APTA STANDARDS DEVELOPMENT PROGRAM

STANDARD

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Operating Practices Working Group

Rail Transit Accident/Incident Notification and Investigation Requirements

Abstract: This standard provides a common framework for rail transit systems to develop accident/incident investigation plans. Additional recommendations on how rail transit systems should implement the policies and procedures contained in the plan required by this standard are given in the informative Annex A, Recommended Process for Performing Rail Transit Accident/Incident Investigations.

Keywords: accident, incident, investigation, notification, reporting

Summary: This standard describes requirements that a rail transit system (RTS) shall develop and implement for accident/incident investigation plans. The standard requires that the RTS accident/incident investigation plan address policies and procedures; notification and reporting; investigation thresholds; coordination with government and regulatory agencies; formal investigation process; training; and post-accident reporting. The requirements that a RTS shall follow to develop its accident/incident investigation plan are provided in the main body text of this standard. Individual rail transit systems shall apply this standard as it relates to that RTS's organizational structure and operating environment. Recommendations for the process (a system or set of procedures) the RTS should follow to perform accident/incident investigations are given in Annex A. Annex A does not contain additional requirements.

Scope and purpose: This standard is intended to assist RTS personnel in investigating accidents/incidents in a logical and organized manner. Since each accident/incident may be different, the procedures and steps described in this document will not necessarily be applied to, nor required for, every RTS accident/incident investigation. The purpose of accident/incident investigation is to gather and assess facts in order to determine cause(s); and to identify corrective measures to prevent recurrence. Accident/incident investigation is not intended to affix blame, or subject people to liability for their actions, or to recommend disciplinary action. The purpose of this standard is to help rail transit systems obtain accident/incident investigation results to learn more about mechanical and other failures and human factors and to correct unsafe conditions.

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Introduction

This introduction is not part of APTA RT-S-OP-002-02, Rev 3 *"Rail Transit Accident/Incident Notification & Investigation Requirements."*

This Standard for Rail Transit Accident/Incident Investigation represents a common minimum framework for those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. In some cases, Federal and/or State regulations govern portions of a Rail Transit System's (RTS) operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by an individual RTS may be either more or less restrictive than those given in this document.

This standard is intended to assist RTS personnel in investigating accidents/incidents in a logical and organized manner. Since each accident/incident may be different, the procedures and steps described in this document will not necessarily be applied to, nor required for, every RTS accident/incident investigation.

Note on alternate practices

Individual rail transit systems may modify the practices in this standard to accommodate their specific equipment and mode of operation. APTA recognizes that some rail transit systems may have unique operating environments that make strict compliance with every provision of this standard impossible. As a result, certain rail transit systems may need to implement the standards and practices herein in ways that are more or less restrictive than this document prescribes. A rail transit system may develop alternates to APTA standards so long as the alternates are based on a safe operating history and are described and documented in the system's safety program plan (or another document that is referenced in the system safety program plan).

Documentation of alternate practices shall:

- identify the specific APTA rail transit safety standard requirements that cannot be met;
- state why each of these requirements cannot be met;
- describe the alternate methods used; and
- describe and substantiate how the alternate methods do not compromise safety and provide a level of safety equivalent to the practices in the APTA safety standard (operating histories or hazard analysis findings may be used to substantiate this claim).

Rail Transit Accident/Incident Notification and Investigation Requirements

1. Accident/incident investigation requirements

1.1 Policies and procedures

The RTS shall develop formal policies and procedures for performing accident/incident investigations. These policies and procedures shall be implemented whenever the investigation threshold set by the RTS in Section 1.2 is met or exceeded.

Recommendations on how to implement these policies and procedures are given in informative Annex A.

1.2 Investigation thresholds

The RTS shall set internal thresholds that trigger the need for a formal accident/incident investigation. Mandated federal accident/incident notification thresholds that may be used by the RTS to trigger an internal, independent investigation are detailed in Section 1.4 of this standard. However, the RTS has the authority to set any thresholds that do not conflict with federal, state, or local laws or regulations. Any RTS threshold shall not supersede any federal, state, or local laws and regulations.

1.3 Reporting requirements

The RTS shall establish its reporting requirements for any employee involved in, having knowledge of, or witnessing, any event that meets the RTS's definition of an accident or incident.

