



DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Mitigation and Investigation of Passenger Rail Human Factor Related Accidents and Operations in Terminals and Stations with Stub End Tracks

[Safety Advisory 2016-03]

AGENCY: Federal Railroad Administration (FRA), U.S. Department of Transportation (DOT).

ACTION: Notice of Safety Advisory.

SUMMARY: FRA is issuing Safety Advisory 2016-03 to stress to passenger and commuter railroads the importance of taking action to help mitigate human factor accidents, assist in the investigation of such accidents, and enhance the safety of operations in stations and terminals with stub end tracks. This safety advisory contains various recommendations to passenger and commuter railroads related to inward- and outward-facing cameras, sleep apnea, and operating practices to potentially mitigate the occurrence and assist in the investigation of human factor related accidents and to enhance the safety of operations in terminals and stations with stub end tracks.

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SUPPLEMENTARY INFORMATION:

I. New Jersey Transit Incident

On September 29, 2016, at approximately 8:38 a.m., New Jersey Transit (NJT) Train 1614 travelling at 21 miles per hour (mph) impacted the bumping block at the end of the track No. 5 Depot, at Hoboken Terminal, in Hoboken, New Jersey. The cab car overrode the bumping block and struck the wall of the terminal building, near the ticket office in the corner of the building. NJT Train 1614 was occupied by three crew members and approximately 331 passengers. The accident resulted in the three crewmembers and 108 passengers being transported to four area hospitals. One individual who was standing on the pedestrian walkway between the tracks and the station was fatally injured from falling debris.

The National Transportation Safety Board (NTSB) has taken the lead role in conducting the investigation of this accident under its legal authority. See 49 U.S.C. 1101 et seq.; 49 CFR 831.2(b). As is customary, FRA is participating in the NTSB's investigation and also investigating the accident under its own authority. NTSB has not issued its formal findings. Although the NTSB has not concluded its investigation of this accident, FRA believes railroads should take more robust action to address human factors that may cause accidents and to enhance protection of railroad employees and the public.

II. Other Railroad Accidents

Amtrak Accident at Philadelphia, PA

On Tuesday, May 12, 2015, National Railroad Passenger Corporation (Amtrak) passenger train 188 (Train 188) was traveling from Washington, D.C., to New York City. Aboard the train were five crew members and approximately 238 passengers. Shortly after 9:20 p.m., the train derailed while traveling through a curve in the track at Frankford

Junction in Philadelphia, Pennsylvania. As a result of the accident, eight persons were killed and a significant number of persons were seriously injured.

NTSB conducted an investigation of this accident under its legal authority and issued its findings on May 17, 2016.¹ As Train 188 approached the curve from the west, it traveled over a straightaway with a maximum authorized passenger train speed of 80 mph. The maximum authorized passenger train speed for the curve was 50 mph. NTSB determined the train was traveling approximately 106 mph within the curve's 50-mph speed restriction, exceeding the maximum authorized speed on the straightaway by 26 mph, and 56 mph over railroad's maximum authorized speed for the curve.² NTSB concluded the locomotive engineer operating the train made an emergency application of Train 188's air brake system, and the train slowed to approximately 102 mph before derailling in the curve.³ NTSB concluded that the probable cause of the engineer accelerating to this speed was due to his loss of situational awareness likely because his attention was diverted to an emergency situation with another train.⁴

On July 8, 2015, NTSB sent a letter to FRA reiterating NTSB recommendations R-10-01 & -02.⁵ The letter indicated NTSB believes inward-facing locomotive recorders could have provided valuable information to help determine the cause of the accident.

¹ 49 U.S.C. 1101 et seq.; 49 CFR 831.2(b); and NTSB, Railroad Accident Report, RAR-16/02, Derailment of Amtrak Passenger Train 188, Philadelphia, Pennsylvania, May 12, 2015, <http://www.nts.gov/investigations/AccidentReports/Reports/RAR1602.pdf>.

² RAR-16/02 at 1. FRA regulations provide, in part, that it is unlawful to "[o]perate a train or locomotive at a speed which exceeds the maximum authorized limit by at least 10 miles per hour." 49 CFR 240.305(a)(2).

³ RAR-16/02 at 4-5.

⁴ Id. at 44.

⁵ National Transportation Safety Board, *Safety Recommendation History for Safety Recommendation R-10-001*: available online at: http://www.nts.gov/_layouts/nts.recsearch/Recommendation.aspx?Rec=R-10-001. NTSB's accident report also reiterated these recommendations. See RAR-16/02 at 46-47. NTSB also sent a letter regarding locomotive recorder recommendations to Amtrak.

