

# Manual for the Development of System Safety Program Plans for Commuter Railroads

American Public  
Transportation Association



Commuter Rail Safety Management Program

**May 15, 2006**

American Public Transportation Association  
**1666 K Street, N.W.**  
**Washington, DC 20006**

## Table of Contents

<u>Section</u>	<u>Page Number</u>
<b>Preface</b>	1
<b>1. The Importance of a System Safety Program Plan To Commuter Railroad Operations</b>	2
1.1. Purpose	2
1.2. Background	2
1.3. Relationship to APTA Commuter Rail Safety Management Program	3
1.4. Goals	4
<b>2. How To Use This Manual</b>	5
2.1. Organization	5
2.2. Element Categories	5
2.2.1. Safety Management Administrative Requirements: <i>Elements 1 - 7</i>	5
2.2.2. Safety Program Implementation: <i>Elements 8 – 17</i>	5
2.2.3. Safety Engineering Techniques and Analysis: <i>Elements 17 – 21</i>	5
2.2.4. Safety Assurance: <i>Elements 22-23</i>	5
<b>3. Safety Management Administrative Requirements</b>	6
3.1. Element 1: Policy Statement and Authority for SSPP	6
3.1.1. Policy Statement	6
3.1.2. Authority	6
3.2. Element 2: Purpose and Scope of the System Safety Program Plan	6
3.3. Element 3: Goals For System Safety Program Plan	7
3.3.1. Appropriate and Clearly Stated	7
3.3.2. Long-term, Meaningful, and Achievable	7
3.3.3. Integrated with Corporate Mission, Vision, or Values	7
3.4. Element 4: Identifiable and Attainable Objectives	7
3.4.1. Quantifiable Safety Objectives	7
3.4.2. Methodology for Implementing the Objectives	7
3.4.3. Accountability for Achieving Objectives	8

<b><u>Section</u></b>	<b><u>Page Number</u></b>
3.5. Element 5: System Description/Organizational Structure	8
3.5.1. System Description	8
3.5.2. Organizational Structure	8
3.5.3. Relationship and Authority of the Safety Department	8
3.5.4. Legislative Requirements	8
3.5.5. Safety Plan & Policy Dissemination	8
3.6. Element 6: System Planning and Integration	9
3.6.1. Strategic Program Planning	9
3.6.1.1 Scalability/Flexibility	9
3.6.1.2 Continuous Improvement Process	9
3.6.2 Administrative Controls	9
3.6.3 Interdepartmental Coordination	10
3.6.4 Interagency Coordination	10
3.7. Element 7: Safety Contract Requirements	10
3.7.1 Contracting for Operational Services	10
3.7.2 Contracting for Facilities, Equipment, and Materials	11
3.7.3 Construction Management	11
<b>4. Safety Program Implementation</b>	<b>12</b>
4.1. Element 8: Facilities Maintenance & Inspections	12
4.2. Element 9: Vehicle Maintenance Inspection/Repair	12
4.3. Element 10: Rules/Procedures Review	12
4.4. Element 11: Training	13
4.5. Element 12: Emergency Planning & Response	13
4.6. Element 13: Workplace Safety Programs	13
4.6.1. Employee Safety Program	14
4.6.2. Contractor Safety Coordination	14
4.6.3. Fitness for Duty Programs	14

<b><u>Section</u></b>	<b><u>Page Number</u></b>
4.6.3.1 Drug and Alcohol Program	14
4.6.3.2 Fatigue Program	14
4.6.3.3 Medical Monitoring Program	15
4.7 Element 14: Passenger & Public Safety Programs	15
4.7.1 Passenger Operational Environment Programs	15
4.7.2 Public Safety Programs	15
4.8 Element 15: Rail Corridor Operational Safety	15
4.8.1 Joint Freight Operations	16
4.8.2 Highway Grade Crossings	16
4.8.3 Trespassing and Intrusion	16
4.9 Element 16: Environmental Management Programs	16
4.9.1 Hazardous Materials Management	17
4.9.2 Hazardous Waste Management	17
4.9.3 Waste Minimization and Pollution Prevention Programs	17
4.9.4 Environmental Outreach Programs	18
4.10 Element 17: Security	18
<b>5. Safety Engineering Techniques and Analysis</b>	<b>19</b>
5.1. Element 18: Hazard Management Process	19
5.2. Element 19: Accident/Incident Reporting & Investigation	19
5.2.1. Criteria and Procedures	19
5.2.2. Internal/External Notification	20
5.2.3. Cause Analysis	20
5.2.4. Reporting and Follow-up Documentation	20
5.3. Element 20: Safety Data Acquisition/Analysis	20
5.4. Element 21: Loss Prevention & Control	21
5.4.1. Fire Safety Analysis	21
5.4.2. Casualty Management Review	21

<b><u>Section</u></b>	<b><u>Page Number</u></b>
<b>6. Safety Assurance</b>	<b>22</b>
6.1 Element 22: System Change Management	22
6.1.1 Configuration Management	22
6.1.1.1 Standards/Design Control	22
6.1.1.2 System Modification – New Processes/Equipment	23
6.1.1.3 Quality Assurance/Quality Control Interface	23
6.1.1.4 Safety Certification	23
6.1.1.5 Document Control	23
6.2 Element 23: Internal Safety Management Assessment	23
6.2.1 Internal Safety Audits	23
6.2.2 Security Self Assessments	24
<b>7. Summary</b>	<b>25</b>
<b>8. Appendices</b>	<b>26</b>
Appendix I	Summary of Applicable FRA Regulations
Appendix II	APTA Passenger Rail Equipment Safety Standards

## Preface

This 2006 edition of the *APTA Manual for the Development of System Safety Program Plans for Commuter Railroads* comes at a critical time in our country's history. As more people than ever rely on commuter railroads to get them safely and efficiently to their daily destinations, transportation providers are called upon to perform at the highest level of industry safety despite increasing budgetary pressures.

The 1998 edition of this manual was developed by the commuter rail industry, jointly with the Federal Railroad Administration (FRA) and the U.S. Department of Transportation, to improve overall safety on commuter railroads by building upon comparable efforts used in rail rapid transit. The experience gained with the first edition has made it clear that some methods practiced by rail rapid transit and other modes are not always directly applicable to the commuter rail environment. Among other factors the legal, financial, organizational, social, legislative, and regulatory conditions that both guide and constrain the commuter rail industry differ from those of the other modes. These six factors, in combination with the property size and operating environment, form the context for each commuter rail safety program. This edition of the APTA Manual provides the adjustments needed to better align the practice of system safety with the modal characteristics of the industry, and the unique operational context of each commuter rail system.

The development of this manual is a direct outgrowth of the work of the commuter rail industry and further refinements made by the APTA Commuter Rail Safety Subcommittee, the Federal Railroad Administration, and APTA staff. This manual was developed to serve the following purposes:

- to provide a primer for both new-start and established commuter railroad systems with regard to the definition of the elements recommended for inclusion in a commuter railroad System Safety Program Plan;
- to establish a recommended format for a System Safety Program Plan;
- to assist commuter railroad systems with established System Safety Program Plans in the continuing development and definition of their respective programs;
- and to provide tangible evidence to passengers, public, and governmental oversight agencies that the commuter railroad industry possesses the means and expertise required to develop sound, effective, pro-active safety programs designed to reduce accident potential and increase the efficiency of commuter railroad operations.

This edition of the Manual for the Development of System Safety Program Plans for Commuter Railroads is not the last word on the subject of commuter railroad system safety. Through its use by APTA in the Safety Management Program, and by the respective commuter railroad systems, it is anticipated that numerous ideas and recommendations for improvements to the manual will be forthcoming. These will be welcomed and evaluated for inclusion in the program. There are many ways to achieve safety excellence and to strive for continuous improvement in the pursuit of safety and security for commuter railroads.

**Copyright © 2006, American Public Transportation Association. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, mechanical, photocopying, recordings, or otherwise, without the prior written permission of the American Public Transportation Association.**

## **1.0 *The Importance of a System Safety Program Plan to Commuter Railroad Operations***

---

### **1.1 Purpose**

The primary purpose for the existence of a commuter railroad is to move people safely. According to statistics provided by the National Transportation Safety Board, commuter railroads have the lowest number of passenger fatalities compared to other transportation modes, regardless whether air, water, or surface transportation. Commuter railroads throughout the United States move hundreds of thousands of riders each day - safely, securely, and efficiently. To do so railroads must have a program that provides consistent, comprehensive safety guidance in a form that ensures continuity during changes in staff, infrastructure, and operating practices and conditions. Such a program must be adequately planned, organized, documented, and staffed. To be effective the program must be flexible to fit the organizational context of each individual commuter railroad, while adhering to established safety principals gained from over 100 years of operations. This process is known as *system safety*. System safety is the management and engineering discipline that addresses these needs and the System Safety Program Plan (SSPP) is the first element of a formal process for applying its principles.