1.4 OCC notification requirements

The RTS shall develop policy that prioritizes the immediate safe response to accidents/incidents over notification requirements. The RTS shall develop and implement accident/incident notification procedures. These procedures shall include operations control center (OCC) notification to the following groups listed below. The procedures shall include, but not be limited to, OCC notification to the following groups:

- Emergency response
- Safety department
- Risk management
- Management
- Customer service
- RTS response personnel

The RTS shall determine the order in which notifications shall be made.

1.4.1 State safety oversight agency notification

The RTS shall define the reporting procedures to notify state safety oversight of a reportable accident/incident. The state safety oversight agency (SSOA), if applicable, shall be notified as per instructions defined according to SSOA requirements per 49 CFR Part 659 and applicable section of the RTS System Safety Program Plan. As SSOAs transition to the safety management system (SMS) approach, the notification requirements will change.

The Federal Railroad Administration (FRA), if applicable, shall be notified as per instructions defined according to the requirements of 49 CFR Part 225 and applicable section of the RTS System Safety Program Plan (SSPP).

1.4.2 Federal, state, transit, local police or other law enforcement agency

The RTS shall notify the applicable enforcement agency as required by federal, state, local or other governing authorities.

1.5 Coordination with government or regulatory agencies

1.5.1 General

The RTS shall coordinate with appropriate government and regulatory agencies as required by law or RTS policy.

The RTS shall also coordinate with those agencies, notified pursuant, that elect to conduct an independent investigation and/or participate in the RTS's investigation. These agencies may include, but are not limited to, National Transportation Safety Board (NTSB), Federal Transit Administration (FTA), FRA, Occupational Safety and Health Administration (OSHA), SSOA, and/or state and local police.

1.5.2 RTS liaison

If a third-party agency elects to conduct an independent investigation and/or participate in the RTS's investigation, the RTS shall establish a point of contact (RTS liaison) for the RTS, who will formally communicate with the third-party agency and the investigator in charge (IIC). The liaison should be knowledgeable and available (preferably at the scene) to the third-party agency. The RTS shall ensure that the RTS liaison and IIC hold a Transit Safety and Security Program (TSSP) certificate for the rail mode in accordance with the Public Transportation Safety Certification Training Plan (49 USC 5329).

1.5.3 Coordination tasks

When a government or regulatory agency advises the RTS that it will conduct a third-party investigation, the RTS shall institute the following minimum coordination tasks:

- Ensure preservation of the accident/incident scene in accordance to instructions and/or requirements provided by the third-party agency. These third-party instructions may supersede or supplement the RTS's own actions to secure the scene.
- Identify and make available qualified personnel to represent the RTS on the various modal and/or technical (discipline) investigative teams that are organized by the third-party agency.
- Establish points of contact to discuss appropriate responsibilities and roles for accident/incident scene management and evidence preservation.
- Provide the name and telephone number (landline and wireless) of the RTS's public information officer.
- Refer any press inquiries on the investigation to the public information officer for the appropriate government, regulatory or third-party investigation agency.

1.6 Investigation process

The Accident/Incident Investigation Plan shall describe the policies and procedures to be used by the RTS to investigate accidents/incidents. Recommendations on a process (a system or set of procedures) that rail transit systems should use to perform accident/incident investigations are contained in informative Annex A.

1.7 Training

The RTS shall develop a policy outlining the training requirements for employees tasked with performing accident/incident investigation. The RTS shall train employees responsible for performing accident investigations to ensure that they are thoroughly familiar with and capable of implementing the RTS's accident/incident investigation according to the SSPP and RTS policies and procedures

1.8 Post-accident reporting

1.8.1 Internal reporting requirements

The RTS's independent investigation shall produce a final investigation report that details the finding(s) and probable cause(s) of the accident/incident and makes recommendation(s) for corrective action when necessary.

The following references provide additional guidance for preparing accident/incident investigation reports:

- "FRA Guide for Preparing Accidents/Incidents Reports," June 2011
- New Instructions for Completing Form FRA F6180.54- Rail Equipment Accident/Incident Report, 2016.
- FTA's 2014 National Transit Database (NTD) Annual Reporting Guide
- Transportation Safety Institute's Transit Rail Incident Investigation Participant Guide. www.tsi.dot.gov

1.8.2 External reporting requirements

RTS shall identify and develop a formal process for reporting, as required. RTS shall identify procedures for collecting and reporting data to the following, as applicable:

- FTA
- NTD
- SSOA
- FRA
- Other agencies

References

This Standard shall be used in conjunction with the following publications. If the following publications are superseded by an approved revision, then the revision shall apply.

