National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials Investigations
Human Performance and Survival Factors Division
Washington, D.C. 20594

HUMAN PERFORMANCE GROUP FACTUAL REPORT

A. ACCIDENT

Location: Richmond, Virginia (CSX ACCA Yard)
Carrier: CSX
Incident: Employee fatality / struck by train
Date: April 1, 2015
Time: About 2:50 a.m. EDT
Number: DCA-15-FR-006

B. HUMAN PERFORMANCE GROUP

Group Chairman

Stephen M. Jenner, Ph.D.
Human Performance Investigator
National Transportation Safety Board
[redacted]

Group Members

Jeffrey G. Apple
Motive Power & Equipment Inspector
Federal Railroad Administration
[redacted]

Donald Cashman
Federal Railroad Administration
[redacted]

William H. Bates
District of Columbia Legislative Director
SMART-UTU
[redacted]

Larry Koster
CSX
Division Manager
[redacted]

C. SUMMARY OF THE ACCIDENT

At CSX's ACCA Yard in Richmond, Virginia, a veteran CSX car inspector /carman (who in this report is referred to as the "accident carman") was tasked with walking across active Remote Control Locomotive (RCL) zone yard tracks to place a car department lock on a switch prior to inspecting train cars. Seconds before reaching the switch he was struck and killed by a train during a yard movement. The yard movement was RCL controlled with a single RCL operator several hundred yards south of the locomotive where he had made a cut on 33 cars. The operational plan was to pull the 33 cars up the lead and switch them out into various yard tracks.

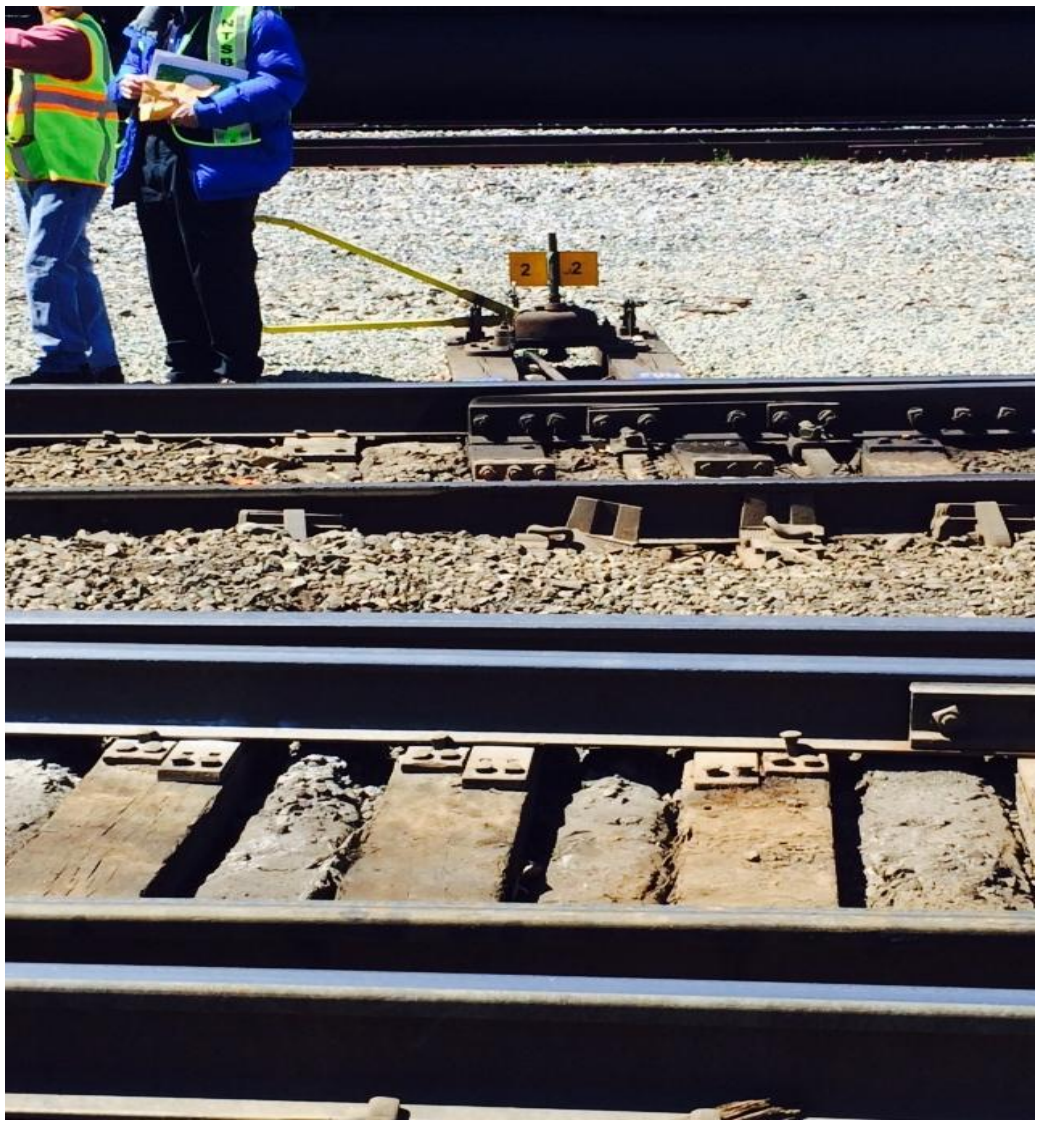

Figure 1: Switch that the accident carman was walking towards. The carman was struck just to left of switch points.