A well-written SSPP will provide the basis for identifying any and all hazards that might interfere with customer and employee safety, as well as the public at large. It will provide for safety reviews of capital improvements, changes in equipment, and changes in operating practices and will include or refer to concrete methods for eliminating, minimizing, and otherwise mitigating these hazards. A SSPP also defines the lines of responsibility and authority for addressing potential hazards in an organization, and establishes safety and security tasks for departmental units that have a lead or a support role in implementation of those responsibilities.

### **1.2 Background**

The field of system safety originally evolved to meet the needs of defense and space applications, but for two decades it has been successfully applied to transportation. In the widely read "System Safety Program Requirements," MIL-STD-882B, Department of Defense, 30 March 1984, subsequently revised through version D, four elements of an effective system safety program were recognized:

- A planned approach to system safety program tasks
- Qualified personnel to accomplish the tasks
- Authority to implement the tasks through all levels of management
- Appropriate financial and personnel resources to accomplish the tasks

Through the use of a formal, planned approach to safety, commuter railroads adhering to system safety concepts have identified and resolved hazards earlier, responded to emergencies in a more orderly manner, anticipated the impact of capital programs and changes in operations, and maintained safe operation despite changes in key personnel.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

This APTA manual seeks to assist commuter railroads in applying these concepts in the context of each railroad's unique operating characteristics and hierarchy of priorities, taking into account such factors as:

- Differences among established properties, new- starts, and those in the midst of substantial growth
- Organizational structures that vary from large agencies with well-defined operational and administrative divisions of labor to smaller ones with over-lapping staff responsibilities
- Self-operated or contractor-operated properties
- Owned, leased, and shared rights of way

All commuter rail operators, regardless of size, operating configuration, or age, should apply system safety principles in a manner appropriate to its operation. This edition of the manual reflects APTA's desire to recognize this variety of operational contexts and the diversity of SSPPs required.

### **1.3 Relationship to APTA Commuter Rail Safety Management Program**

The APTA Commuter Rail Safety Management Program incorporates three distinct functions designed to support commuter railroads with attaining the highest degree of safety and security practicable, given constraints on time, resources, and operational effectiveness. In addition to this manual on developing a system safety program plan, the Commuter Rail Safety Management Program provides practical guidance on how to implement a System Safety Program Plan, including effective practices and an evaluation of the effectiveness of their system safety programs by using an external audit process. The APTA Safety Management Program is a triennial safety assessment that answers the following questions:

1. Does the railroad system have a System Safety Program Plan that conforms with the APTA *Manual for the Development of System Safety Program Plans for Commuter Railroads*?
2. Has the respective railroad's SSPP been fully implemented?
3. Does the respective railroad have an internal safety and security compliance assessment program to identify, monitor, and resolve program deficiencies?

The net result to participating commuter railroads is an improved awareness of the adequacy of their safety and security program, providing methods to continually refine and improve their program delivery. The capture of effective practices provides the industry with an ongoing, benchmarking tool to meet the demands of changing technology and ridership expectations. The Safety Management Program addresses safety management policies, plans, and practices and assesses the extent to which the system safety program conforms to sound transit practice. It offers a unique, independent perspective as to whether the railroad's management process is tracking all the items necessary to maximize safety and security in its operation. The program is thus designed to demonstrate the ability of the railroad to maintain adequate self-regulation. The program does not assess physical conditions of the railroad or its actual safety performance.



Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

## 1.4 Goals

The American Public Transportation Association (APTA) has produced this *Manual for the Development of System Safety Program Plans for Commuter Railroads* to assist its members in developing a System Safety Program Plan designed for the specific needs of a commuter railroad over the entire range of operating circumstances and system life cycles. This manual will further serve as the baseline for the APTA Commuter Rail Safety Management Program.

The main goals of the manual are:

- To establish a system safety philosophy within the commuter rail industry
- To guide commuter railroads in preparing and/or revising their SSPPs
- To assist commuter railroads in preparing for internal and external system safety reviews, assessments, and audits\*
- To provide the means by which a commuter railroad can demonstrate diligence toward the safety and security of its operations.
- To provide commitment to continuous improvement over the entire commuter rail life cycle.

\*Note: Qualification for a safety audit or security assessment requires the development and approval of a System Safety Program Plan.

## **2.0 *How to Use This Manual***

---

### **2.1 Organization**

To achieve the System Safety Program goals as described in Section 1 of this manual, specific sections of this manual have been dedicated to functions that will support the overall goal. They are:

- Section 3: Safety Management Administrative Requirements
- Section 4: Safety Program Implementation
- Section 5: Safety Engineering Techniques and Analysis
- Section 6: Safety Assurance

### **2.2 Element Categories**

#### **2.2.1 Safety Management Administrative Requirements**

Elements 1 – 7 constitute the planning phase of preparing a System Safety Program Plan in which the philosophy and strategic safety plan of the organization is developed from the mission, vision, and values of the organization. Starting with a policy statement and authority, the SSPP is developed to define goals, objectives, organizational context, administrative controls, inter-departmental coordination, and contract requirements.

#### **2.2.2 Safety Program Implementation**

Elements 8 – 17 constitute the implementation phase of the System Safety Program Plan and cover all the essential tasks that must be in place to effectively manage commuter railroad safety and security efforts. Most of these tasks are associated with APTA standards or FRA regulations.

#### **2.2.3 Safety Engineering Techniques and Analysis**

Elements 18 – 21 constitute the measurement and checking phase of the System Safety Program Plan and provide evaluation and analysis functions against the plan's performance goals and objectives. The Hazard Management process is a key feature of this phase. Loss Prevention and Loss Control, Accident Investigation, and Safety Data Acquisition/Analysis are other programs that help to identify and control hazards and to manage risk to the organization.

#### **2.2.4 Safety Assurance**

Elements 22 and 23 constitute the evaluation and corrective action phase of the System Safety Program Plan. Both internal and external reviews, assessments, and audits are used to determine if the plan and controls are functioning as intended. Opportunities for improvement are identified and reported back to the Safety Management Administrative phase to enable adjustments to existing programs, or the creation of new programs to be planned and developed that will enrich and improve the System Safety Program Plan over time.

### **3.0 *Safety Management Administration Requirements***

---

This section of the System Safety Program manual discusses general safety policies, sources of authority for the safety program, a description of how system safety fits into the organization, the organization's general goals and objectives, and the plans and procedures for controlling and updating the SSPP.

By defining, describing, and presenting the policies and practices in this template, the railroad, despite the unique aspects of its operating environment, can compile or revise its SSPP so it fosters a strong System Safety Program, conforms to sound industry practice, and meets the legislative or regulatory needs of the organization.

#### **3.1 Element 1: Policy Statement and Authority for the System Safety Program Plan**

##### **3.1.1 Policy Statement**

The commuter railroad must establish a System Safety Program Plan as an operating document that has been prepared for and approved by the commuter railroad top management. Reference should be made to the management approval either by an enabling signature on the title page or other means. Approval is generally given by the chief executive officer or the governing board.

##### **3.1.2 Authority**

The body empowered to develop the commuter railroad should be identified by its legal name. Any authorizing and implementing legislation that may have been required to establish that body should be cited. This information should include federal, state, and local statutes enacted to establish the commuter railroad 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.

The Authority Statement in the System Safety Program Plan should define as clearly as possible the authority for establishment and implementation of the System Safety Program and how that authority has been delegated through the organization and to contractors acting on behalf of the commuter rail system.

#### **3.2 Element 2: Purpose and Scope of the System Safety Program Plan**

The System Safety Program Plan must provide the reason for why it is being written. It should be emphasized that the System Safety Program Plan establishes the safety philosophy of the whole organization and provides the means for implementation.

The relationship of system safety to system operations should also be defined. In addition, all departments involved in safety or security tasks must have a clear definition of their individual responsibilities relative to the scope of the System Safety Program. Authority for plan implementation must be provided for all plan participants in detail. System safety definitions or a glossary of safety and security terms applicable to the operating system should be provided or referenced, as appropriate.

### **3.3 Element 3: Goals for System Safety Program Plan**

The overall goal of a System Safety Program for commuter railroads is to identify, eliminate, minimize, and/or control safety hazards and their attendant risks by establishing requirements, lines of authority, levels of responsibility and accountability, and methods of documentation for the organization.

#### **3.3.1 Top Down Approach**

A commuter railroad should begin with this overall goal and develop specific goals appropriate to its own program. These should be system specific goals, tailored to the individual needs of the system. They should be clearly stated and supported by the use of objectives (see section 3.4).

