

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594**



**GROUP CHAIRMAN'S FACTUAL REPORT OF
INVESTIGATION**

RRD19FR009

**By
W. Deven Chen**

WARNING

The reader of this report is cautioned that the transcription of a cockpit image and audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

January 29, 2020

Onboard Image Recorder

Specialist's Factual Report
By W. Deven Chen

1. EVENT

Location: Philadelphia, PA
Date: July 8, 2019
Train: Northbound Ridge-Spur train
Operator: SEPTA
NTSB Number: RRD19FR009

2. SUMMARY

On Monday, July 8, 2019, about 5:21 p.m. eastern daylight time (EDT), a northbound Southeastern Pennsylvania Transit Authority (SEPTA) train struck two SEPTA roadway workers in Philadelphia, Pennsylvania. A southbound Ridge-Spur train was operating on track 2, just north of the SEPTA Erie interlocking and passed the roadway workers. Simultaneously, a northbound Ridge-Spur train, struck the roadway workers after leaving Erie Station. One roadway worker was killed, and the other roadway worker was injured (non-life-threatening) and transported to a local hospital. Both roadway workers were inspecting the track inspection and making light repairs. Shortly after the accident, the train was evacuated, and passengers were escorted to Erie Station without injuries.

3. GROUP

A group was convened on November 19, 2019. The group consisted of the following members:

Chairman: W. Deven Chen
Electrical Engineer
National Transportation Safety Board (NTSB)

Member: Jim Southworth
Investigator-In-Charge
National Transportation Safety Board (NTSB)

Member: Troy Lloyd
Railroad Accident Investigator
National Transportation Safety Board (NTSB)

Member: David Hunter
Director of Accident Prevention and Investigation
SEPTA System Safety

Member: Elizabeth Bonini
Manager of State Safety Oversight Program
PennDOT

4. DETAILS OF INVESTIGATION

On September 4, 2019, the NTSB Vehicle Recorder Division received the following devices:

Recorder Manufacturer/Model:	SEPTA USB Flash Drive
Disk Number:	1
Recorder Manufacturer/Model:	SEPTA USB Flash Drive
Disk Number:	2

4.1. Video Files

Each SEPTA USB Flash Drive contained recorded video imagery with no audio from separate cameras mounted in various positions on both the southbound train and the northbound train (striking train). The USB Flash Drive 1 contained videos recorded on the accident date and the videos captured the event. The videos averaged about 30 minutes in length. The USB Flash Drive 2 contained videos recorded two days after the accident date, and its contents were not included in this report.

4.2 Timing and Correlation

The time on the recorded videos were 1 hour behind EDT. All the times used in this report have been adjusted to reflect the offset and expressed in EDT.

Additionally, the times of rear-facing camera and the operator cab camera of southbound train were found 3.6 seconds behind the time of its forward-facing camera and the times of cameras of northbound train. The times of videos from the northbound train were taken as references. All the times of the videos of the southbound train have been adjusted to reflect the offset.

4.3 Summary of Recording Contents

In agreement with the Investigator-In-Charge, a video group was convened, and the following transcript was developed on September 19, 2019.

4.3.1 Northbound Ridge-Spur train videos

The transcription of the video event began when the operator of the striking train entered the cab at 17:10:08. The train was at the 8th Street station and the train was about to head northbound. There was nothing anomalous observed about the way the operator keyed up the train. The operator was not seen with a portable electronic device. At 17:10:56, the train began moving northbound, the operator may have glanced briefly down the track. As the train left the 8th Street station, it was not obvious the operator was looking ahead while leaving the station until 17:11:05, when the operator took a glance ahead at the track. In the next 10 seconds or so, as the train was leaving the station, the operator was still making adjustment on the controls, and it was not obvious the operator was looking down the track. At 17:11:17, the operator sat down and for the first time was obviously looking down the track.

At 17:11:20, the operator hit the horn button. At 17:11:58, the train entered the Chinatown station. During the trip between 8th Street and Chinatown station, there was nothing anomalous observed. The train stopped at Chinatown station at 17:12:13.

At 17:12:30, the train began moving, the operator was looking ahead, and the operator became seated at 17:12:38. As the train approached an abandoned platform, the operator hit the horn button at 17:13:11. During the trip between Chinatown station and Fairmount station, there was nothing anomalous observed. The train stopped at Fairmount station at 17:14:18.