Code of Federal Regulations:

29 CFR Part 1904 (OSHA), "Recording and Reporting Occupational Injuries and Illnesses"
49 CFR Part 225 (FRA), "Railroad Accidents/Incidents: Reports Classification, and Investigations"
49 CFR Part 270 (FRA), "System Safety Program, Final Rule"
49 CFR Part 655 (FTA), "Prevention of Alcohol Misuse and Prohibited Drug Use in Transit Operations"
49 CFR Part 659 (FTA), "Rail Fixed Guideway Systems; State Safety Oversight; Final Rule"
49 CFR Part 672 (FTA), "Public Transportation Safety Certification Training Program"
49 CFR Part 674 (FTA), "State Safety Oversight, Final Rule"
49 CFR Part 840 (FRA), "Rules Pertaining to Notification of Railroad Accidents"

Federal Railroad Administration Guide for Preparing Accidents/Incidents Reports, June 2011.http://safetydata.fra.dot.gov/OfficeofSafety/ProcessFile.aspx?doc=FRAGuideforPreparingAccIncReports.pdf

Federal Railroad Administration, New Instructions for Completing Form FRA F6180.54- Rail Equipment Accident/Incident Report, 2016.
http://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/FormFRAF6180RailEquipmentAccidentReportInstructions.aspx

Federal Transit Administration "2017 Safety and Security Policy Manual," 2017.
https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/2017%20NTD%20Safety%20and%20Security%20Policy%20Manual_1.pdf

United States Code: 49 USC 5335(c), "Reports and Audits"

Definitions

accident/incident: An unexpected loss-causing event that results in a fatality, bodily injury or property damage.

authority having jurisdiction: The organization with the legal responsibility for overseeing an investigation.

fatality: The death of a person either at the time an accident/incident occurs or within 24 hours thereafter.

loss-causing: Term used to describe bodily injury, loss of life and/or property, to be defined specifically by RTS.

major accident: At a minimum, major accidents are defined as meeting the criteria listed in Section 1.4.1 in this standard. Individual properties may require notifications at thresholds lower than stated in Section 1.4.1 of this standard.

minor accident: Those accidents not covered under the criteria to be met in Section 1.3.4.1 of this standard, at the discretion of the RTS.

rail incident commander: The RTS staff member responsible for managing and responding to emergencies/incidents and for acting as a liaison with emergency responders.

investigator in charge: The RTS staff member (generally from the safety department, or alternately the risk department) responsible for the detailed investigation of an emergency/incident.

rail transit: All forms of non-highway ground transportation that run on rail.

Abbreviations and acronyms

AHJ	authority having jurisdiction
APTA	American Public Transportation Association
CFR	Code of Federal Regulations
EOC	emergency operations center
FEMA	Federal Emergency Management Agency
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IC	incident command
ICS	incident command system
IIC	investigator in charge
ME	medical examiner
NATSA	North American Transportation Services Association
NTD	National Transit Database
NTI	National Transit Institute
NTSB	National Transportation Safety Board
OCC	operations control center
OSHA	Occupational Safety and Health Administration
RTS	rail transit system
SSOA	state safety oversight agency
SSPP	system safety program plan
TSI	Transportation Safety Institute
USC	United States Code

Summary of document changes

- Document title changed from Rail Transit Accident/Incident Investigation & Notification to Rail Transit Accident/Incident Notification and Investigation Requirements.
- Updated references to applicable FTA and FRA reporting requirements
- Committee membership updated.
- Some global changes to sections headings and numbering resulted when sections dealing with references and acronyms were moved to the end of the document.
- Added one new section at the end of the document - Summary of Changes.
- The following sections which appeared in the First Edition published in 2004, have been deleted. They outlined the methods for capturing and reporting the data and given that this type of information is subject to change and is available from the FTA and FRA web sites, it was determined to delete from the document:
    - 4.7.2.1 FTA reporting requirements, and
    - 4.7.2.2 FRA reporting requirements
- There were other cosmetic changes such as capitalization, punctuations, grammar, etc.
- Added a new section A.9 Operations Coordination in Annex A.
- Under references section, additional CFR regulations and USC codes added to reflect other reporting requirements.

Document history

Document Version	Working Group Vote	Public Comment/ Technical Oversight	Rail CEO Approval	Rail Standards Policy & Planning Committee Approval	Publish Date
First published	—	—	—	—	Sep 22, 2002
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Appendix A (informative): Recommended process for performing rail transit accident/incident investigations

A.1 Overview

This annex provides a recommended process of steps to follow when performing an accident/incident investigation.