#### **3.3.2 Goal Requirements**

In specifying system safety goals, a commuter railroad 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 commuter railroad, the goal must have broad and continuing relevance.
- A goal must be meaningful. 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 and meaningful in terms of their impact on safety.
- A goal must be achievable. Any goal that meets the first two criteria but cannot be reached is meaningless.

3.3.3 A goal in some real sense must be linked to or integrated with the safety commitment expressed in the corporate mission, vision, and values of the organization.

### **3.4 Element 4: Identifiable and Attainable Objectives**

Objectives are the working elements of the System Safety Program, the means by which the identified goals are achieved. Objectives must meet three key conditions: be quantifiable, provide a methodology for implementation, and identify those persons accountable for attaining the desired results.

3.4.1 Objectives must be easily quantifiable and use the proper measurement scale or value as a key performance indicator; however, they must still be meaningful in that they provide a framework for the day-to-day activities that enable a safe commuter railroad operation.

3.4.2 The methodology for implementing objectives is usually met through implementation of policy instructions (PIs) and/or standard operating procedures (SOPs). Policies and standard operating procedures are central to the System Safety Program and must be established by top management.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

The commuter railroad should therefore be guided by the following:

- Policies and procedures set the framework for guiding the safety program, on a relatively long-term basis;
- Policies and procedures should be assessable to those governed by them.

3.4.3 Identification of personnel accountable for attaining the objective is central to tracking and measuring progress toward desired results. Performance appraisal systems that evaluate safety performance as a key criteria are effective means to satisfy this need.

### **3.5 Element 5: System Description/Organizational Structure**

The objectives of this section are to define the commuter railroad's organizational context, operating environment, and physical characteristics, including service and performance parameters.

#### **3.5.1 System Description**

This section should briefly describe the system characteristics. The information presented should be sufficient to allow non-technical and non-commuter railroad persons to understand the system and its basic operations. The following components should be included in the System Description:

History	Operations	Scope of Service
Maintenance	Physical Plant	System Requirements

#### **3.5.2 Organizational Structure**

The description of the organizational structure of the commuter railroad is often met by provision of detailed organizational diagrams identifying the key positions at all levels and showing the titles of persons responsible at each position.

#### **3.5.3 Relationship and Authority of the Safety Department**

These criteria can usually be satisfied by providing diagrams showing the structure of the system safety unit and the relationship and lines of communications between the system safety unit, other units of the organization, and senior management.

#### **3.5.4 Legislative Requirements for Safety and Security**

The commuter railroad must observe all applicable legislative and regulatory requirements and must satisfy any important financial, social, or political mandates.

#### **3.5.5 Safety Plan and Policy Dissemination**

This section is meant to identify those persons who will be holders of the SSPP and those who will be guided by the SSPP requirements, including permanent and temporary staff and contractors. A description of the method in which this information will be provided would also be included.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

### **3.6 Element 6: System Safety Program Plan Control and Update**

This section establishes the review frequency of the System Safety Program Plan and describes the method by which updates, corrections, and modifications will be made to the plan. The procedure should state whether the plan will be updated on demand or at selected intervals. This 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.

#### **3.6.1 Strategic Program Planning**

The focus of the strategic planning process should be on both development and continuous improvement of the SSPP, and for meeting the needs of the commuter rail organization to satisfy its safety mission within the community served by demonstrating diligence toward industry safety and security standards.

3.6.1.1 The APTA manual contains 23 elements recognized as good management practices for attaining effective controls on safety and security. However, there is no one right way to achieve this desired level of performance as each agency is unique in its operating environment, its organizational context, and size or resources. Therefore, a commuter rail property must adopt a strategic planning process (comparable to the three-year audit cycle) that targets areas for improvement but also provides flexibility to adjust to changes that occur in its operating environment and organizational structure, without compromising the operational safety margin.

3.6.1.2 The planning process must also ensure that the organization's size and resources are in proportion to its operational risk and hazards, to provide proper fit and scalability for implementation of the 23 program elements.

#### **3.6.2 Administrative Controls**

To effectively execute the tasks needed to support the SSPP throughout the commuter rail organization, checks and balances need to be established in the administration of critical processes to ensure that communication and a common understanding of these concepts occurs. Checks and balances incorporated within administrative controls form the basis for ensuring the viability of system level safety and security functions that support all departments within the organization. At a minimum, administrative controls should be in place to monitor the condition of document control and configuration control procedures. Checks should be made on the review and update of procedures to ascertain they are being accomplished in a timely fashion and are consistent with supporting the strategic planning process. The organization should also have a performance appraisal process that incorporates safety and security as one area of evaluating staff performance based against the achievement of objectives and tasks assigned in the SSPP.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

### 3.6.3 Inter-departmental Coordination

Successful implementation of a SSPP depends in large measure on the coordination of effort between different departments within the organization to provide either a lead role or support role in managing tasks. It is essential to have department personnel serve on inter-departmental committees or task forces that possess the necessary knowledge and authority, and that these committees are purposeful with duties formally described. These inter-departmental committees must also report to the proper level in management to ensure that action items are given the consideration and resources needed for proper implementation. Formal agendas, meeting minutes, and tracking logs are commonly used to sustain the process and provide proof that diligent effort is being made.

### 3.6.4 Inter-Agency Coordination

Many of the services relied upon by commuter railroads to support safety and security efforts are within the jurisdictional control of other agencies in the community. It is also incumbent upon the commuter railroad to advise and assist emergency services and utilities in the safe performance of their work whenever they are within the vicinity of train operations. To satisfy these important needs, inter-agency coordination must be effectively established and ongoing. Committees formed must meet frequently to address mutual roles and responsibilities and to critique plans that support each other's needs, especially those that impact the safety and security of employees and passengers. Formalized structure is needed to track progress through the use and distribution of agendas and meeting minutes, to satisfy reporting relationships for each agency.

## 3.7 **Element 7: Safety Contract Requirements**

Element 7 requires the organization to codify provisions for safety-related policies, procedures, or other documentation regarding contracted services, regardless of the type of operation. If the agency contracts out for services, it is necessary to define the safety and security related requirements and deliverables within the scope of the contract documents. The organization's SSPP can be utilized as a guideline for the contractor to develop a project specific safety plan that will effectively address the safety elements. Establishing safety requirements within the contract will also support consistent application of the required safety elements in the event of contractor turnover. In addition, the mechanisms needed for the organization to monitor the extent of application of the approved contractor safety plan should also be included within the contract documents. This will ensure reporting and performance objectives are clearly understood by all contractors and sub-contractors responsible for performing safety and security critical services for the organization.

### 3.7.1 Contracting for Services

Agencies that utilize contractors to perform safety related functions need to ensure these services are being performed in accordance with recommended safety criteria. Contract provisions should require contractors providing these safety related services to incorporate and document the proposed application of recommended safety elements within the scope of its contract submittals. At a minimum, a contractor System Safety Program Plan (SSPP) should be required as a contract deliverable for review and approval by the organization. The contractor's SSPP should be designed to the program requirements as outlined within

Revision Number: 2.4  
 Next Revision Due: December 2008

Date: May 15, 2006  
 Next Review Due: December 2007

this manual and should describe the means and methods for attainment of safety program goals and objectives, along with all applicable local, state and federal regulations. The contractor SSPP should be customized to address the safety requirements as applied to the scope of the contract, and related safety provisions as defined within the Agency's own SSPP. Other contractor documentation requirements applicable to the safety elements outlined in this manual should also be specified as deliverables within the scope of contract documents including, but not limited to Operating and Safety Rules and Procedures, Drug and Alcohol Program, Security Plan, Training Plan, and Quality Assurance manual.

The contractor's safety administration program needs to be defined and submitted by the contractor to the organization for review and approval. This submittal should include safety personnel resources designated to administer the program requirements and their respective qualifications to perform these responsibilities. Finally, the agency should require the contractor to submit regular key performance indicator reports and analysis designed to assess the level of effectiveness by which the program elements have been implemented.

### 3.7.2 Contracting for Facilities, Equipment, and Materials

Agencies may also decide to contract maintenance and repair services to address infrastructure needs including its facilities, equipment, and materials. Contingent on the scope of these contract services, many provisions described in the previous section (3.7.1) may apply, including the submittal of a contractor safety plan. At a minimum, the agency should ensure the proposed facilities, equipment, and materials' operating and safety management programs are documented by the contractor and reviewed and approved by the agency, to ensure they meet all applicable local, state and federal regulatory requirements. Maintenance programs should also be consistent with applicable manufacturer recommended requirements and/or relevant organizational maintenance standards. As described above, relevant maintenance and safety procedures and training, security, drug and alcohol and QA programs, if applicable, should also be submitted to the agency for review and/or approval.