D. DETAILS OF ON-SCENE INVESTIGATON

1. Behavioral Factors

a. Sleep/Wake/Work Hours

Investigators were unable to construct a 72-hour sleep/wake history of the accident carman.[1] The day of the accident was the accident carman's third consecutive day working after being off duty for two days (his normal time off). Prior to his two days off he had worked five consecutive days. His normal on duty times were from 11:00 p.m. to 7:00 a.m. The commute time from his residence to the train yard was about one hour.

2. Task Factors

a. Accident trip sequence

On the night of the incident, the accident carman and his coworker (who in this report is referred to as the "second carman") went on duty at 11:00 PM. The two carmen had worked with each other for over 12 years, including nightshifts. The second carman told investigators that he and the accident carman had a busy but routine shift. He observed the accident carman's behavior and speech as being normal from the beginning of his shift (including the safety briefing and discussing safety procedures) until moments before the accident.

Nearly 4 hours into their shift the weather had gotten colder and the second carman went inside to put on his coveralls while the accident carman remained in a CSX truck parked adjacent to the tracks. When the second carman returned, the accident carman departed the truck and began walking to the switch (about 96 feet from the truck) while the second carman went to retrieve the blue flag from the south end of Track 4 and place it on the south end of track 2. While positioning the blue flags, the second carman detected the oncoming train, then turned and observed the accident carman walking "irregular" toward the switch as if he were "in a trance." He had not slowed his pace or stopped before crossing over the tracks, nor had he turned his head to look for oncoming trains. The second carman stated, "Normally, there would be more movement in his (the accident carman's) body…he was not moving his face. His arms, his body, it was like in one fixed motion… There was no stopping. There was no intention. There was no sign to me, oh, he's going to stop now." Another CSX employee (a train engineer), who had briefly observed the accident carman walking towards the switch, told investigators that the accident carman appeared "fixated on that switch."

Moreover, the accident carman did not acknowledge the second carman's repeated calling out to him from about 100 feet away seconds before the was struck by the train. (The second carman, however, believed that the sound of the striking train and other noise in the yard may have masked his voice.) Just before the accident carman was struck, the second carman saw him turn around and put up his arms as if trying to "protect yourself, that kind of move, then he got hit."

[1] The carman lived by himself. There were no relatives who were knowledgeable of his daily activities.

The Remote Control Operator (RCO) went on duty March 31, 2015 at 11:00 p.m. He told investigators that his work that night was routine, and he had not experienced any issues with the equipment (e.g., train equipment, belt pack, radio, etc.). At the time of the accident he was positioned on the ground between tracks N1 and N2. He was not aware that the train he was controlling had struck the carman until he received a radio communication directing him to stop his train. However, moments prior to receiving that call he was in the process of stopping the train because he had detected two flat cars on the rear of the train.

b. Cellular Phone Use

The accident carman's personal cell phone was recovered in the train yard near the location where the carman had been struck. The phone was found turned on, and had been placed in a hard case so that the front of the phone was facing the case. According to the cellular phone records acquired by the NTSB, no incoming or outgoing calls, nor text messages, were made or received at the time of the accident.

3. Medical Factors[2]

a. Health

The accident carman was estimated to be approximately 6'1" tall, and weighed 349 pounds. In the last several months he was observed being out of breath after short walks. He expressed to coworkers an interest in losing weight. According to a coworker he may have suffered from diabetes.

The second carman told investigators that about 3 or 4 days prior to the accident, the accident carman told him that he was scheduled to have a colonoscopy. He also may have been recently prescribed eye drops. The second carman indicated that the accident carman believed the eye drops may have had a poor interaction with other medications he had been taking. He would also need to have shots (details unknown) every 3 days. The second carman told investigators that the accident carman expressed feeling nervous the previous day. According to second carman, the accident carman's physician had drawn blood, given him a vitamin shot and encouraged him to eat oranges.