After this accident occurred, Amtrak announced it would install inward-facing cameras on all of its ACS-64 locomotives on the Northeast Corridor.

Southern California Regional Rail Authority (Metrolink) Chatsworth, CA

On September 12, 2008, in Chatsworth, California, an accident occurred involving a collision between a Southern California Regional Rail Authority (Metrolink) passenger train and a Union Pacific Railroad Company (UP) freight train.⁶ The accident occurred after the locomotive engineer operating the Metrolink passenger train failed to stop his train for a stop signal. As a result of the accident, 25 persons on the Metrolink train were killed and 102 injured passengers were transported to the hospital. The accident damage was estimated to be in excess of \$12 million. The NTSB found the probable cause of that accident was the Metrolink locomotive engineer's distraction due to the use of a personal cell phone to send text messages resulting in a failure to comply with the signal indication.⁷

Shortly after the Metrolink accident, the Rail Safety Improvement Act of 2008⁸ (RSIA) was enacted. RSIA required, among other items, that railroads install Positive Train Control (PTC) systems. Also after the accident, FRA issued its Emergency Order No. 26 (EO 26). 73 FR 58702 (Oct. 7, 2008). EO 26 prohibited railroad operating employees (typically train crew members such as locomotive engineers and conductors) performing safety-related duties from using or turning on electronic devices such as personal cell phones. The requirements in EO 26 were codified in amended form at 49

⁶ See National Transportation Safety Board, *Collision of Metrolink Train 111 with Union Pacific Train LOF65-12 Chatsworth, California September 12, 2008*, Accident Report NTSB/RAR-10/01 (Jan. 21, 2010); available online at: <http://www.nts.gov/investigations/AccidentReports/Reports/RAR1001.pdf>.

⁷ *Id.* at 66.

⁸ Rail Safety Improvement Act of 2008, Public Law No. 110-432, Division A, 122 Stat. 4848 (Oct. 16, 2008); available online at <https://www.fra.dot.gov/eLib/Details/L03588>.

CFR part 220, subpart C, in an FRA final rule published on September 27, 2010, which took effect on March 28, 2011. 75 FR 59580. Among other requirements in the final rule, railroad operating employees are required to receive training on the regulation's requirements governing the use of electronic devices while on-duty and are also required to be tested by railroad supervisors to determine employees' compliance with such requirements. 49 CFR 220.313-315.

The NTSB's report on the Chatsworth accident resulted in two new Safety Recommendations, R-10-01 and R-10-02.⁹ Safety Recommendation R-10-01 superseded Safety Recommendation R-07-003, and recommended that FRA:

Require the installation, in all controlling locomotive cabs and cab car operating compartments, of crash- and fire-protected inward- and outward-facing audio and image recorders capable of providing recordings to verify that train crew actions are in accordance with rules and procedures that are essential to safety as well as train operating conditions. The devices should have a minimum 12-hour continuous recording capability with recordings that are easily accessible for review, with appropriate limitations on public release, for the investigation of accidents or for use by management in carrying out efficiency testing and system wide performance monitoring programs.

In addition, Safety Recommendation R-10-02 recommended that FRA:

Require that railroads regularly review and use in-cab audio and image recordings (with appropriate limitations on public release), in conjunction with other performance data, to verify that train crew actions are in accordance with rules and procedures that are essential to safety.

Metro-North Railroad Derailment, Bronx, NY

On December 1, 2013, at approximately 7:20 a.m. EST, southbound Metro-North Railroad (Metro-North) passenger train 8808 derailed as it approached the Spuyten Duyvil Station in New York City. All passenger cars and the locomotive derailed, and,

⁹ National Transportation Safety Board, *Safety Recommendations R-10-01 and R-10-02* (Feb. 23, 2010); available online at: <http://www.nts.gov/safety/safety-recs/recletters/R-10-001-002.pdf>.

as a result, four passengers died and at least 61 passengers were injured. The train was traveling at 82 mph when it derailed in a section of curved track where the maximum authorized speed was 30 mph. Following the accident, the engineer reported that: (1) he felt dazed just before the derailment;¹⁰ and (2) his wife had complained about his snoring. The engineer then underwent a sleep evaluation that identified excessive daytime sleepiness and a sleep study that diagnosed severe obstructive sleep apnea (OSA). Based on its investigation of the derailment, the NTSB concluded that the engineer had multiple OSA risk factors, such as obesity, male gender, snoring, complaints of fatigue, and excessive daytime sleepiness. Even though the engineer had these OSA risk factors, neither his personal health care provider nor his Metro-North occupational health evaluations had screened the engineer for OSA.¹¹ NTSB determined that the probable cause of the accident was the “engineer’s noncompliance with the 30-mph speed restriction because he had fallen asleep due to undiagnosed severe obstructive sleep apnea exacerbated by a recent circadian rhythm shift required by his work schedule.”¹²