### 3.7.3 Construction Management

Construction contractors working on or near the agency's property have the potential to create safety hazards that must be mitigated through the development of structured programs that provide a clear understanding of relevant safety procedures and work site requirements. All construction contractors must comply with relevant local, state, and federal regulations. In addition, these contractors must also comply with relevant organizational safety procedures including track access and right of way safety procedures. Contract provisions should mandate compliance to these requirements and require the necessary training and qualifications of personnel to ensure these standards are understood and effectively implemented. Safety Certification requirements should be specified within the contract documents as applicable. Construction management should be required to submit, for review and approval by the agency, a *Construction Safety Manual* that documents the scope of the contractor's safety program and the means by which all safety requirements will be achieved. Construction management on-site safety professional qualifications should also be submitted for review and approval by the agency. All construction sub-contractors should be required to adhere to the provisions contained within the prime contractor's safety plan. The commuter rail organization needs to describe within the scope of its SSPP the means by which construction contractor safety performance will be evaluated and assessed in accordance with the construction management's approved program plan submittals.



## **4.0 *Safety Program Implementation***

---

The means whereby goals and objectives become realizable through effective implementation of policies and procedures for each area in which safety and security controls are needed for managing risk. This section of the manual identifies specific program areas where good management practices are applied to support the attainment of organizational safety and security goals. Many of these program implementation elements are associated with APTA standards and Federal railroad regulations, which provide detailed guidance in carrying out these functions.

### **4.1 Element 8: Facilities Maintenance & Inspection**

The important function of maintenance within the transit infrastructure and its assets is one that must be verified and checked constantly. The first step in this process is to identify and locate all assets and equipment with safety-related characteristics. Equipment with safety critical functions such as fire protection equipment, emergency communications equipment, and employee safety devices would be included in this category. A customized list for each commuter rail system needs to be established.

A regular cycle of inspections needs to be developed, along with the list of exactly which items are to be inspected. Observations of defective or missing equipment, of course, should be reported whenever observed. Maintenance inspections should also be closely coordinated with the Hazard Management Process as those responsibilities for maintenance inspections will frequently be in a position to observe hazardous conditions.

In addition, it is imperative that proper corrective actions be prescribed, implemented, and tracked as part of a verification process. Such inspection records become extremely valuable tools in establishing that respective portion of the management organization is reasonable and prudent in discharging its professional responsibilities.

### **4.2 Element 9: Vehicle Maintenance Inspection & Repair**

This section should address the responsibilities and requirements of all groups performing maintenance. Issues such as preventative maintenance, scheduled inspections, and failure maintenance should be addressed here, either specifically or generally, by referencing documents such as maintenance plans and directives with safety critical systems, components, and processes identified. Procedures for performing maintenance, inspection, and repair of safety critical systems and components must be well written, with appropriate training provided and a system for verification of proper work practices employed. Deferred maintenance practices must address the relation to safety related vehicle systems and components, and a “go/no go” criteria must be established. Appropriate maintenance documentation methods and the use of proper tools and test equipment are other issues to be addressed.

### **4.3 Element 10: Rules and Procedure Review**

One of the most important functions of the organization is to ensure that rules and procedures are carefully developed, maintained, and followed throughout all administrative, operational, and maintenance departments. The internal verification process must contain a methodology to ensure uniform, coordinated development and implementation of rules and procedures. Operational rule books and safety critical procedures must be controlled documents that are issued under prescribed

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

authority, distributed to all those who have responsibility for duties affected by the rules or procedures, and have a method of ensuring that rules are understood and acknowledged by all employees.

Competency is achieved through training and confirmed through proficiency testing. Rules and procedures are protected from unauthorized changes and modifications, and are subject to frequent review and formalized update procedures. Likewise, administrative and maintenance departments must do the same for rules and procedures affecting their classification of employees and contractors who work under their authority. In the maintenance department areas, this applies not only to safety rules but also to procedures for conducting inspections and making repairs to equipment. Improper maintenance procedures have been the dominant cause of numerous accidents in the transportation industry.

#### **4.4 Element 11: Training and Certification**

Proper qualification of operating and maintenance personnel is a vital part of a safe transit environment. The System Safety Program Plan requires that all necessary training is conducted and documented. Not only is the maintenance of complete and accurate certification records of operating and maintenance personnel required, but the content and presentation materials need to be retained along with testing results, including the grading process used. This is necessary to establish the requirements that ensure completeness and validity of course content and testing. While the level of detail presented in the System Safety Program Plan for training/certification requirements is at the discretion of the rail system, a training and certification policy or procedure should be in place and referenced in this section.

#### **4.5 Element 12: Emergency Planning & Response**

Emergency response is a primary component of any commuter railroad's Safety Program Plan. As such, it must be afforded constant attention. Periodically scheduled meetings with outside agencies, emergency drills, and the revision and distribution of emergency response procedures are required, with necessary approvals and checks for completion provided in the SSPP. Descriptions of relationships with both over-arching and detailed responsibilities should also be included as part of the SSPP, including references to other master and support documents and procedures supporting emergency plans and response protocols.

U.S. commuter railroads must comply with the Federal Railroad Administration (FRA) "Passenger Train Emergency Preparedness" regulation. This regulation, effective May 4, 1998, sets forth criteria for vehicle emergency window/door exit markings, inspections, maintenance, and repair. In addition, the rulemaking sets forth minimum Federal safety guidelines for the preparation, adoption, and implementation of emergency preparedness plans by railroads connected with the operation of passenger trains, including all railroads that host the operation of rail passenger service. The rule also requires each affected railroad to instruct its employees on the provisions of its plan.

#### **4.6 Element 13: Workplace Safety Programs**

The most valuable resource any transit system has is its employee work force. Time and money are constantly being invested on attaining the individual members of the work force to a condition of maximum and effective productivity. It is, therefore, not only essential from an employee consideration perspective but also from a good management perspective to ensure, to the highest degree practicable, the safety of our employees and our contractors.

#### 4.6.1 Employee Safety Programs

The System Safety Program must provide that its Employee Safety Program conforms to requirements by law and regulatory authority. These include requirements for hazardous materials safety and applicable occupational safety & health requirements. However, it must be emphasized that these regulatory requirements are only minimum requirements and by themselves are insufficient in meeting the needs for employee safety in a commuter rail environment. Efforts must be made to maintain a thorough Employee Safety Program above and beyond these minimums to account for special condition prevalent in rail maintenance facilities and rail operations. An Employee Safety Program must be designed to have the best possible input from all necessary units, including contributions from the employees themselves.

#### 4.6.2 Contractor Safety Coordination

Employees of contractors do not come under the direct jurisdiction of commuter railroads. When contractors work on commuter railroad property, especially under operating conditions, certain requirements must be applied to all members of the contractor work force. This is essential for the safety of passengers, commuter railroad employees, contractor employees, and the protection of commuter railroad property. The contractor and all contractor employees must be clear from the outset that the commuter railroad is in charge and that all necessary rules and procedures will be followed without exception. This of course, places a significant responsibility on the commuter railroad and responsible units for ensuring that all contractor personnel (1) are instructed on the procedures, (2) know the procedures, and (3) follow the procedures. Imposed sanctions must be spelled out at the beginning and, if possible, included in the contract.

#### 4.6.3 Fitness for Duty Programs

##### 4.6.3.1 *Drug and Alcohol Program*

Since virtually all U.S. commuter railroads require federal funds for continued growth and operation, the drug testing requirements of the Federal Railroad Administration (FRA) now form the basis for drug abuse programs, including alcohol. Above and beyond these programs, it is incumbent upon all commuter railroads to provide a mechanism for ensuring that the same oversight is provided for any type of substance that can alter the mental and physical conditions of employee, such as over-the-counter medications. The bottom line is protecting the riding public and commuter railroad employees. All efforts should be geared toward this end. Policies, processes, procedures, and responsibilities should be outlined in SSPP and/or reference made to the appropriate master document containing that information.

##### 4.6.3.2 *Fatigue Program*

Fatigue conditions cannot be overlooked as a potential for creating hazardous operating conditions, as history has shown that fatigue can become the primary cause or a contributing factor to commuter rail accidents. The SSPP should provide for fatigue counter-measures to manage this risk potential. Effective measures include establishing a second job policy, providing crew layover accommodations, medical evaluations for sleeping disorders, and awareness training programs for employees.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

#### 4.6.3.3 *Medical Monitoring Program*

Developing and applying appropriate medical standards for safety critical positions must extend beyond the pre-employment examination and take into account the aging process on sensory degradation and its effect upon safety within the commuter rail environment. Medical monitoring programs should be appropriate to the classification of employee and frequented enough to identify physical or mental deterioration of employees below the thresholds established for safe performance of their duties.

