

June 2009 Collision of Two Washington Metropolitan Area Transit Authority Metrorail Trains Near Fort Totten Station, Washington, DC

PURPOSE

This case study is intended to provide a useful tool for the U.S. Nuclear Regulatory Commission (NRC) staff as it interacts with the regulated community. The case study will enable the staff to identify and learn from the findings made by the National Transportation Safety Board (NTSB) about the collision of two Washington Metropolitan Area Transit Authority (WMATA) Metrorail trains in June 2009. The collision resulted in the loss of nine lives and multiple passenger injuries. The NTSB [report](#) points out that WMATA failed to implement many significant attributes of a sound safety program. Many of these attributes parallel the positive safety culture traits the NRC has incorporated into its recent Safety Culture Policy Statement.

WHAT HAPPENED?

On Monday, June 22, 2009, at about 4:58 p.m. eastern daylight time, WMATA Metrorail train 112 struck the rear of stopped Metrorail train 214. The powerful impact caused the rear car of train 214 to telescope into the lead car of train 112, resulting in a loss of occupant survival space in the lead car of about 63 feet (about 84 percent of its total length). Nine people aboard train 112, including the train operator, were killed. Emergency response agencies reported transporting 52 people to local hospitals. (NTSB/RAR-10/02)



PROBABLE CAUSE

- “A failure of track circuit modules caused the automatic train control system to lose detection of one train (train 214) allowing a second train (train 112) to strike it from the rear.” (NTSB NEWS SB-10-29)
- WMATA failed to institutionalize and employ across the system an enhanced track circuit verification test procedure that was developed following a near collision in Rosslyn, VA, in 2005. **If this test procedure had been institutionalized and used systemwide, it would have identified the faulty track circuit before the accident.** (NTSB/RAR-10/02)
- Other major contributing factors were “WMATA’s lack of a safety culture” and WMATA’s failure to replace or retrofit 1000-series railcars, which were shown in a 2004 accident to exhibit poor crashworthiness. (NTSB/RAR-10/02)

NRC Positive Safety Culture Traits

Evidence of Weak Safety Culture Traits

Leadership Safety Values and Actions, in which leaders demonstrate a commitment to safety in their decisions and behaviors.

At a monthly board meeting on June 25, 2009, WMATA provided a safety culture presentation to its Board of Directors. The presentation focused on WMATA’s commitment to correct recognized hazards, such as parking lot injuries and improper door operations. It did not address safety or train operations or audit findings and corrective action plans. The NTSB was concerned that senior management may have placed too much emphasis on investigating these types of hazards to the exclusion of passenger safety during transit. (NTSB/RAR-10/02)

Problem Identification and Resolution, in which issues potentially impacting safety are promptly identified, fully evaluated and promptly addressed and corrected commensurate with their significance.

“In 2006, the NTSB recommended that WMATA accelerate the retirement of the 1000-series cars or retrofit them with crashworthiness collision protection comparable to the 6000-series cars. In 2007, that recommendation was classified ‘Closed—Unacceptable Action’ based on WMATA’s response that it was not feasible to retrofit the 1000-series cars and that they would remain in service until replacement with the 7000-series cars in 2014,” as originally planned. (NTSB/RAR-10/02) This issue was identified and evaluated but not addressed or corrected commensurate with the potential risk. The NTSB report recommends replacing all 1000-series railcars as soon as possible with cars that have crashworthiness collision protection at least comparable to the 6000-series railcars. (NTSB/RAR-10/02)

Personal Accountability, in which all individuals take personal responsibility for safety.

The June 25, 2009, WMATA safety presentation defined a preventable accident as “an accident that occurred because the employee failed to do everything reasonably expected of a trained professional to avoid involvement in an accident.” (NTSB/RAR-10/02) Based on this definition, NTSB concluded that “WMATA placed much of the blame for causing and much of the responsibility for preventing accidents on frontline employees. Placing blame on frontline employees is not likely to improve the safety of the system as a whole.” (NTSB/RAR-10/02)

