NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

December 16, 2015

Surveillance Video Recorder

Specialist's Factual Report
By Charles Cates

1. EVENT

Location:	Philadelphia, Pennsylvania
Date:	May 12, 2015
Locomotive ID (consist position):	Siemens ACS-64 #601 (lead)
Company:	Amtrak
NTSB Number:	DCA15MR010

2. GROUP

In agreement with the investigator in charge, a video group was not convened.

3. SUMMARY

For a summary of the accident, refer to the *Accident Summary* report, within this docket.

4. DETAILS OF INVESTIGATION

On May 18, 2015 the National Transportation Safety Board (NTSB) Vehicle Recorder Division received four video files taken from three different cameras of a security video system on the outside of a building near the crash site of the Amtrak train. The files were transferred to the NTSB on DVD.

The NTSB's Vehicle Recorder Division received the following four files:

Device: Unknown security camera recording system
Filenames: CH 7-2015-05-12-22-00-01.avi
CH 7-2015-05-12-22-28-08.avi
CH 8-2015-05-12-21-59-59.avi
CH 9-2015-05-12-22-00-01.avi

4.1. Recorder Description

The videos were from three cameras in a surveillance video system. The videos were taken around the time of the accident, and were saved as four separate .avi movie files.

Each file had a visible time stamp imposed on the bottom of the frame, with the time stamps synchronized between the four files.

4.2. Video Files

The recordings were captured at 29.97 frames per second and a resolution of 704x480 pixels. They were encoded using the H.264/MPEG-4 video codec.

4.3. Timing and Correlation

The times used in this report are expressed as local time of the accident, eastern daylight time (EDT). Timing of the transcript was established by correlating the video events to common events on the Amtrak train's Track Image Recorder (TIR)[1]. Specifically, the time at which the initial flash was recorded on the Amtrak TIR was used as a marker to develop the following time offset:

EDT = Encoded video time – 2997 seconds

This equation will provide timing accuracy to +/- 1 second.

4.4. Summary of Recording Contents

In agreement with the Investigator-In-Charge, a video group did not convene and a summary report was prepared.

4.4.1. Video Recording One: CH 7-2015-05-12-22-00-01.avi

The total duration of this recording is 10 minutes 47 seconds, and it covers sections of the time period from 9:10:04 pm to 9:38:10 pm. Sections of video from 9:10:18 pm to 9:13:40 pm, 9:14:56 pm to 9:19:59 pm, 9:22:21 pm to 9:25:03 pm, 9:26:30 pm to 9:29:43 pm, 9:30:57 pm to 9:32:15 pm, and 9:33:26 pm to 9:35:07 pm were not included in the file, and the embedded time stamp jumped over those sections.

The view of this recording was looking perpendicular to the track, near the start of the curve where the accident took place. See figure 1 for the approximate field of view of the camera, with other details annotated from the locomotive Onboard Image Recorder.

[1] See the *Onboard Image Recorder Specialist's Factual Report* for more details on the Amtrak train's TIR and event timing.

Significant events captured in this recording were as follows: The train first came in to view at 9:20:34, in the right side of the frame. The train moved from right to left in the frame, and the locomotive left the view of the camera. At 9:20:38, with passenger cars still visible in the frame, a bright flash from the left briefly illuminated the area. Several frames later, still at 9:20:38, arcing could be seen at the wheels of the last train car. At 9:20:39, another three bright flashes from the left illuminated the frame in rapid succession, as the final car left the view of the camera.

At 9:36:46 search lights illuminated the track area from the left and swept across the frame. At 9:38:06 a person with a flashlight could be seen walking alongside the near side of the tracks from right to left.