### 4.7 **Element 14: Passenger & Public Safety Programs**

Commuter Railroads must include provisions for passengers and the general public to be within or pass through a railroad environment that is both safe and secure. This includes use of provided parking lots, street and sidewalk access to facilities, properly designed and maintained passenger stations and boarding areas, rolling stock safety features, and adequate emergency egress plans and response capabilities.

#### 4.7.1 Passenger Operational Environment Programs

Managing the safety and security aspects of the passenger operational environment is differentiated from the static fixed facility issues identified in Element 8 such as presence of fire protection equipment, alarms and cameras. The Passenger Operational Environment is the way in which the facilities provided are utilized by the patrons. This includes safe walking paths through parking lots to separate pedestrian and automobile conflicts, slip and fall potential, platform crowding, platform gap, train door control procedures and proper escalator or elevator use, among others.

#### 4.7.2 Public Safety Programs

A formalized passenger and public safety outreach program to provide essential safety and security information to commuter rail patrons and the general public is an important part of the safety effort requiring planning, leadership, organization and documentation to be effective. Some of these programs are short term efforts targeted to specific demographic groups while others are well established long-term efforts with general applicability to continuously heighten awareness to common problems such as suspicious packages, door closing, platform gap, escalator safety and trespass. The presence of highway grade crossings on a commuter rail property necessitates the establishment of a grade crossing management effort. To truly mitigate the hazards identified at highway-rail grade crossings, all parties involved with the crossings must participate in the hazard identification and mitigation.

### 4.8 **Element 15: Rail Corridor Operational Safety**

The safety of the operating rail corridor is perhaps the largest challenge to management of risk for a commuter railroad. Not only are employee and contractor safety within the operating envelope a continuous challenge to the safety of operations, but other serious operating hazards in the form of joint freight operations, highway grade crossings, and unauthorized intrusion or criminal trespass must also be managed at a safety critical level with Hazard Management performed and corresponding plans, procedures, and practices applied to mitigate the effects identified,

implemented, and continually evaluated. For these reasons, commuter railroads are encouraged to implement a *Corridor Safety Action Plan* that provides specific management focus to programs that will eliminate or mitigate these risks.

#### 4.8.1 Joint Freight Operations

Many commuter railroads own and operate a line segment and permit freight operations on that line under a joint facility agreement. Some commuter railroads operate on the lines of a freight railroad. Others may have a Purchase of Service Agreement (PSA), and still others may operate over lines where joint passenger/freight operations exist. Each of these arrangements, including pertinent policies, procedures, and relevant issues should be addressed or clearly referenced in the System Safety Program Plan. Any of these arrangements requires strong focus on the safety of operations for all parties to ensure that all train movements are compatible.

#### 4.8.2 Highway Grade Crossing Management Programs

A multiple disciplinary approach to grade crossing safety is essential for proper design, installation, maintenance, and operations to occur. Grade crossing safety management must be continuously reviewed and Hazard Management applied to ensure that the highest practicable level of safety can be achieved on all routes, under all service conditions. To assist in hazard elimination/mitigation, U.S. Department of Transportation has developed a "Highway/Rail Grade Crossing Action Plan." This handbook will assist the commuter railroad to work with others in proactive ways to determine highway-rail crossing hazards and ways to eliminate or mitigate such hazards. Identification extends to determining whether the crossing could be separated or eliminated, what signal protection may be appropriate, whether traffic patterns should be changed to eliminate the potential for accidents, etc. The commuter railroad should utilize, when appropriate, enforcement strategies and outreach programs such as *Operation Lifesaver* and "4-E" type programs (Elimination, Engineering, Education and Enforcement) in their System Safety Program Plans. Specific attention should be given to pedestrian activity at grade crossings, near or at stations, and the conditions created by multiple train operations in a corridor often referred to as the "second train" approach.

#### 4.8.3 Trespassing and Intrusion Programs

Trespassers are a major concern for all commuter railroads. They comprise a high potential for accidents in terms of deaths and/or injuries to themselves and endanger passengers on trains during emergency braking to avoid them. Trespassers may be children playing in the wrong place, a person who may attempt suicide, hikers on a short-cut, etc. Therefore, the system safety plan must include identification and/or evaluation of the risk to the operation and/or passengers created by trespassers, as well as the risk of injury and death to trespassers. The commuter railroad should have plans and procedures in place to mitigate trespass incidents. Some effective measures include a review of real estate holdings to determine how best to keep non-authorized personnel out, deployment of intrusion detection equipment and alarms, and providing public education that includes elements similar to the "4-E" Program (Elimination, Engineering, Education and Enforcement).

## 4.9 Element 16: Environmental Management Programs

Commuter railroads are required to have a program in place for the safe use, transport, storage, and disposal of chemicals and substances that result in a number of compliance areas to be addressed. Additionally, commuter railroads are held accountable for environmental impacts of their operations, including noise and pollution. This section should include all environmental issues, responsibilities, processes, policies, and procedures either directly or through clear references. The following paragraphs discuss some, but not all pertinent issues that should be addressed in this section as local requirements differ significantly.

### 4.9.1 Hazardous Materials Management

Most commuter railroads come under the jurisdiction of either state or federal Environmental Protection Agencies. It is incumbent on each railroad to determine which regulations it must follow and then ensure that all organizational elements are aware of these requirements and how they must be followed. Emphasis is placed on the issues of handling and storage of potentially hazardous materials safely, with the end result of protecting people and the work environment. Examples of areas to be addressed include storage vessel construction, alarms and signage emergency response (i.e., emergency medical response, preparedness drills), personal protective equipment and installations (i.e., respirators, gloves, shower/eyewash stations, etc.), inventory and compatibility issues, waste collection and handling, and established work practices. The proper use of engineering controls should be emphasized in all established work practices. The *Superfund Amendments Re-authorization Act (SARA)* Title III and Community Right-to-Know issues have been crucial to managing environmental concerns on site, and managing community relations off-site.

### 4.9.2 Hazardous Waste Management

The proper handling of hazardous waste, including use of proper containers, marking, labeling, storage spill containment and response, transportation for disposal, and accurate record keeping are all highly regulated by federal, state, and local laws. The SSPP should establish authority and responsibility for meeting these requirements and provide proactive program guidance in managing and controlling the attendant hazards.

When control procedures and equipment fail and hazardous substances are released, a completely different set of requirements must be met. Existing facilities may be impacting the environment, soil, and water through leaking underground tanks. A program of testing, replacing, monitoring, and permitting of underground petroleum storage tanks exists in many states. When past practices or accidents have resulted in contamination of soils and water, clean-ups and remediation must be included in the program approach. The *Comprehensive Environmental Response Compensation and Liability Act (CERCLA)* and other federal and state requirements must be addressed correctly and efficiently to reduce the impact to the environment and achieve cost efficiency.

Emergency response must be planned for all contingencies with all participants' roles and responsibilities outlined. This outline should include notifications (i.e., state agencies, U.S. Coast Guard, etc.) and other procedures included or referenced in the SSPP.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

#### 4.9.3 Waste Minimization and Pollution Prevention Programs

When material is released into the environment, the *Clean Water Act*, the *Clean Air Act*, and other regulations present a need for formal programs to address permit and compliance requirements. Commuter railroads that operate diesel locomotives are subject to air pollution requirements in many jurisdictions. Operating maintenance facilities also has the potential for compliance with air and water pollution regulations and permits may be required. Examples include air filtration and exhaust system discharge permitting and storm run-off testing and reporting. Commuter railroads in many jurisdictions are also subject to providing waste minimization or source reduction plans to control the types and quantities of hazardous materials used. These programs have additional economic benefits to the organization in reducing inventories, reducing the amount of training and personal protective equipment supplied to employees, and limiting risk of serious injuries and environmental cleanup from spills and leaks. The economic benefits from waste minimization programs also apply to solid wastes, waste water, and power consumption.

#### 4.9.4 Environmental Outreach Programs

At commuter railroads chemicals are used, transported, stored and then disposed with potential risks existing to workers, customers and the environment. Over and above required safety and environmental issues that must be addressed, it is emphasized that commuter railroads at the national level are promoted as a “Friend of the Environment”. Each commuter railroad should examine its operation to determine where improvements can be made and how to maximize the positive effect that commuter railroad use by the general public has on our environment.

### 4.10 **Element 17: Security**

The commuter rail system safety program should provide a pro-active, prevention-oriented approach to security. However, no matter how well planned and implemented a security plan is, there will always be security breaches that require reactive law enforcement actions. Therefore, provisions are needed for such incidents. The current thinking with regard to commuter railroad security emphasizes the importance of identifying potential threats and areas of vulnerability, developing approaches that will minimize those threats and vulnerabilities, and demonstrating a clear and pro-active approach to security.