Railroad safety is of the utmost importance to FRA, and, based on the above accidents, FRA recommends several measures discussed below, to address human factor-caused accidents

III. Inward- and Outward-Facing Cameras

On December 4, 2015, the President signed into law the Fixing America’s Surface Transportation Act, Pub. L. 114-94, 129 Stat. 1686 (Dec. 4, 2015) (FAST Act). Section 11411 of the FAST Act, codified in the Federal railroad safety laws at 49 U.S.C. 20168 (the Statute), requires FRA (as the Secretary of Transportation’s delegate) to promulgate

¹⁰ NTSB, Railroad Accident Brief RAB-14/12, Metro-North Railroad Derailment, October 24, 2014, p. 2.

¹¹ *Id.* at 3.

¹² *Id.* at 5.

regulations requiring each railroad carrier that provides regularly scheduled intercity rail passenger or commuter rail passenger transportation to install inward- and outward-facing image recording devices in all controlling locomotives of passenger trains. 49 U.S.C. 20168(a). Although FRA is in the process of developing a regulatory proposal addressing this statutory mandate, FRA encourages railroads to accelerate the installation of the cameras. The Statute contains various design and operational requirements related to these cameras including:

- A minimum 12-hour continuous recording capability (49 U.S.C. 20168(b)(1));
- Crash and fire protections for any in-cab image recordings that are stored only within a controlling locomotive cab or cab car operating compartment (49 U.S.C. 20168(b)(2));
- Recordings must be accessible for review during an accident or incident investigation (49 U.S.C. 20168(b)(3));
- Railroads may use the recordings to:
 - Verify that train crew actions follow applicable safety laws and the railroad carrier's operating rules and procedures (49 U.S.C. 20168(d)(1));
 - Assist in an investigation into the causation of a reportable accident or incident (49 U.S.C. 20168(d)(2)); and
 - Document a criminal act or monitor unauthorized occupancy of the controlling locomotive cab or car operating compartment (49 U.S.C. 20168(d)(3)).

In addition to the design and operational requirements in the FAST Act, the Statute also contains various other requirements regarding the use and maintenance of

inward- and outward-facing cameras as well as limitations and protections on how data from the cameras can be used. Importantly, the Statute prohibits railroads from using image recordings to retaliate against their employees. 49 U.S.C. 20168(i). In addition, to discourage tampering with the cameras, the Statute allows railroads to take enforcement actions against employees that tamper with or disable an inward- or outward-facing image recording device. 49 U.S.C. 20168(f). Furthermore, recording device data obtained from a locomotive involved in a FRA reportable accident or incident must be preserved by the railroad for one year after the accident or incident. 49 U.S.C. 20168(g).

Once FRA has acquired this data from the railroad, FRA is prohibited from publicly disclosing locomotive audio and image recordings or transcripts of oral communications between train, operating, and communication center employees related to the accident or incident FRA is investigating. However, FRA may publicly release a transcript of a written depiction of visual information that the agency deems is relevant to the accident at the time other factual reports on the accident are released to the public. 49 U.S.C. 20168(h). This restriction is similar to the prohibition on public disclosure of locomotive recordings that NTSB takes possession of during an investigation. 49 U.S.C. 1114(d).

FRA remains concerned with the ability to fully investigate accidents that appear to be human factor-caused where there is insufficient information from the controlling locomotive cab or cab operating compartment to conclusively determine what caused or contributed to an accident. Locomotive cab recording information could benefit investigations and help identify necessary corrective actions before similar train accidents occur. Inward- and outward-facing image recording devices would be valuable in

revealing crew actions and interactions before, during, and after an accident. FRA also believes that inward- and outward-facing cameras will give railroads the ability to monitor crew behavior to ensure compliance with existing Federal regulations and railroad operating rules and deter noncompliance. Existing Federal regulations at 49 CFR part 217 require railroads to conduct operational tests to determine the extent of employees' compliance with railroad operating rules, and particularly those rules which are most likely to cause the most accidents or incidents.

IV. Railroad Employee Fatigue

Fatigue of railroad employees continues to be a concern of FRA, particularly for employees with sleep disorders who operate passenger trains. This Advisory contains suggested measures that railroads and employees should utilize to prevent work-related errors and on-the-job accidents as a result of sleep disorders.