Since each accident/incident may be different, the tasks and procedures detailed in this annex will not necessarily be applied to, nor required for, every RTS accident /incident investigation. RTS management should rely on the experience and good judgment of the IIC. Each individual RTS should apply this recommended process as it relates to its own organizational structure.

A.2 Initiation of investigation

Using the investigation threshold requirements developed to meet the requirements of Section 1.2 of this standard, the RTS determines if an investigation is required.

If an investigation is required, the RTS should designate an investigator in charge to conduct the investigation in accordance with the procedures contained in the RTS Accident/Incident Investigation Plan developed to comply with this standard.

A.3 Initial RTS response

A.3.1 Incident command

Upon notification of an accident/incident, responsible modal supervisory personnel will respond to the scene and establish, as necessary, the RTS's on-site incident command (IC). The RTS's on-site IC will coordinate with the incident command established by outside emergency responders and become a resource to the incident commander.

A.3.2 Investigator in charge

A.3.2.1 Authority

The IIC will initiate, coordinate and conduct an independent on-site investigation of accidents/incidents that meet the RTS investigation thresholds. The RTS may support the IIC with an accident investigation team.

A.3.2.2 Response

Upon notification of an accident/incident meeting RTS investigation thresholds, the IIC will respond to the scene when practical. He or she will also be the point of contact/communication with any responding regulatory agency.

A.3.2.3 Coordination with incident command

The IIC will coordinate with the RTS's on-site IC.

A.3.2.4 Securing the scene

When possible and if not in conflict with any authority having jurisdiction (AHJ), the IIC will secure the scene in order to preserve site conditions and evidence to ensure accurate data development. Each RTS should develop its own protocol for restoring the scene.

A.3.3 Coordination and provision of technical assistance/expertise

A.3.3.1 Investigator-in-charge (IIC)

The IIC will coordinate with the IC to obtain, as needed, technical assistance/expertise in conducting required post-accident/incident assessments of vehicles, infrastructures, physical plant and/or equipment.

A.3.3.2 Incident command (IC)

If the IIC requests technical assistance/expertise, then the IC will ensure that the required technical assets are made available and deployed to the scene in a timely manner. The IIC should ensure that tests are completed in a timely manner. The Emergency Management Institute (EMI) of the Federal Emergency Management Agency (FEMA) provides education in various levels of IC. Examples of these educational courses include:

- ICS-100: Introduction to the Incident Command System
- ICS-200: ICS for Single Resources and Initial Action Incidents
- ICS-300: Intermediate ICS for Expanding Incidents
- ICS-400: Advanced ICS for Command and General Staff
- IS-700: National Incident Management System, An Introduction
- IS-701: NIMS Multiagency Coordination System (MACS)
- IS-702: NIMS Publication Information Systems
- IS-703: NIMS Resource Management
- IS-704: NIMS Communication and Information Management
- IS-706: NIMS Intrastate Mutual Aid – An Introduction
- IS-800: National Response Framework, An Introduction
- G-191: Incident Command System/ Emergency Operations Center Interface
- G-402 Incident Command System (ICS) Overview for Executives/Senior Officials
- G-775: Emergency Operations Center (EOC) Management and Operations

A.3.3.3 Investigation committee

Consideration should be given to the formation of a multifunctional investigation committee consisting of operations, mechanical, engineering and safety personnel under the leadership of the IC.

A.3.3.4 Technical assistance content

Examples of technical assistance/expertise include, as applicable, inspection, testing and operational assessment of the following:

- Signals/train control
- Track
- Power
- Communications
- Vehicles and equipment

A.4 Accident/incident on-site data development

The transit system's IIC has four objectives for data development when initially responding to an accident scene:

- To secure the scene to ensure safety and to prevent a second accident.
- To preserve short-term and long-term physical evidence.
- To develop a preliminary sequence of events to determine what happened.

- To identify employees, passengers and other eyewitnesses to obtain preliminary statements and contact information.

Once an event occurs, short-term information becomes quickly perishable as an accident scene is recovered (e.g., equipment or obstructions are moved or rearranged, equipment controls are repositioned, witnesses "disappear," etc.) The primary task of on-site data collection is to prioritize the retrieval of such perishable information.

A.4.1 Initially photographing the scene

Upon arrival on the accident scene, the IIC should arrange to have the scene photographed as soon as possible from a panoramic view, preferably before the accident scene is disturbed. This panorama should include camera photographic shots of the involved vehicle(s) in full view; nearby infrastructure features; and any evident significant obstructions, objects or conditions. Accident scene photographs should be taken using a "four-point compass" method. The entire scene should be photographed from multiple vantage points. The photographer should attempt to provide sufficient depth of field to show relative positioning of objects and subjects for later comparison with diagrams.