In short, “system security” means threat and vulnerability management. One key purpose of this section of a commuter railroad system safety/security plan is to:

- Define explicitly the role of each employee and department in support of security goals.
- Detail any and all functions in support of each system security goal and objective.
- Establish milestones for developing and implementing system security within the commuter railroad.

The security section of the commuter railroad System Safety Program Plan should also specify how state and local law enforcement and commuter railroad police or security personnel interface and work together, and how the parties communicate and share jurisdictions. Reference to any agreements between law enforcement agencies and commuter railroads would be included or referenced in this section. It is extremely important to have or develop a strong working relationship between the commuter railroad and law enforcement agencies.

## **5.0 *Safety Engineering Techniques and Analysis***

---

The practice of system safety integrates management systems with safety engineering practices to optimize safety performance at the highest level practicable within the constraints of time, cost, and operational effectiveness. To achieve this performance, system risk must be identified, measured and controlled effectively using a variety of analytical methods and techniques. This section of the manual establishes the means by which risk to the organization can be determined, minimized, and controlled using evaluative tools to check the progress of implementing goals and objectives.

### **5.1 Element 18: Hazard Management Process**

The hazard identification/resolution process is perhaps the heart of the System Safety Program. While there has been much written about the level of formality needed for this section of the program, it remains an individual matter for each transit system to fit the proper process to its respective organization. The important element that must be included in a fully developed System Safety Program is the mechanism, accessible to all levels of the organization, by which hazards are identified, analyzed for potential impact on the operating system, and resolved in a manner acceptable to general management. The entire Hazard Management process is nothing more than a formalized procedure for risk acceptance by the commuter railroad management staff. It allows for a systematic hazard identification process and a coordinated hazard effects minimization process. The Hazard Management process usually resides with the safety unit of the commuter railroad organization, which is responsible for all supporting documentation and coordination.

There are a number of Hazard Management models that may be used to guide the development of a *Commuter Rail Hazard Management Program*. The most widely used and referenced model is Military Standard 882. Many of the common hazard analysis techniques in use today, such as Preliminary Hazard Analysis, System Hazard Analysis, Subsystem Hazard analysis, Operations Hazard Analysis, as well as many others are based upon Military Standard 882.

### **5.2 Element 19: Accident/Incident Reporting and Investigation**

Conducting investigations of accidents and incidents is related to the Hazard Management process in that feedback and follow-up from these investigations should be automatically evaluated for hazard resolution. Once an incident occurs, it is incumbent upon commuter railroad safety management to identify potential actions to prevent a recurrence of the respective problem. Some basic elements necessary for a properly executed investigation of all accidents, incidents, and “near misses” include the following:

#### **5.2.1 Criteria and Procedures**

A formal policy must exist and be fully understood by all organizational groups as to exactly which accidents/incidents will be investigated. This policy should include a pre-determination on such things as thresholds for automatic activation of an investigation, guidelines on whether incidents should be investigated immediately or after the fact, and who is in charge of each specific level of investigation.



Preparation of appropriate procedures, formats, and approaches for performing investigations must be documented and properly implemented. Verification of full understanding and compliance with such procedures by all organizational elements is also required.

#### 5.2.2 Internal and External Notification

Pre-determination of the appropriate notification of accidents and participation in accident investigations should be understood and available to all involved commuter railroad personnel. Exact criteria for establishing notification thresholds are required both internally and externally to the organization.

External notification requirements and the preparation of necessary reports to all regulatory agencies and governing boards should be identified and personnel assigned to carry out these requirements.

#### 5.2.3 Cause Analysis

While actual procedures for accident/incident investigation may vary greatly from one commuter railroad to another, especially in such areas as the department in charge and responsible for addressing corrective actions, the ultimate goal remains the same - elimination of accidents. This will not occur unless a thorough incident investigation has developed all of the facts in evidence and a cause analysis is performed in accordance with the Hazard Management Process. Findings, conclusions, and recommendations resulting from investigations should be specified as to type, format, distribution, and retention.

#### 5.2.4 Reporting and Follow-up Documentation

All necessary information pertaining to a specific occurrence should be in standard format and stored in a specified location. Applications for use of incident documentation include ongoing training, especially where human error and procedural error are involved; litigation, where documentation of efforts to prevent such incident can be extremely valuable especially to establish that commuter railroad management is reasonable and prudent; and budget development, where certain re-designs and equipment purchases can be easily justified. Assurance should be provided that all recommendations and identified needs for corrective actions are assigned, tracked, reported, and verified. This is an extremely important step to providing a key element in recurrence prevention.

### **5.3 Element 20: Safety Data Acquisition/Analysis**

One of the most important services the safety unit provides for the commuter rail organization is the collection, maintenance, and distribution of safety data relative to system operation. This data includes information gathered from within the respective railroad on various operating events relative to safety. Analysis of this system specific data can be used to determine trends and patterns in system operation. Used as part of the Hazard Management process, data collection and analysis can be used to identify hazards before they cause accidents by such techniques as trend analysis. It thus becomes a vital component of efforts to improve system performance, not only in respect to safety and security but also in the overall delivery of service to the riding public. The responsibilities for providing, receiving, processing, and analyzing data should be listed here and can be general or specific, based on the needs of the commuter rail system.

Revision Number: 2.4  
 Next Revision Due: December 2008

Date: May 15, 2006  
 Next Review Due: December 2007

Exactly what types of analysis techniques are used as part of the data analysis process must be determined by the individual needs of each commuter railroad. This decision is based on variable aspects of the railroad environment such as whether any major system changes or procurements are underway. Frequently, ongoing procurement contracts require a certain amount of safety data and analysis to be provided by suppliers. It must be determined in advance how this data will be used and who will be responsible for its evaluation.

Communication with other commuter railroads is also a productive source of input into both the data acquisition and hazard management processes. This type of coordination can be used to discover potential problems before they occur at a given railroad by monitoring events at other railroads, especially those with similar components. Development of “lessons learned” from historical data is a key component of the Safety Data Acquisition element. Participation in industry committees, workshops and conferences, and other efforts in this regard further enhance the value of data acquisition/analysis.

#### **5.4 Element 21: Loss Prevention and Control**

Loss prevention plans and control procedures are important aspects of any safety or security effort to keep the potential of catastrophic property loss low and to appropriately manage incident costs. Fire loss of facilities and vehicles has historical precedent and should always be a concern for commuter rail properties. Another concern for commuter rail properties is maintaining control of costs associated with all types of accident loss, whether it be from third-party claims, employee injury related medical costs, or litigation. The SSPP should provide for management plans and procedures to identify and analyze the potential for loss and methods for control. This section of the manual should be used to incorporate the results of formal hazard analysis performed and the resultant management control plans that became ongoing programs. A *Business Continuity of Operations Plan* would be one example of this. Two common management practices in Loss Prevention and Control for commuter railroads are shown below:

- 5.4.1 *Fire Safety Analysis* – Recent regulations and APTA standards provide a high degree of importance on maintaining vigilance and preparedness for fire events. Specific guidance is provided for conducting a fire safety analysis of vehicles in commuter rail service. Additional fire safety analysis for passenger stations is found in NFPA 130.
- 5.4.2 *Casualty Management Review* – Many, but not all losses sustained by a commuter rail property arise from safety and security events. Effective practices have been developed to deal with major loss events by developing inter-departmental coordination and reporting on potential loss events that occur throughout the organization. Safety and security personnel have an important role in providing information and analysis to support loss control initiatives.

## 6.0 *Safety Assurance*

---

System safety programs must be able to ensure that the margin of safety designed and built into the commuter rail system is maintained consistently over time and is not diminished by necessary changes that are inevitable in a transportation system. To provide this level of safety assurance, a method for managing change must be adopted and a system to measure the effectiveness of program implementation must be incorporated.

### 6.1 **Element 22: System Change Management**

Because changes to the transportation system are constant and come from all aspects of commuter rail operations, different techniques for identifying and managing change in the organization must be adopted to ensure that the integrity of safety and security procedures, equipment, and personnel are not compromised. Changes found to be beneficial to one part of the organization may create the opportunity for a catastrophic incident in another part of the organization, if there is no effective means of identifying, analyzing, and controlling changes that occur across the system.

#### 6.1.1 Configuration Management

Configuration Management is the top level methodology for assessing the impact of change to safety critical areas of operations. Configuration management is a process that ensures, as much as possible, that all property, equipment, systems design elements, etc. are documented as to configuration, both accurately and completely. Any changes to an individual sub-system or a fleet/inventory wide change must be recorded on as-built drawings and addressed in training courses, maintenance manuals, and procedures in a timely and effective manner. The Configuration Management process must include, as a minimum procedures for the authority to make configuration changes, the process for incorporating these changes into all appropriate documentation, and the process for ensuring that all necessary units, including System Safety, are formally made aware of such changes. Configuration Management works in conjunction with other stand-alone programs to ensure the highest level of safety practicable is maintained throughout the system's life cycle.