The operator serviced the Fairmount station from the left side of the train, during that time the operator was out of the camera view. At 17:14:44, the operator re-entered the camera view and operated the cineston control before sitting. The train began moving at 17:14:47. The operator applied the horn at 17:14:52. The operator was then standing again while the train was moving but looking forward.

At 17:15:27, the train crossed an interlocking. As the train approached the Girard station, the operator remained standing. The train entered the station at 17:15:52. The train stopped at Girard station at 17:16:10.

At 17:16:26, the train began moving from Girard station, the operator was still standing, and the operator appeared to be looking forward.

At 17:16:55, roadway workers appeared on track 4. There was a green signal and the roadway workers appeared to be working under a train approach warning. The two roadway workers were observed northbound standing in the gauge of the track at the cross over from track 3 to track 4. At 17:17:00, the roadway workers gave a vertical flashlight signal to proceed and the operator acknowledged with the horn.

The train continued to North Philadelphia station. There was nothing anomalous observed. The train stopped at North Philadelphia station at 17:19:10. The train started moving at 17:19:25. The operator was looking forward as the train left the station.

The train continued to Erie station. There was nothing anomalous observed. As the train was coming to stop, roadway workers were observed in distance ahead of the station between track 2 and track 3. The train stopped at Erie station at 17:21:11.

At 17:21:12, the operator opened the operator cab window, and appeared to look behind the train along the platform. The operator continued to look behind the train along the platform. During this time, the operator was approached by a pedestrian. While the operator was looking behind the train, the roadway workers gave horizontal hand signal with a flashlight to the operator. Figure 1 is a screenshot of the roadway workers giving a horizontal hand signal with a flashlight. The time was 17:21:28.