A.4.2 Documenting general observational information

A.4.2.1 General information upon arrival

Document the following checklist items:

- Location
- Day and date of occurrence
- Time of occurrence
- Time of arrival of IIC, supervisory staff and responders
- Visibility (dawn, day, dusk, dark)
- Weather (clear, cloudy, rainy, foggy, snowing, sleeting)
- Approximate temperature

A.4.2.2 Eyewitness information

Obtain eyewitness information as quickly as possible. Information should include the following:

- Name, address telephone number
- Witness category (employee, passenger, bystander)
- Status of witness (observer or principal involved in accident)
- Brief description or account of what was or was not observed

A.4.3 Documenting vehicle and infrastructure factors and conditions

A.4.3.1 Vehicle condition at scene

Document the damage and condition of the vehicle(s), including monetary damage estimate. Checklist items should include, as a minimum, the following:

- Car-body condition (visible damage)
- Positions of all operator controls (controller and brake handles, headlight and other switches, air gauge readings, etc.)
- Wheels/axles/trucks/sanders
- Brake systems (friction, electric [dynamic], track)
- Door positions or other entry/exit location conditions

- Headlights, marker lights, indicator lights status

A.4.3.2 Vehicle dynamics

Document evidence relative to vehicle travel/speed to include, as a minimum, the following:

- Ensure event log data (where in service) is secured.
- Identify wheel marks on track.
- Identify evidence of sanding.
- Identify evidence indicating the area of contact/collision.
- Determine line-of-sight distances.
- Ensure arrangement to secure recorded communication data.

A.4.3.3 Infrastructure and environmental conditions at scene

Document the damage and condition of the infrastructure and environmental conditions, including a monetary damage estimate. Checklist items should include, as a minimum, the following:

- Damage (observable) to track, signals, bridges, structures, buildings other infrastructure equipment or machinery
- Damage (observable) to crossing protection apparatus, if relevant
- Roadway approaches and visible pedestrian approaches (unauthorized or otherwise), if relevant
- Evidence (observable) of recent environmental alteration (washout, landslide, etc.)
- Evidence (observable) of recent miscreant alteration (vandalism)
- Point of derailment, collision or other incident

A.4.4 Diagramming and measuring the scene

A.4.4.1 Diagramming

Sketch the scene, as appropriate, regarding the relative location of track(s), vehicle(s), signals, equipment, apparatus, buildings, bridges and other structures. Include noteworthy landmark features, such as roadways, waterways, pathways, flora, etc. Diagram alignment should be relative to geographic north.

A.4.4.2 Measuring

Indelibly mark points of reference in the field (e.g., paint or chalk markings). Document correlation of points of reference with resting positions of objects or subjects. Use feet as a standard unit of measure.

A.4.5 Photographing specific circumstances

Arrange to have specific objects or subjects photographed as soon as possible from both normal periphery and close-up views, preferably before the accident scene is disturbed. The photographer should attempt to ensure appropriate depth of field to sufficiently record subject material. These photographs should attempt to include, as a minimum, the following:

- Each vehicle involved, exterior four sides, including number
- Each vehicle involved, interior compartment
- Each vehicle involved, operating control compartment
- Resting position of wheels if off track, including evidence of sanding
- All visible points of vehicle damage
- Evidence of wheel marks on rail
- All visible points of infrastructure damage
- Any visibly evident contributing obstructions, objects, or conditions

- Position of casualties, if stationary
- Any other subject that appears out of the ordinary

A.4.6 Casualty factors

Document the current status of all known casualties, including the following:

- Injuries – total number, personal information (if possible)
- Fatalities– total number, personal information (if possible)
- Identification of responder units that treated or transported casualties
- Identification of hospitals where casualties were transported

A.4.7 Toxicological factors

The RTS is mandated by 49 CFR Part 655, "Prevention of Alcohol Misuse and Prohibited Drug Use in Transit Operations," to conduct toxicological testing based upon regulatory requirements, collective bargaining agreements or standard policy. RTS field supervisory personnel making determinations should meet qualification standards.

A.4.7.1 Identify if testing is required

Determine if event factors meet criteria for drug and alcohol testing. Determine which employees, if any, are subject to testing based upon the criteria.