##### 6.1.1.1 *Standards/Design Control*

The SSPP should make reference to applicable standards where they exist and govern the operation of safety critical functions of the railroad. The areas where deviations to standards or waivers to regulatory requirements were adopted need also to be identified. In areas where no standards exist for safety critical processes or equipment, design criteria and controls used should be referenced and originals retained.

#### 6.1.1.2 *System Modification – New Processes/Equipment*

Commuter rail systems are in a perpetual state of acquisition, as new equipment, system expansions and modifications, and system rehabilitations require constant design and procurement efforts. Ongoing acquisitions and procurement in fact can be more critical than initial design for many reasons. Coordination and compatibility with the existing system, construction efforts under operating conditions, and testing and break-in phases must all be managed as part of the ongoing system safety effort.

#### 6.1.1.3 *Quality Assurance/Quality Control Interface*

Another effective technique that can be employed in the management of change is to use existing Quality Programs to provide levels of assurance over safety critical parts and procedures. Commuter rail operators that have obtained ISO 9000 and/or ISO 14000 certification have the ability to control changes but do not have the capability to provide hazard analysis and approve new changes in safety critical areas.

#### 6.1.1.4 *Safety Certification*

Safety Certification is used to oversee the addition and introduction of completely new systems and the integration to the existing system if the project is not a new start. The US DOT Federal Transit Administration and APTA have jointly published a manual on how to conduct a safety certification program.

#### 6.1.1.5 *Document Control*

Methods for identification and maintenance of control documents should include a provision for handling those documents deemed to be safety critical. Many methods and systems of document control exist and it is at the discretion of the commuter rail organization to adopt one that fits their organizational needs.

## 6.2 **Element 23: Internal Safety Management Assessment**

System safety is the formal process of managing a system to ensure that all identified safety elements in a given environment are in place and are performing as designed. In a commuter rail environment, it is difficult to identify any elements which are not safety related, even if only indirectly. The **Internal Safety Management Assessment** process thus becomes extremely important in determining if all organizational elements, equipment, procedures, and functions are performing as intended, from a system safety perspective. It requires constant attention and activity

### 6.2.1 Internal Safety Audits

The Internal Safety Audit determines compliance with an agency's safety policies, rules, regulations, guidelines, codes, procedures, assigned system safety activities, and requirements as prescribed within the System Safety Program Plan. Items found not in conformance are reported and corrective action plans filed to improve the deficiencies.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

#### 6.2.2 Security Self Assessments

Security Self-Assessments are the equivalent process that Internal Safety Audits serve for the safety program. Given the uniqueness in practice of security in defining threats and vulnerabilities, self-assessments can provide a needed critique function to identify areas for improvement.

## 7.0 *Summary*

---

This manual is the creation of the APTA Commuter Rail Committee to continue the commitment toward safety excellence. This enhanced edition of the *Manual for the Development of System Safety Program Plans for Commuter Railroads* improves upon the original work created to implement guidelines for System Safety Program Plans identified in FRA Emergency Order 20. The design intent of this edition was to further define commuter rail system safety elements in a concise and clear manner. In the process, we have incorporated changes made by the FRA to passenger emergency regulations, codified similar sections of the manual from 29 elements to 23 elements, and provided for an *Integrated Management Systems* approach with a continuous improvement cycle that matches the ISO methodology of Plan, Do, Check, Act for those agencies wishing to certify their management programs. This manual remains a risk based approach to managing safety with a heavy emphasis in health, fire, environment, quality, and security programs. The Commuter Rail Safety Committee has been charged with the responsibility for review and maintenance of this manual.

It is a well known and established fact that commuter rail is the safest mode of passenger transportation. There is a long history of safe operations evidenced and documented by National Transportation Safety Board statistics. Even though there have been some setbacks from time to time, commuter rail as an industry has an enviable safety record. However, attaining and achieving the high level of safety and security in the commuter rail industry is no “accident”. It is the result of the hard work, vision, and innovation of many people over a hundred years that has made safety a core value and the culture of the industry. This manual carries forward the “systems” thinking of the pioneering APTA book “Moving People Safely”, originally published in May 1972. Safety is foremost in the design of equipment, maintenance of track, rules of operation, implementation of procedure, and at the point of service for our employees, patrons, and the public. This manual is a continuation of that effort by codifying the knowledge and experiences gained and accepted as good management and engineering practices, and from lessons learned throughout the commuter rail industry in the area of safety and security. This manual, however, is not the final word on the subject but only a set of compass points on the way to safety excellence. The principals and practices set forth in the preceding pages will be passed forward to succeeding generations to refine and incorporate new ideas and technologies that will advance safety and security to yet higher levels of performance.

Commuter railroad systems participating in the APTA Commuter Rail Safety Management Program will carry forward past success with the expectation that the best performance can always be improved upon. In that regard, all commuter railroads in this program will be expected to ensure that the elements identified will be incorporated into their System Safety Program Plans, and will open themselves to a regular review of how well they have been implemented. It is fully realized that this cannot be a prescriptive process. Each commuter railroad has unique characteristics and limitations on resources that forego a “one size fits all” philosophy. Guidelines on suggested ways to implement each of the elements identified, as well as methods used to assess and evaluate progress made in implementation of the elements, are made available in separate manuals. To continue to attain and improve upon the commuter rail history of safety excellence, management must accept ultimate responsibility for the methodology and practices they implement and challenge themselves to find ways to improve, if the reasons of system safety for the industry are to be achieved.

Revision Number: 2.4  
Next Revision Due: December 2008

Date: May 15, 2006  
Next Review Due: December 2007

## **8.0 Appendices**

**Appendix I**

**Summary of Applicable FRA Regulations**

**Appendix II**

**Summary of Applicable APTA PRESS Standards**

## A P P E N D I X

### I - Code of Federal Railroad Administration Regulations Relating to Commuter Rail

#### 49CFR Part

213	<u>Track safety guidelines</u>	Applies to all standard gage track in the general railroad system of transportation
214	<u>Railroad workplace safety</u>	Applies to railroads that operate rolling equipment on track that is part of the general railroad system of transportation.
217	<u>Railroad operating rules</u>	Applies to railroads that operate trains or other rolling equipment on standard gage track which is part of the general railroad system of transportation.
218	<u>Railroad operating practices</u>	Applies to railroads that operate rolling equipment on standard gage track which is part of the general railroad system of transportation.
219	<u>Control of alcohol and drug use</u>	Applies to railroads that operate rolling equipment on standard gage track which is part of the general railroad system of transportation.
40	<u>Procedures for transportation workplace drug testing</u>	Applies through regulations that reference it, issued by agencies of the DOT to transportation employers.
220	<u>Radio guidelines equipment and procedures general railroad</u>	Applies to railroads that operate trains or other rolling equipment on standard gage track which is part of the general railroad system of transportation.
221	<u>Rear and marking device</u>	Applies to passenger, commuter, and freight trains when operated on standard gage main track which is part of the general railroad system of transportation.
223	<u>Safety glazing</u>	Applies to railroads that operate rolling equipment on standard gage track which is part of the general railroad system of transportation.
225	<u>Railroad accident incidents reporting</u>	Applies to all railroads, except those whose entire operations are confined within an industrial installation.
228	<u>Hours of service of railroad employees</u>	Applies to all railroads, except those that operate only on track inside an installation which is not part of the general railroad system of transportation.
229	<u>Railroad locomotive safety guidelines</u>	Applies to all standard gage railroads, except those that operate only on track inside an installation which is not part of



the general railroad system of transportation.

