
Develop Corrective Actions	X	X		X	RPT/ REC	X	X	X	X
Operator Training: Initial & Recurrent	X			X			X	X	X
Maintenance Training: Initial & Recurrent		X		X		X		X	X
Accident/Incident Investigation	X	X	X	X	RPT/ REC	X	X	X	X
Emergency Procedures: Development/Training	X					X	X	X	X
Audits/Quality Checks			X		RPT	X	X		X
Develop/Revise Rules & SOP's	X	X				X	X	X	X
Compliance with Regs & Standards	X	X	X					X	X
Configuration Management		X		X	RPT				X
Preventive Maint. & Plant Insp. Documnt.	X	X			RPT				X
Review Proposed System Modifications	X	X	X	X	REC	X	X	X	X

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5.0 SYSTEM SAFETY PROGRAM IMPLEMENTATION AND MAINTENANCE

This section should be used to describe implementation of the System Safety Program Plan and how the property will assure that safety is an integral and continuous part of its planning, specification, design, test, operation, maintenance, construction, procurement and disposal activities. This section should describe periodic, Plan updates, System Safety Program audits and reviews, and the development of directives, guidelines and instructions to implement the provisions of the plan.

5.1 PROGRAM SCHEDULE

This section describes the property's schedule for implementing the SSPP, its priorities for achieving the purpose of the System Safety Program Plan to include conformance with applicable State and Federal laws.

5.2 REQUIREMENTS FOR PROGRAM UPDATE

This section should be used to describe the property's procedures to periodically update the SSPP (annually or bi-annually).

5.3 SAFETY AUDITS

A Safety Audit Program should be described and implemented to ensure that the objectives and requirements of the property's System Safety Program Plan are being accomplished. The Audit Program should:

- ▣ Include activities for ensuring adequate on-the-job safety surveillance during system installation, checkout, maintenance, operating, and modification operations.
- ▣ Determine compliance with management safety policies as contained in this SSPP, and the property's operating rules, regulations, standards, codes, procedures.
- ▣ Recommend specific corrective action plans to eliminate or minimizing the effects of any deviations from compliance.

6.0 SYSTEM SAFETY PROGRAM VERIFICATION

Verification of compliance with the implementation activities is accomplished through reviews, tests, analyses, reports, inspections, audits, investigations, and drills.

6.1 NEW SYSTEMS

Verification of compliance with safety requirements contained in the specifications is accomplished by using coordinated reviews of contractual documentation, system design reviews, assessment of failure modes and criticality analyses, fault free analysis, preparation of test procedures, testing, and review of test results. Adherence to configuration control and other appropriate management procedures are assessed.

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**6.2 OPERATIONAL SYSTEMS**

Verification of compliance is accomplished through the review of accident/incident reports, comparison of performance to safety goals, investigations into cause and needed corrective action, inspections of facilities and equipment, adherence to configuration control and management procedures, review of operating procedures and safety rules, and emergency drills.

**6.3 OCCUPATIONAL SAFETY AND HEALTH**

Verification of compliance is accomplished through the use of surveys, inspections, and analysis of injury/illness reports.

**6.4 CONSTRUCTION SAFETY**

Verification of compliance during construction is accomplished through reviews of contract specifications, testing, and inspection of on-site work activities.

**6.5 FIRE PROTECTION**

Verification of compliance with fire protection requirements is accomplished through the use of emergency drills, inspections, incident investigations and periodic testing of fire protection and fire suppression systems.

**6.6 SAFETY INFORMATION AND REPORTING**

Verification of compliance is accomplished through a review of information contained in safety databases. Audits of reports and investigations are conducted.

**6.7 SAFETY TRAINING**

Verification of training is accomplished by reviewing and monitoring safety training activities for content to assure appropriateness of training to on-the-job requirements. Testing is conducted to assure adequacy of training. Certification and re-certification of employees in safety-critical jobs is accomplished.

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## APPENDIX H

OVERVIEW OF HEAVY RAIL RAPID TRANSIT SYSTEMS  
OPERATING IN THE UNITED STATES**Bay Area Rapid Transit District (BART)**

The rail rapid transit system of the Bay Area Rapid Transit District began serving the San Francisco Bay area in 1972. The system includes 71 miles of track; 25 miles of at-grade construction, 23 miles of aerial structure, 19 miles of underground construction, and 4 miles of underwater tube linking San Francisco with Oakland. The 600-car fleet carries about 66,000,000 passengers annually.

**Chicago Transit Authority (CTA)**

The Chicago Transit Authority (CTA) serves the city of Chicago and 39 suburbs. The CTA system has 209 miles of open line and 143 stations. A new route under construction is scheduled to begin operation in 1992. Service is provided 24 hours a day, 7 days a week on all but two routes, which provide only rush hour service. The transit car fleet consists of 1,203 electrically powered cars. CTA ridership is about 500,000 passengers per weekday.