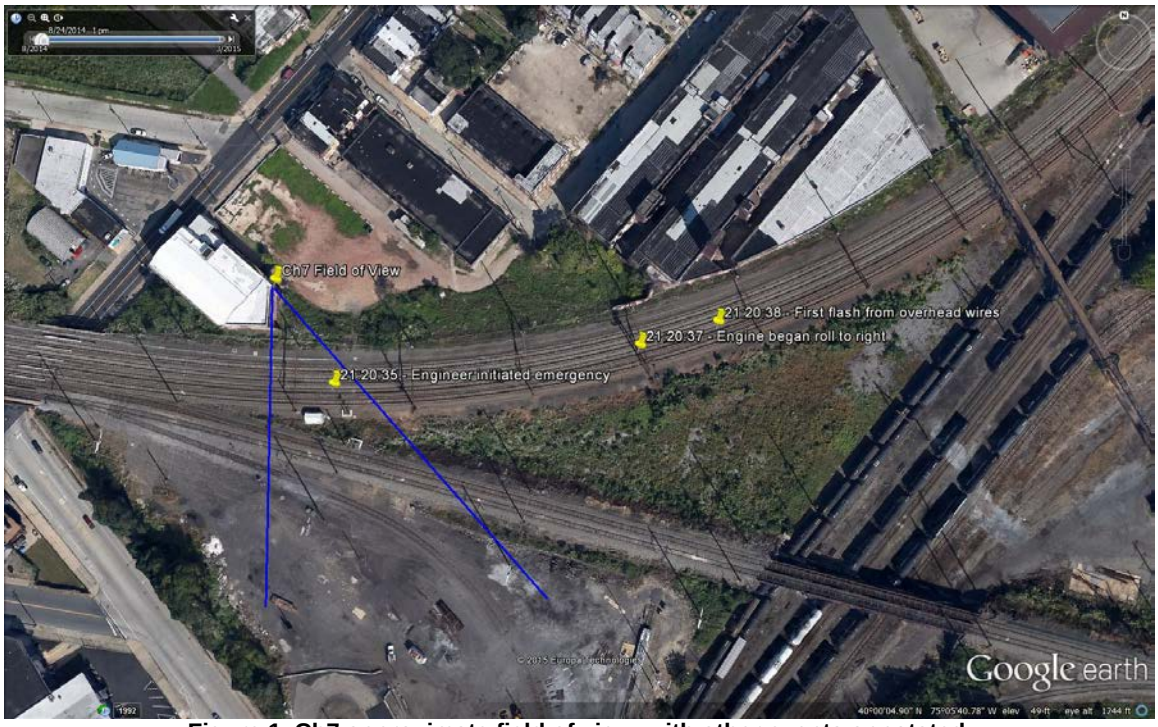

Figure 1. Ch7 approximate field of view, with other events annotated.

4.4.2. Video Recording Two: CH 7-2015-05-12-22-28-08.avi

The total duration of this video was 36 seconds, and it covers the time period from 9:38:11 pm to 9:40:03 pm. A section of video from 9:38:14 pm to 9:39:31 pm was not included in the file, and the embedded time stamp jumped over this section. Figure one shows the field of view of this camera.

In this video, people with flashlights could be seen walking in the area of the far side of the tracks.

4.4.3. Video Recording Three: CH 8-2015-05-12-21-59-59.avi

The total duration of this video was 5 minutes 11 seconds, and it covers sections of the time period from 9:10:01 pm to 9:40:03 pm. Sections of video from 9:10:19

pm to 9:19:10 pm, 9:21:25 pm to 9:36:15 pm, and 9:38:37 pm to 9:39:43 pm were not included in the file, and the embedded time stamp jumped over those sections.

The view of this recording was from the southeast to the east, coincident with the track in the direction the accident train was traveling. The beginning of the accident sequence was captured by this camera, however, none of the final resting positions of the cars were seen in this view. See figure two for the approximate field of view of this camera, with other details annotated from the locomotive Onboard Image Recorder.