## **A P P E N D I X I (continued)**

### **49CFR Part**

- |     |   |  |
|-----|---|--|
| 231 | <u>Railroad safety<br/>appliance guidelines</u>   | Applies to all standard gage railroads, except those that operate only on track inside an installation which is not part of the general railroad system of transportation.   |
| 232 | <u>Railroad power brakes<br/>and drawbars</u>   | Applies to all standard gage railroads, except those that operate only on track inside an installation which is not part of the general railroad system of transportation.   |
| 233 | <u>Signal systems reporting<br/>requirements</u>  | Applies to railroads that operate on standard gage track which is part of the general railroad system of transportation.   |
| 234 | <u>Grade crossing signal<br/>system safety</u>  | Applies to all railroads, except those that operate only on track inside an installation which is not part of the general railroad system of transportation.   |
| 236 | <u>Rules, guidelines and<br/>instructions governing the<br/>installation, maintenance,<br/>and repair of signal systems</u> | Applies to all intercity and commuter railroads that operate only on track inside an installation which is not part of the general railroad system of transportation.  |
| 238 | <u>Passenger Equipment<br/>Safety Standards</u>   | Applies to all intercity and commuter railroads to prescribe the minimum safety standards for railroad passenger equipment.  |
| 239 | <u>Passenger Train<br/>Emergency Preparedness</u>   | Applies to passenger railroads and prescribes minimum Federal safety standards for the preparation, adoption, and implementation of emergency preparedness plans by railroads connected with the operation of passenger trains, and requires each affected railroad to instruct its employees on the provisions of its plan. |
| 240 | <u>Qualification and<br/>certification of<br/>locomotive engineers</u>  | Applies to all railroads, except those that operate only on track inside an installation which is not part of the general railroad system of transportation  |
| **  | <u>Emergency Order 20</u>   | Notice 1 published 2/20/1996 and Notice 2 published 2/29/1996 applies to all commuter railroads and railroads that "host" Commuter rail operations. Portions of EO 20 have subsequently been adopted into other regulations, such as Part 239, however, EO 20 still remains in effect.                                       |

## **APPENDIX**

### **II – APTA Manual of Standards and Recommended Practices for Rail Passenger Equipment**

#### **VOLUME ONE – Introduction**

Introduction, Table of Contents, Background

Appendix A

Appendix B

Appendix C

#### **VOLUME TWO – Construction and Structural**

APTA RP-C&S-001-98

Recommended Practice for Passenger Equipment Roof Emergency Access

APTA RP-C&S-003-98

Recommended Practice for Developing a Clearance Diagram for Passenger Equipment

APTA SS-C&S-004-98

Standard for Austenitic Stainless Steel for Railroad Passenger Equipment

APTA SS-C&S-006-98

Standard for Attachment Strength of Interior Fittings for Passenger Railroad Equipment

APTA SS-C&S-007-98

Standard for Fuel Tank Integrity for Non-Passenger Carrying Passenger Locomotives

APTA SS-C&S-011-98

Standard for Cab Crew Seating Design and Performance

APTA SS-C&S-012-02

Standard for Door Systems for New and Rebuilt Passenger Cars

APTA SS-C&S-015-99

Standard for Aluminum and Aluminum Alloys for Passenger Equipment Car Body Construction

APTA SS-C&S0016-99, Rev. 1

Standard for Row-to-Row Seating in Commuter Rail Cars

APTA SS-C&S-020-03

Standard for Passenger Rail Vehicle Structural Repair

## **APPENDIX II (continued)**

APTA SS-C&S-034-99, Rev. 2

Standard for the Design and Construction of Passenger Railroad Rolling Stock

### **VOLUME THREE – Electrical**

APTA SS-E-001-98

Standard for Insulation Integrity

APTA RP-E-002-98

Recommended Practice for Wiring of Passenger Equipment

APTA RP-E-003-98

Recommended Practice for Load Testing of Diesel Engines

APTA RP-E-004-98

Recommended Practice for Gap and Creepage Distance

APTA SS-E-005-98

Standard for Grounding and Bonding

APTA RP-E-006-99

Recommended Practice for Diesel Electric Passenger Locomotive Dynamic Brake Control

APTA RP-E-007-98, Rev. 1

Recommended Practice for Storage Batteries and Battery Compartments

APTA RP-E-009-98

Recommended Practice for Wire Used on Passenger Equipment

APTA SS-E-010-98

Standard for the Development of an Electromagnetic Compatibility Plan

APTA RP-E-011-98

Recommended Practice for Head End Power Load Testing

APTA RP-E-012-99, Rev. 1

Recommended Practice for Normal Lighting System Design for Passenger Cars

APTA SS-E-013-99

Standard for Emergency Lighting System Design for Passenger Cars

## **APPENDIX II (continued)**

APTA RP-E-014-99

Recommended Practice for Diesel Electric Passenger Locomotive Blended Brake Control

APTA RP-E-015-99

Recommended Practice for Head End Power Source Characteristics

APTA RP-E-016-99

Recommended Practice for 480 VAC Head End Power System

APTA RP-E-017-99

Recommended Practice for 27-Point Control and Communication Trainlines for Locomotives and Locomotive Hauled Equipment

APTA RP-E-018-99

Recommended Practice for 480 VAC Head End Power Jumper and Receptacle Hardware

APTA RP-E-019-99

Recommended Practice for 27-Point Jumper and Receptacle Hardware for Locomotives and Locomotive Hauled Equipment

## **VOLUME FOUR – Inspection and Maintenance**

APTA RP-I&M-001-98, Rev. 1

Recommended Practice for Battery System Periodic Inspection and Maintenance

APTA RP-I&M-002-98

Recommended Practice for Rail Car Technical Documentation

APTA RP-I&M-003-98, Rev. 1

Recommended Practice for Door System Periodic Inspection and Maintenance

APTA SS-I&M-004-98

Standard for Handbrake Periodic Inspection and Maintenance

APTA SS-I&M-005-98, Rev. 2

Standard for Passenger Compartment Periodic Inspection and Maintenance

APTA SS-I&M-006-98

Standard for Draft Gear Periodic Inspection and Maintenance

## **APPENDIX II (continued)**

- APTA SS-I&M-007-98, Rev. 2  
Standard for Car Body Exterior Periodic Inspection and Maintenance
- APTA SS-I&M-008-98, Rev. 1  
Standard for Electrical Periodic Inspection and Maintenance
- APTA SS-I&M-009-98  
Standard for Tread Brake Shoes and Disc Brake Pad Periodic Inspection and Maintenance
- APTA SS-I&M-010-98  
Standard for Disc Brake Periodic Inspection and Maintenance
- APTA SS-I&M-011-98  
Standard for Tread Brake Unit and Brake Cylinder Periodic Inspection and Maintenance
- APTA SS-I&M-012-98  
Standard for Truck and Suspension Periodic Inspection and Maintenance of Passenger Coaches
- APTA SS-I&M-013-99, Rev. 1  
Standard for Periodic Inspection and Maintenance of Passenger Coaches
- APTA SS-I&M-014-99  
Standard for Modification Methodology for the Periodic Inspection and Maintenance of Passenger Coaches
- APTA SS-I&M-015-00  
Standard for Inspection and Testing of Roller Bearings on Passenger Equipment After a Derailment
- APTA SS-I&M-016-00  
Standard for Pantograph Current Collection Equipment Periodic Inspection and Maintenance
- APTA SS-I&M-017-02  
Standard for Third Rail Current Collection Equipment Periodic Inspection and Maintenance
- APTA SS-I&M-018-04  
Standard for Baggage Car Periodic Inspection and Maintenance

## **APPENDIX II (continued)**

### **VOLUME FIVE – Mechanical**

- APTA RP-M-001-97  
Recommended Practice for Air Connections, Location and Configuration of, for Passenger Cars Equipped with AAR Long Shank Tight Lock or Similar Long Shank Type Couplers
- APTA RP-M-001-98  
Recommended Practice for Passenger Car Axle Design
- APTA RP-M-002-98  
Recommended Practice for the Inspection and Maintenance of Type H-Tightlock Couplers
- APTA RP-M-003-98  
Recommended Practice for the Purchase and Acceptance of Type H-Tightlock Couplers
- APTA RP-M-004-98  
Recommended Practice for Secondhand and Reconditioned Type H-Tightlock Couplers
- APTA SS-M-005-98, Rev. 1  
Standard for Code of Tests for Passenger Car Equipment Using Single Car Testing Device
- APTA SS-M-006-98, Rev. 1  
Standard for Parking Brakes on New Passenger Cars and Locomotives
- APTA SS-M-007-98  
Standard for Conductor's Valve – New Passenger Car / MU Locomotives
- APTA RP-M-009-98  
Recommended Practice for New Truck Design
- APTA RP-M-010-98  
Recommended Practice for Derailment Investigation Reports
- APTA SS-M-011-99  
Standard for Compressed Air Quality for Passenger Locomotive and Car Equipment
- APTA SS-M-012-99, Rev. 1  
Standard for the Manufacture of Wrought Steel Wheels for Passenger Cars and Locomotives

## **APPENDIX II (continued)**

### **VOLUME VI – Passenger System Standards and Recommended Practices**

APTA SS-PS-001-98

Standard for Passenger Railroad Emergency Communications

APTA SS-PS-002-98, Rev. 2

Standard for Emergency Signage for Egress/Access of Passenger Railroad Equipment

APTA SS-PS-003-98

Standard for Emergency Evacuation Units for Rail Passenger Cars

APTA SS-PS-004-99, Rev. 1

Standard for Low Location Exit Path Marking

APTA RP-PS-005-00

Recommended Practice for Fire Safety Analysis of Existing Passenger Rail Equipment