A.4.7.2 Authority and type of test

Identify the authorization to conduct the test and the type of test that is required. Authorization and types include the following:

- FTA (for cause, post-accident)
- FRA (for cause, post-accident)
- SSOA
- RTS (for cause, post-accident)
- Local, regional, or state police

A.5 Accident/incident off-site data development

Once the accident scene has been recovered, the RTS Investigator-in-Charge (IIC) has three objectives for data development:

- To collect remaining applicable non-perishable data.
- To conduct interim research and analysis of all collected data to date to reconstruct the event.
- To determine probable cause and contributing factors.

In the aftermath of an accident, long-term information that is nonperishable must be collected (e.g., operational speeds and conditions, maintenance and inspection records, damage estimates, etc.). The primary task of off-site data collection is to coordinate documentation to support evaluation of system, vehicle, and employee performance.

A.5.1 Coordination and provision of technical assistance/expertise

Coordinate needed post-accident research and analysis with all support departments and independent outside agencies. As recommended in Section A.3.3.4, arrange for providing specialized technical support within the respective discipline(s) and/or departments.

A.5.2 Vehicle and component performance

A.5.2.1 Inspections/tests

Conduct and/or document post-accident inspections/tests on vehicles as needed to determine if pre-existing conditions contributed to the accident. Applicable components to be tested should include, as a minimum, the following:

- Operator controls
- Wheels/axles/trucks/sanders
- Braking systems friction, electric (dynamic), track
- On-board signal/speed control systems
- Communication system
- Lights
- Whistle/horn/gong

A.5.2.2 Engineering specifications

Obtain all applicable engineering specifications and drawings, as applicable.

A.5.2.3 Maintenance history

Research prior maintenance history of vehicle or components to determine if any significant conditions or performance levels existed prior to the accident. Identify relevant protocols and recommended frequency. Identify activities performed or omitted, the dates and by whom they were performed.

A.5.2.4 Data comparison

Compare systems performance data (inspections/tests, maintenance history) vs. prescribed engineering limits/specifications to determine if there were any contributing factors to the accident.

A.5.2.5 Damage costs

Verify vehicle damage and repair costs.

A.5.3 Vehicle dynamics

A.5.3.1 Event log data

Recover event log data to determine actual vehicle performance prior to and at the time of the event.

A.5.3.2 Communication data

Recover recorded radio or other communication data to determine if the flow of information is of significance.

A.5.4 Infrastructure system performance

A.5.4.1 Inspections/tests

Conduct and/or document timely post-accident inspections/tests on infrastructure as needed to determine if pre-existing conditions contributed to the accident. Infrastructure components to be tested should include, as a minimum or as applicable, the following:

- Track structure
- Traction power system
- Signal systems
- Routing systems

- Buildings and other structures
- Bridges
- Grade crossing protection apparatus
- Other equipment or machinery

A.5.4.2 Event log data

Recover data from any off-vehicle event recorders, such as signal system event recorders or other software driven records systems.

A.5.4.3 Engineering specifications

Obtain all applicable engineering specifications and drawings.

A.5.4.4 Maintenance history

Research prior maintenance history of systems to determine if any significant conditions or performance levels existed prior to the accident. Identify relevant protocols and recommended frequency. Identify activities performed or omitted, the dates and by whom they were performed.

A.5.4.5 Data comparison

Compare systems performance data (inspections/tests, maintenance history) vs. prescribed engineering limits/specifications to determine if there were any contributing factors to the accident.

A.5.4.6 Damage costs

Verify infrastructure damage and repair costs.

A.5.5 Operational conditions and factors

A.5.5.1 RTS operating instructions

Identify all applicable transit operating instructions at the location of accident. These include, but are not limited to, the following:

- Maximum authorized speed and speed restrictions
- Operating signs and locations
- Wayside signal locations and aspects capable of being displayed
- Bulletins or other special operating orders in effect at time of accident
- Automatic signal systems in effect (train control, cab signals, interlockings, automatic block, etc.)
- Any special operating conditions

A.5.5.2 Other operating instructions

Obtain and research applicable federal and state rules/regulations to determine compliance and effect on accident dynamics. As applicable, these should include, as a minimum, the following:

- Motor Vehicle Code
- Operating standards and practices
- Equipment standards
- Qualification/certification level requirements
- Inspection/maintenance standards
- Safety standards and practices

A.5.6 Interviews and outside reports

A.5.6.1 Primary interviews

Conduct detailed face-to-face interviews as needed to determine the sequence of events leading up to and at the time of the accident. If possible, tape record the interview and obtain the interviewee's signature. Interviews should include, as a minimum or as applicable:

- Crew members
- Other employees directly or indirectly involved in the sequence of events
- Non-employee accident principals
- Passengers
- Bystander witnesses

A.5.6.2 Secondary interviews

Obtain any interview data conducted by other independent sources.