Sleep disorders represent a serious health problem and left untreated can result in impaired work performance, including possible loss of alertness and situational awareness, which could in turn present an imminent threat to transportation safety.¹³ In general terms, sleep disorders range from fairly common disorders, such as insomnia (the inability to initiate or maintain sleep) to relatively rare sleep disorders such as narcolepsy (inappropriate and uncontrollable sleep episodes). Railroad employees who typically work on-call are especially vulnerable to circadian rhythm disorders such as shift work sleep disorder (SWSD).¹⁴ SWSD symptoms include excessive sleepiness when a worker needs to be awake, insomnia when the worker needs to obtain sleep, unrefreshing sleep,

¹³ See 81 FR 12642, 12643-12644 (Mar. 10, 2016); Federal Railroad Administration Notice of Safety Advisory 2004-04 (Oct. 1, 2004).

¹⁴ Id.

and difficulty concentrating.¹⁵ One of the more common sleep disorders is obstructive sleep apnea (OSA). And, the lawyer representing the engineer of the NJT train stated the engineer had undiagnosed OSA.¹⁶

OSA is a respiratory disorder characterized by a reduction or cessation of breathing during sleep. OSA is characterized by repeated episodes of upper airway collapse in the region of the upper throat (pharynx) that results in intermittent periods of partial airflow obstruction (hypopneas), complete airflow obstruction (apneas), and respiratory effort-related arousals from sleep (RERAs) in which affected individuals awaken partially and may experience gasping and choking as they struggle to breathe. Risk factors for developing OSA include: obesity, male gender, advancing age, family history of OSA, large neck size, and an anatomically small oropharynx (throat).

Additionally, OSA is associated with increased risk for other adverse health conditions such as: hypertension (high blood pressure), diabetes, cardiac dysrhythmias (irregular heartbeat), myocardial infarction (heart attack), stroke, and sudden cardiac death.

Individuals who have undiagnosed OSA are often unaware they have experienced periods of sleep interrupted by breathing difficulties (apneas, hypopneas, or RERAs) when they awaken in the morning. As a result, the condition is often unrecognized by affected individuals and underdiagnosed by medical professionals.

For individuals with OSA, eight hours of sleep can be less restful or refreshing than four hours of ordinary, uninterrupted sleep. Undiagnosed or inadequately treated moderate to severe OSA can cause unintended sleep episodes and resulting deficits in attention, concentration, situational awareness, and memory, thus reducing the capacity to

¹⁵ Id.

¹⁶ See <http://www.nbcphiladelphia.com/news/local/NJ-train-crash-undiagnosed-engineer-sleep-disorder-apnea-hoboken-401555955.html>.

safely respond to hazards when performing safety sensitive duties. Thus, OSA is a critical safety issue that can affect operations in all modes of travel in the transportation industry.

On March 10, 2016, FRA published an advance notice of proposed rulemaking (ANPRM) requesting data and information concerning the prevalence of moderate-to-severe OSA of individuals occupying safety sensitive positions in rail transportation and the potential consequences for rail safety. See 81 FR 12642 (Mar. 10, 2016). The ANPRM also requested information on the potential costs and benefits from regulatory actions that would address the safety risks associated with rail transportation workers in safety sensitive positions who have OSA. The ANPRM was published jointly with the Federal Motor Carrier Safety Administration and requested similar information regarding highway transportation workers in safety sensitive positions and highway safety. This Advisory and accompanying recommended actions is not in response to the ANPRM; rather, it is an action concurrent with the ANPRM. FRA is currently reviewing the data and information submitted in response to the ANPRM.

V. Passenger Terminals and Stations with Stub End Tracks

The Hoboken accident involved NJT Train 1614 that was traversing a stub end track entering a passenger station at 21 mph – 11 mph over the 10 mph posted speed limit. FRA recommends identifying locations that have stub end tracks at passenger terminals and stations that are equipped with technology that can warn and enforce passenger trains to stop short of a stub end track and ensure they enforce applicable speed limits. If such locations are not equipped with technology that can warn and enforce passenger trains to stop short of a stub end track and ensure they enforce applicable speed

limits, then FRA encourages railroads to take other operational actions to prevent trains from overrunning stub end tracks equipped with or without bumping posts. One such operational action would be to require communications between the engineer and other qualified employees that can take appropriate action, such as applying the emergency brakes, if necessary.