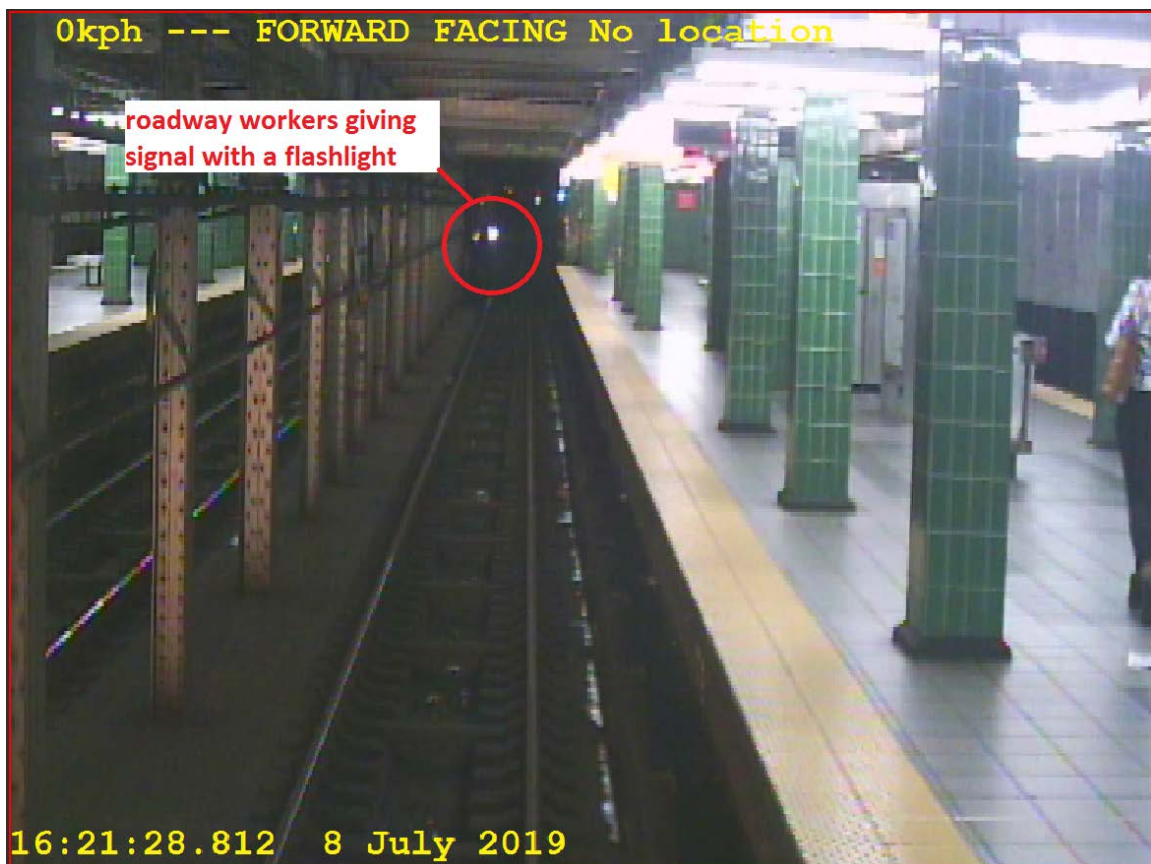


Figure 1: screenshot of the roadway workers giving a horizontal hand signal with a flashlight (time on the figure was 1 hour behind EDT).

From 17:21:29 to 17:21:41, the roadway workers continued to give flashlight signals. The operator was still looking behind the train along the platform.

The operator began moving the train while he was still looking behind the train along the platform. Around the same time that the train began moving, the headlight of an oncoming southbound ridge train on track 2 came into view at 17:21:43. The headlight of the oncoming train was very bright. Figure 2 is a screenshot at this time.



Figure 2: the headlight of an oncoming southbound ridge train seen ahead of the striking train (time on the figure was 1 hour behind EDT).

At 17:21:43, the roadway workers' signal appeared to cease¹. The striking train was moving forward. The oncoming train was still approaching with headlight on. At 17:21:47, the operator appeared to be looking forward. At this time, a quick horizontal hand signal was observed from a roadway worker. The operator then glanced backward again toward the platform as the train was accelerating away from the station. By 17:21:51, the operator was looking forward again, however, the oncoming train continued to approach with a bright headlight. Figure 3 is a

¹ The evidence observed here is from a digital camera system and may not exactly represent what could be observed by the operator.

screenshot of this time. It was not obvious from the camera view that the roadway workers were visible.



Figure 3: screenshot at 17:21:51 (time on the figure was 1 hour behind EDT).

At 17:21:54, the oncoming train passed the striking train, and the roadway workers came into view. The watch man and inspector were standing side by side in the interlocking fouling track 3, facing track 2. The inspector was closer to the approaching train. The operator was looking forward at this time. The roadway workers appeared to be looking at the passing southbound train, not the striking train. Figure 4 is a redacted screenshot at this time.



Figure 4: redacted screenshot at 17:21:54 (time on the figure was 1 hour behind EDT).

A few frames before the strike occurred, the roadway workers were clearly visible. Both struck roadway workers were standing in the interlocking fouling track 3. The fatally struck roadway worker (the watch man) was standing in the gauge of the crossover from track 2 to track 3. The non-fatally struck roadway worker (the inspector) was standing in the interlock fouling track 3. The watch man was standing north of the inspector. Both struck roadway workers appeared to be side by side, facing the passing, oncoming, southbound ridge train.

The roadway workers were struck at 17:21:57.

At 17:21:58, the operator put his hand on his face. In the next few seconds, the operator applied brake and the train fully stopped at 17:22:11. Moment later, the operator was holding a handheld radio.

4.3.2 Southbound Ridge-Spur train videos

At 17:21:38, the headlight of northbound train came into view of southbound train forward-facing camera. At 17:21:49, the operator applied horn signal. At the same time, roadway workers came into view.

At 17:21:51, the watch man and inspector were standing side by side in the interlocking fouling track 3, facing track 2. At 17:21:53, roadway workers were no long visible from the forwarding-facing camera of southbound train.

At 17:21:57, the front of the northbound train was visible to the rear-facing camera of southbound train. The roadway workers were also visible in the rear-facing camera of southbound train. At the same time, the northbound ridge train was observed making contact with both roadway workers. At 17:21:58, the track inspector appeared to be brushed by the northbound ridge train and pushed over to track 2, while the watch man was continuing to contact with the northbound ridge train.

At 17:22:16, the southbound ridge train came to a stop at Erie station.