The accident carman had been known to regularly drink about a 12-pack of Diet Pepsi during his shift. Because of the high workload in the train yard the night of the accident, neither carman had taken a break to eat.

b. *Postaccident Toxicology*

Specimens were taken from the accident carman after the accident and analyzed by the Virginia Office of Chief Medical Examiner in Richmond, Va. The results were discussed as part

[2] Additional medical and toxicological information will be provided in the NTSB's Medical Officer's Factual Report.

of the autopsy report. Specimens were also sent to and analyzed by the Civil Aerospace Medical Institute (CAMI) in Oklahoma City, Oklahoma.

In the autopsy report (date April 1, 2015), analysis of the blood specimen found:

> Tetrahydrocannabinol levels of 0.0098 mg/L
>
> THC Carboxylic Acid 0.015 mg/L.
>
> All other drugs tested negative (for blood and vitreous specimens).

The Summary of the autopsy report stated:

> Autopsy examination demonstrated multiple lethal injuries: decapitation, diffuse blunt force trauma to the torso, and traumatic bilateral below the knee amputation of the legs.
>
> Natural disease was also present consisting of atherosclerotic and hypertensive cardiovascular disease, obesity, and hepatosplenomegaly. Incidentally, an accessory spleen and a right simple renal cortical cyst were also identified.
>
> The cause of death: Decapitation, blunt force trauma to torso and bilateral leg amputation.

The CAMI report (dated August 27, 2015) found the following:

> Glucose NOT detected in Vitreous. Creatinine NOT detected in Vitreous.
>
> 134.8 (mg/dL). creatinine detected in urine.
>
> 14 (mg/dl) glucose detected in urine. 5.8 (%) hemoglobin A1C detected in the blood.
>
> 0.0103 (ug/ml, ug/g) tetrahydrocannabinol (Marihuana) detected in blood.
>
> 0.2803 (ug/ml, ug/g) tetrahydrocannabinol carboxylic acid (Marihuana) detected in urine
>
> 0.0238 (ug/ml, ug/g) tetrahydrocannabinol carboxylic acid (Marihuana) detected in blood.

4. Operational Factors

a. Training and Experience

CSX accident carman -- The CSX carman, age 53, hired on with CSX on September 11, 1981. According to a CSX General Car Foreman (who had been in this position for about 2 years) the accident carman was a good employee who had never experienced a serious injury

while working on the railroad. In the last 2 years the General Car Foreman had not received any complaints about the accident carman's performance while working in the train yard. The General Car Foreman regarded him to be a happy, positive person.

On February 24, 2015 he satisfactorily completed CSX's "Qualified Mechanical Inspection" training program. He had also completed several other safety-related training at CSX in 2015.

Remote Control Operator -- The RCO hired on with CSX on January 13, 2014. On April 21, 2014, he started training on remote control operations and attended class in Newport News. He also received on-the-job training (OJT) there as well as in the ACCA Yard. He became a qualified conductor in June 2014.

b. Environmental Issues

Visibility / Lighting -- The night of the accident was cool and at times windy. There was no precipitation or fog reported in the area. The portion of the yard where the accident occurred was well lit. None of the employees interviewed had mentioned any concerns they had about visibility due to inadequate lighting.

5 Accident Recreation

On April 3, 2015, about the time of the incident and under similar weather / environmental conditions, investigators from the NTSB, FRA, CSX and SMART recreated the movements of the accident carman and the second carman while an exemplar train (a single locomotive) was operated past the switch where the incident occurred. The purpose of the recreation was to better understand what the accident carman might have been able to detect (see and hear) as he walked from his CSX truck adjacent to the tracks to the switch where the accident occurred.

Key Observations:

1. The distance from the CSX truck (where the accident carman was seated moments before the accident) and the switch was about 96 feet. It took investigators about 22 seconds to walk from the truck to the switch at a speed they estimated the accident carman had walked.

2. From the perspective of the carman walking from the CSX truck to the accident switch, the head end of exemplar accident train could not be seen until about 16 seconds before it reached the switch. Another train that had been parked on track 2 a few hundred feet south of the switch – which was present on the night of the accident and had not been moved - had blocked the line-of-sight of the carman to the exemplar train until the exemplar train had nearly passed the parked train. The strobe light on the exemplar train could first be seen (barely above the parked train) about 6 seconds before the head end was first observed.

3. An investigator who was positioned where the second carman was located at the time of the accident called out to the exemplar accident carman as he neared the switch. This replicated the actions of the second carman, who had yelled the accident carman's name and tried to warn him of the approaching train seconds before the accident. During the accident recreation, the exemplar accident carman was not able to hear his own name being called or any other voices before he reached the point of impact.

Variability in the accident recreation -- Unlike the accident train, the exemplar train began to blow its horn, then sounded its bell, prior to it being visually detected by the exemplar accident carman. The bell was heard ringing about 11 seconds, and the horn was heard about 6 seconds, before being seen. This created additional sounds (potential audio cues) that were not present at the time of the accident.

Compiled by: /s/ Date: September 3, 2015

Stephen M. Jenner, Ph.D.
Human Performance Investigator