A.5.6.3 Supervisory reports

Obtain applicable supervisory reports of investigation.

A.5.6.4 Outside agency reports

Obtain applicable reports of investigation prepared by outside agencies and police.

A.5.7 Documenting human factors

A.5.7.1 Employee records

Research employee records for performance history or incidents relating to accident dynamics. These records should include, but are not limited to, the following:

- Operating and safety practices compliance
- Qualification/certification levels and experience
- Training and continuing education history
- Accident/Incident history
- Toxicological and medical history
- Attendance/discipline history

A.5.7.2 Fatigue factors

Research and document employee hours of service before accident. This should include the following:

- Time employee reported for duty
- Elapsed time from on-duty time until time of accident
- Break periods before accident
- Available off-duty hours before reporting for assignment
- Number of consecutive days worked prior to day of accident
- Nature of off-duty activity prior to accident

Please refer to APTA RT-OP-S-23-17 for guidance pertaining to fatigue management for rail transit personnel.

A.5.7.3 Fitness for duty

Research and document the employee's fitness for duty. This should include the following:

- Visual acuity
- Pre-existing medical conditions
- Consumption of prescription/non-prescription medication

A.5.7.4 Employee performance

Consider all aspects of employee performance comparative to operating conditions, vehicle and infrastructure conditions, and human physical limitations. Compare research data to event log and communication data to determine performance level.

A.5.8 Follow-up casualty factors

A.5.8.1 Contacting hospitals and verifying casualties

Contact hospitals to verify casualties. Obtain the following:

- Number
- Identities
- Severity (injuries vs. fatalities); include medical examiner reports

A.5.8.2 Trespasser events

Conduct additional research for trespasser events. Research the following:

- Police reports related to indications of suicide or foul play
- Medical Examiner toxicological reports

A.5.8.3 Potential injury dynamics/survival factors

Document vehicle, infrastructure or operating conditions that could have contributed to or increased severity of casualties.

1.8.3 A.5.9 Follow-up toxicological factors

1.8.3.1 A.5.9.1 Testing results

Obtain results of post-accident toxicological testing.

1.8.3.2 A.5.9.2 Testing determination

Obtain determination of toxicological significance, if available.

1.8.4 A.5.10 Reconstruction

As considered relevant, reconstruct the accident dynamics and sequence of events based upon all data developed from on-site investigation and off-site research. Establish facts that were contributory to the accident. Fact-finding should include, as a minimum, the following categories:

- Actual vehicle performance
- Actual infrastructure performance
- Actual employee performance
- Mathematical calculations
- Scale drawings/diagrams

- Photographic evidence

A.6 Analysis

When all readily obtainable information is assembled, the IIC should ensure that all existing evidence is evaluated and make a general determination as to the contributing factors and probable cause of the accident. As applicable, the following information should be included:

- IIC's primary report
- All other supervisor's individual reports
- Interview reports
- Technical reports (vehicle, infrastructure, other)
- Outside agency reports
- Data contained on records, if applicable
- Hand-written statements
- Event log data
- Radio/communication tapes and/or transcripts
- Maps, drawings, or diagrams
- Photographs or videos

The IIC should keep in mind that the investigation might not have reached the final stage. It is essential the IIC understands that future evidence may surface which could change the determination of probable cause.

A.7 Preparing reports and recommendations

A.7.1 Investigator in charge

The IIC should prepare a summary report detailing the data and analysis to support a determination of cause and recommended corrective action, where needed.

A.7.2 Draft report

A draft report should be completed in a time period to be determined by the AHJ or RTS. Suggested report formats are detailed in Sections A.7.3 and A.7.4.

A.7.3 Accident/incident report

As a minimum, the accident/incident report should include the following sections:

- Executive Summary
- Sequence of events
- Prior to the accident/incident
- The accident/incident
- Subsequent to the accident/incident
- Findings/analysis
- Conclusions
- Probable cause
- Contributory causes
- Recommendations

A.7.4 Evidence retention

The RTS should establish a protocol to retain, secure and store physical evidence and documentation developed pursuant to investigations for future criminal, tort or AHJ action. The protocol should attempt to include, as a minimum, the following:

- Chain of custody procedure
- Validation of photographs/videotapes and control center tapes
- Physical evidence retention procedure
- Procedure for destructive/nondestructive testing

A.7.5 Record keeping

Items to be archived and indexed should include, as applicable, those listed in Section A.6 and any others as determined by the RTS.