**Greater Cleveland Regional Transit Authority (GCRTA)**

Rapid transit operations in Cleveland date back to 1913; the Greater Cleveland Regional Transit Authority was created in 1974. The 19.5 miles of track of the current rapid transit line is served by 18 stations. The 85-car electrically propelled fleet provides service 22 hours a day, 7 days a week. Rail ridership is about 5.5 million passengers annually.

**Mass Transit Administration of Maryland (MTAMD)**

In 1976, the Maryland legislature authorized funds for the construction of a rail rapid transit system. Revenue service began in 1983. The 14.2 miles of rail are served by 12 stations. Weekday service begins at 5:00 a.m. and ends at 8:00 p.m.; weekend service is from 8:00 a.m. to 5:00 p.m. The transit fleet consists of 100 electrically powered cars. Rail ridership is about 50,000 passengers per day.

**Massachusetts Bay Transportation Authority (MBTA)**

Rapid transit operations in Boston date back to 1901. In 1948, the Massachusetts legislature created a new transit agency which was renamed the Massachusetts Bay Transportation Authority in 1964. The current 45.7 miles of the rapid transit system are served by 53 stations. The 408-car fleet provides service weekly 21 hours per day and on weekends for 19 hours a day.

**Metro-Dade Transit Agency (MDTA)**

A 1978 voter referendum established the groundwork for a balanced transportation system, including rapid rail, to serve Miami and the surround suburbs in Dade County. Revenue service began in 1984. Of the 22.6 miles in the system, 21 are elevated. There are 21 stations in the system, and revenue service is generally available 18 hours per day. The 136 electrically powered cars carry about 41,000 passengers daily.

**Metropolitan Atlanta Rapid Transit Authority (MARTA)**

Legislation passed by the Georgia General Assembly in 1965 established the framework to organize Atlanta's first comprehensive rapid transit system. Revenue service began in 1979. The current 32-mile system is served by 29 stations. An additional 12.3 miles is to be completed by 1995. Service is provided to downtown Atlanta and the surrounding counties of Fulton and DeKalb 22 hours per day (from 4:00 a.m. to 2:00 a.m.). The 240 electrically powered rail cars carry about 6,080,000 passengers per month.

**New York City Transit Authority (NYCTA)**

The history of rapid transit in New York dates back to 1885 when the first train run by electrical power travelled on Ninth Avenue. In 1905, the first regular subway service began operating over 9.1 miles and carrying 300,000 passengers daily. Today, the subway fleet of more than 6,000 cars traveling on more than 716 miles of mainline trackage carry more than 3.3 million passengers each week day. There are 469 stations on the system which provides service 24 hours a day.

**Port Authority Trans-Hudson Corporation (PATH)**

The Port Authority Trans-Hudson Corporation has operations that date back to 1908. However, current service was a result of legislation enacted by the States of New Jersey and New York in 1962. The 13.9 miles of track provides service 24 hours a day. The existing fleet of 247 cars carry about 206,000 passengers each work day between New York and New Jersey.

**Port Authority Transit Corporation (PATCO)**

The Port Authority Transit Corporation (PATCO) is the operating subsidiary of the Delaware River Port Authority (DRPA) of Pennsylvania and New Jersey. PATCO's mission is to operate and maintain the rail transit facilities owned and built by the DRPA.

The PATCO rail transit line operates between Lindenwold, New Jersey, and center city Philadelphia, Pennsylvania, a distance of 14.5 miles, 2.3 miles of which are subway and 12.2 above ground. Thirteen stations are located on the 14.5 miles of line. Service is provided 24 hours a day, 7 days a week, 365 days a year. The transit car fleet consists of 121 fully compatible, multiple-unit type, high performance, electrically propelled vehicles. More than 11 million passengers ride PATCO annually.

**Southeastern Pennsylvania Transportation Authority (SEPTA)**

The Southeastern Pennsylvania Transportation Authority (SEPTA) provides public transportation throughout the Philadelphia metropolitan area, which encompasses a five-county area. The rapid transit operations of SEPTA, with a car fleet of about 400 cars carry over 5 million passengers annually.

**Washington Metropolitan Area Transit Authority (WMATA)**

Federal legislation in 1966 created the Washington Metropolitan Area Transit Authority (WMATA). The legislation included the development of a heavy rail transit service (Metrorail) to serve the greater Washington, D.C., area: the District of Columbia, Northern Virginia (Arlington and Fairfax Counties and the city of Alexandria), and Maryland (Montgomery and Prince George's Counties).

The Metrorail system is planned for 103 miles, 73 of which are currently completed. Sixty-three stations serve the 73 miles of line open, which include subway and above-ground portions. Weekday service is provided 18.5 hours per day (5:30 a.m. to 12:00 midnight); weekend service begins later each morning (8:00 a.m. on Saturdays and 10:00 a.m. on Sundays). The transit car fleet consists of 660 electrically propelled cars operating on exclusive rights-of-way. Metrorail ridership is about 500,000 passengers per day.

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