VI. Recommended Actions

In light of the recent accident discussed above, and in an effort to ensure the safety of the Nation's railroads, their employees, and the general public, FRA recommends that intercity passenger and commuter railroads do each of the following:

1. Instruct their employees during training classes and safety briefings on the importance of compliance with maximum authorized train speed limits and other speed restrictions when entering passenger stations and terminals;

2. Not less than once every six months evaluate operational testing data as required by 49 CFR 217.9. A railroad should consider increasing the frequency of operational testing where its reviews show any non-compliance with maximum authorized train speeds in passenger stations or terminals. Railroads should conduct a significant number of operational tests on trains required to operate into a station or terminal with stub end tracks;

3. Adopt procedures requiring communication between crew members and the locomotive engineer before and during operation into a station or terminal and/or implement technology to appropriately control and/or stop the train short of the stub end track. These actions could include:

a. Making modifications to automatic train control (ATC), cab signal, or other signal systems capable of providing warning and enforcement to ensure trains comply with applicable speed limits and stop short of stub end tracks;

b. If a railroad does not utilize an ATC, cab signal, or other signal system capable of providing warning and enforcement at applicable passenger terminals and stations with stub end tracks platforms (or if a signal system modification would interfere with the implementation of PTC or is otherwise not viable), making all passenger train movements at the identified locations while in communication with a second qualified crew member. This will provide constant communication with the locomotive engineer and allow the second crewmember to take immediate appropriate action if the locomotive engineer is not responding or is unable to stop short of stub end tracks. This could also include making a safety stop at predetermined location and if the locomotive engineer does not make an appropriate safety stop the second qualified crew member can take appropriate action to stop the train;

4. Review Safety Advisory 2004-04 (69 FR 58995, Oct. 1, 2004); Effect of Sleep Disorders on Safety of Railroad Operations, in its entirety with all operating crews. Recommended actions from Safety Advisory 2004-04 are listed below:

a. Establish training and educational programs to inform employees of the potential for performance impairment as a result of fatigue, sleep loss, sleep deprivation, inadequate sleep quality, and working at odd hours, and document when employees have received the training. Incorporate elements that encourage self-assessment, peer-to-peer communication, and co-worker identification accompanied by policies consistent with these recommendations. The Railroaders' Guide to Healthy Sleep website

(<http://www.railroaderssleep.org>) has several educational resources to assist railroaders in improving their sleep health including an anonymous tool for self-screening for sleep disorders including OSA. This website is set up to disseminate educational information to railroad employees and their families about sleep disorders, the relevance of healthy sleep to railroad safety, and provide information about improving the quality of the railroaders' sleep. The website was developed in conjunction with the Division of Sleep Medicine at Harvard Medical School, WGBH Educational Foundation, and Volpe—The National Transportation Systems Center;

b. Ensure that employees' medical examinations include assessment and screening for possible sleep disorders and other associated medical conditions (including use of appropriate checklists and records). Develop standardized screening tools, or a good practices guide, for the diagnosis, referral and treatment of sleep disorders (especially OSA) and other related medical conditions to be used by company paid or recommended physicians during routine medical examinations; and provide an appropriate list of certified sleep disorder centers and related specialists for referral when necessary;

c. Develop and implement rules that request employees in safety-sensitive positions to voluntarily report any sleep disorder that could incapacitate, or seriously impair, their performance;

d. Develop and implement policies such that, when a railroad becomes aware that an employee in a safety-sensitive position has an incapacitating or performance-impairing medical condition related to sleep, the railroad prohibits that employee from performing

any safety-sensitive duties until that medical condition appropriately responds to treatment; and

e. Implement policies, procedures, and any necessary agreements to—

i. Promote self-reporting of sleep-related medical conditions by protecting the medical confidentiality of that information and protecting the employment relationship, provided that the employee complies with the recommended course of treatment;

ii. Encourage employees with diagnosed sleep disorders to participate in recommended evaluation and treatment; and

iii. Establish dispute resolution mechanisms that rapidly resolve any issues regarding the current fitness of employees who have reported sleep-related medical conditions and have cooperated in evaluation and prescribed treatment.

5. Accelerate the installation of inward- and outward-facing cameras in passenger trains in the cab of the controlling locomotive or cab car operating compartment per the FAST Act. FRA notes that the FAST Act includes provisions on standards for the cameras, use of the cameras, and preservation and protection of data from the cameras.

FRA encourages all intercity passenger and commuter railroads to take actions consistent with the preceding recommendations. FRA acknowledges that action on some of the above recommendations may have already taken place by segments of the industry. If so, FRA recommends railroads review their current programs for relevancy and review the policies and procedures with all their operating employees.

FRA may modify this Safety Advisory 2016-03, issue additional safety advisories, or take other appropriate action necessary to ensure the highest level of safety on the Nation's railroads, including pursuing other corrective measures under its rail safety

authority..

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Chief Safety Officer.

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