A.8 Follow-up

A.8.1 Implementing recommendations

The RTS should coordinate with affected departments to draft a corrective action plan for implementing recommendations developed after an accident/incident investigation.

A.8.2 Corrective action plan summary

The RTS should prepare a Corrective Action Plan Summary for all recommendations developed after an accident/incident investigation.

A.8.3 Corrective action plan information

The Corrective Action Plan should include the following information:

- The recommendation and plan for correction.
- Activity to meet objectives of the plan.
- Responsible department/individual for plan implementation and task activity.
- Scheduled completion dates.
- Estimated cost.
- Follow-up
    - Ensure that recommendation is implemented.
    - Ensure that recommendation does not result in other safety issues.

A.8.4 Periodic reporting

The RTS should prepare an internal status report of corrective action plan activity and completion status. The RTS should provide this report to the senior manager of each part of the RTS organization responsible for implementation of the corrective action. The RTS should have a follow-up review to check that the corrective actions have been implemented.

A.8.5 Assigned tasks

Departments and/or individuals designated as the responsible party for specific action plan objectives should complete the assigned tasks.

A.9 Operations coordination

It is recommended that the RTS develop prearranged protocols with emergency responders which will minimize disruption to transit service without impeding accident or incident response and investigation.

Annex B: Overview of TSI Transit Rail Incident Investigation Guide

The Public Transportation Safety Certification Training Program requires that transit safety employees, contractors, consultants, and oversight personnel must complete applicable coursework for the Transit Safety and Security Program (TSSP) certificate. Coursework is provided by TSI on behalf of USDOT. TSI requires Transit Rail Incident Investigation as part of the TSSP, the course is led in a classroom and culminates with an operational field exercise that recreated a transit rail incident.

The modules, and corresponding learning objectives, of the course pertain to:

- Track and structures
    - The investigator shall identify and describe track and structure systems
    - The investigator shall list track and structure systems that can cause or contribute to an incident.
- Signal systems
    - The investigator shall identify and describe the different types of signalling system components, control systems, maintenance records, and pre-incident and post incident testing.
    - The investigator shall list signalling systems that can cause or contribute to an incident,
- Power systems
    - The investigator shall identify and describe the different types of power systems
    - The investigator shall discuss basic safety rules for working with power systems
- Supervisory control and data acquisition (SCADA) and communication systems
    - The investigator shall identify and describe the various parts of SCADA and communication systems
    - The investigator shall discuss the problems with SCADA and communication systems that can cause or contribute to an incident.
- Rail vehicles
    - The investigator shall identify and describe the various types of rail vehicles, both revenue and non-revenue, to include light rail, heavy rail, trolleys, inclined planed, monorail, people mover, commuter, freight, and intercity.
    - The investigator shall describe how various vehicle issues can cause or contribute to an incident.
    - The National Public Transportation Safety Plan shall establish minimum safety performance standards for public transportation vehicles used in revenue operations.
- Operations
    - The investigator shall identify various operational issues, including work rules, policies, and procedures, both formal and informal.
    - The investigator shall discuss track/train dynamics and train handling issues
    - The investigator shall discuss the various types of operational problems that can cause or contribute to an incident.
    - The investigator shall describe the processes of developing, revising, and managing operational procedures.
    - The investigator shall identify and discuss the human factors, including fatigue, ergonomics, training, personal work history, and medical conditions
    - The investigator shall discuss the individual differences in processing information, perceptions, and re-actions that may contribute to an incident.
- Evidence collection and report writing
    - The investigator shall identify and describe the basic evidence collection process
    - The investigator shall identify and discuss the different types of reports
    - The investigator shall describe the basics of photo documentation and its advantages and disadvantages

    - The investigator shall identify alternate sources of incident photographs
    - The investigator shall describe how to conduct effective interviews, including basic interview techniques and different ways to ask questions.
- Special cases
    - The investigator shall discuss the different types of rail collisions
    - The investigator shall discuss examples of how RTSs have conducted collision investigations
    - The investigator shall identify the elements that contribute to a derailment and the most common causes
    - The investigator shall discuss the rail aspects of a highway grade crossing investigation
    - The investigator shall discuss the various train information that needs to be evaluated when investigating a grade crossing collision.