NRC Positive Safety Culture Traits	Evidence of Weak Safety Culture Traits
Work Processes , in which the process of planning and controlling work activities is implemented so that safety is maintained.	As the result of a 2005 audit, the Federal Transit Administration issued nine deficiency findings and one recommendation to comply with the Code of Federal Regulations. After 2 years, the audit findings were still open and WMATA did not have a process to identify and address system safety deficiencies. (NTSB/RAR-10/02)
Continuous Learning , in which opportunities to learn about ways to ensure safety are sought out and implemented	The 2005 near collision in Rosslyn, VA, afforded a prime opportunity to learn about ways to ensure safety. WMATA developed an enhanced track circuit verification test to identify track circuits with the potential to lose train detection; however, the test was never institutionalized and circuit monitoring tools fell into disuse, indicating that WMATA either did not recognize the severity of the risk posed or did not communicate that hazard to all departments of the agency. The results of the hazard assessment and procedures for addressing the identified risk should have been integrated into the training and guidance materials for all affected personnel. (NTSB/RAR-10/02)
Environment for Raising Concerns , in which a safety conscious work environment is maintained where personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment or discrimination.	NTSB found examples of a deficient reporting culture within WMATA resulting from fear of retaliation. As a result of these findings, NTSB recommended that WMATA develop and implement a nonpunitive safety reporting program to collect and review reports from staff at all levels throughout the organization and share the results of these reviews with all divisions of WMATA. (NTSB/RAR-10/02)
Effective Safety Communication , in which communications maintain a focus on safety.	In response to the 2005 event in Rosslyn, VA, WMATA developed and issued technical bulletins requiring the use of an enhanced circuit verification test procedure; however, none of the WMATA technicians interviewed as part of the investigation was familiar with the enhanced procedure. NTSB concluded that WMATA failed to recognize that the near collision in Rosslyn represented an unacceptable hazard and did not ensure that the communication reached all affected divisions in the organization for resolution. (NTSB/RAR-10/02)
Respectful Work Environment , in which trust and respect permeate the organization.	WMATA required all trains to be operated in automatic mode during the morning and evening rush periods. The operator of train 214 had been reprimanded previously for operating his train in manual mode; however, on the day of the accident, he changed from automatic to manual mode because he did not want to rely on the automated system to properly position the train along the platform. His actions are indicative of the distrust between WMATA management and its employees. "Disciplinary practices perceived as unfair can motivate individuals to hide safety-related information or adopt behaviors to avoid blame." (NTSB/RAR-10/02)
Questioning Attitude , in which individuals avoid complacency and continuously challenge existing conditions and activities in order to identify discrepancies that might result in error or inappropriate action.	The NTSB report states that managers had an apparent tendency to tolerate failures and malfunctions in the automatic train control system. This may explain why WMATA officials had designated track circuit alarms in the Metrorail Operations Control Center as requiring no specific response and why neither technicians nor maintenance officials placed a high priority on addressing a loss of train detection. NTSB concluded that this complacency likely influenced the inadequate response to malfunctions. (NTSB/RAR-10/02)

WHAT CAN ORGANIZATIONS LEARN FROM THIS ACCIDENT?

This accident reinforces the need for, and importance of, promoting a positive safety culture by routinely evaluating NRC safety culture activities and initiatives and making enhancements and adjustments to ensure that an organization remains proactive and appropriately focused in this important area. Key lessons from this case study include the following:

- Leaders and individuals should be committed to the core values and behaviors that emphasize safety over competing goals to ensure protection of people and the environment.
- Problems that have been identified as potential safety threats, but that have not been fully evaluated and addressed, should be escalated until resolved.
- Personnel should be encouraged to raise concerns without fear of retaliation.
- Processes and procedures should be standardized, implemented, maintained, and communicated.
- Personnel, equipment, tools, procedures, and other resources needed to ensure safety and security should be available.

Note that the NRC has not conducted a formal analysis of the events discussed herein for, or in conjunction with, NTSB, WMATA, or any other organization. The NRC compiled the factual information presented and discussed from publicly available sources, as identified.

Sources of Information:

Railroad Accident Report
NTSB Number RAR-10/02
NTIS Number PB2010-916302
NTSB News-SB-10-29

The NRC Office of Enforcement (OE) developed this Safety Culture Case Study. If you have any questions, please contact David Solorio, Branch Chief, at 301-415-0149 or by sending an e-mail to Dave.Solorio@nrc.gov.

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