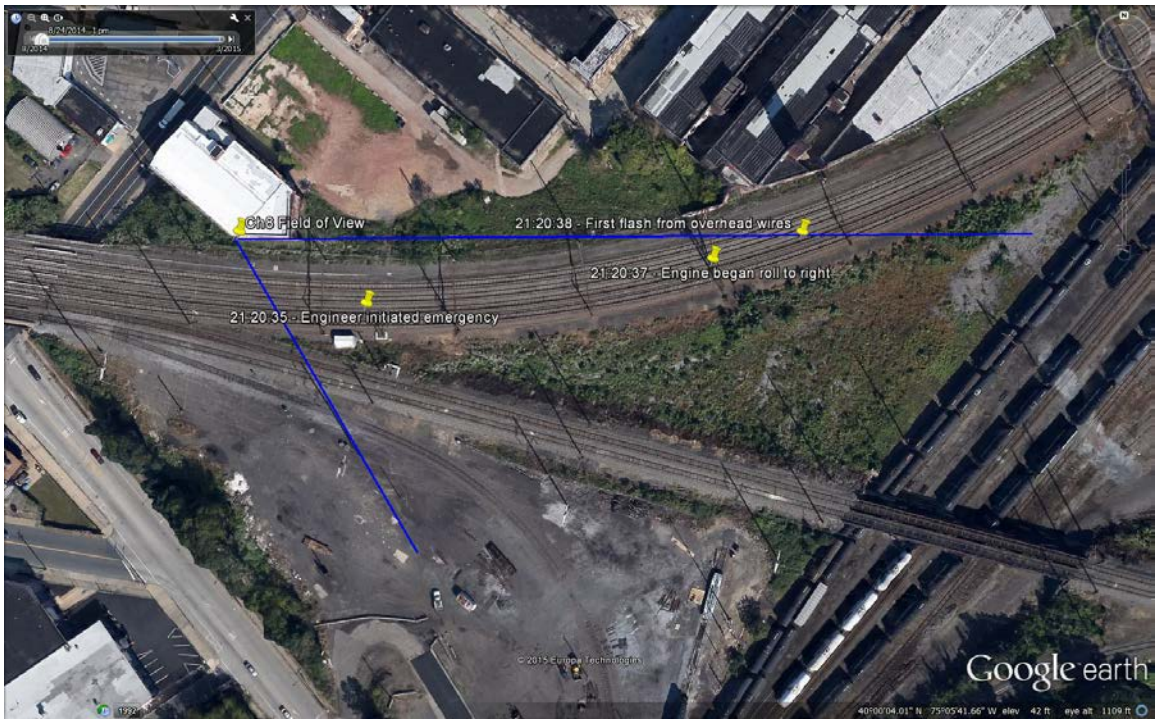

Figure 2. Ch8 approximate field of view, with other events annotated.

Significant events captured by this recording were as follows: The train first came in to view at 9:20:34 pm, in the right side of the frame. As the locomotive moved through the frame it was seen that the aft cab lights were illuminated. The windows of the passenger cars were illuminated as well. At 9:20:37 pm, an arc was seen from the roof area of the locomotive, followed by sparks coming from the area around the wheels. At 9:20:38 pm, a flash that was bright enough to saturate the full video image was recorded. After the flash subsided, the windows of the passenger cars were no longer illuminated, and sparks were seen showering down from the area of the overhead wires near the locomotive. At 9:20:38 pm, the back of the last car in the train became visible, and the tail lights were illuminated. At 9:20:39 pm, another two bright flashes from the left side of the image saturated the majority of the image. The train continued to move to the left of the frame with sparks continuing to be generated around the area of the original arc. At 9:20:41 pm, with the last car nearing the edge of the frame, the tail lights of the last car began to roll to the right, before becoming obscured by

dust and debris. By 9:20:44 pm, no more lights from the train were seen. A cloud of dust was seen in the distance.

At 9:36:15, moving lights were seen in the area near where the train cars went out of the view of the camera. At 9:36:38, lights similar to those from a vehicle could be seen approaching the tracks from the north, in the area near where the train cars left the view of the camera. At 9:36:46 a search light swept back across the tracks in the area near the camera. At 9:37:50, a person with a flashlight could be seen walking along the tracks towards the accident site, and additional moving lights were seen in the area where the train cars left the view of the camera.

4.4.4. Video Recording Four: CH 9-2015-05-12-22-00-01.avi

The total duration of this video was 4 minutes and 26 seconds, and it covers sections of the time period from 9:10:04 pm to 9:40:03 pm. Sections of video from 9:10:14 pm to 9:20:01 pm and 9:21:25 pm to 9:34:58 pm were not included in the file, and the embedded time stamp jumped over these sections.

The view of this camera was to the east, looking nearly parallel to the tracks in the direction from which the train was coming. Much of the view was obscured by vegetation immediately in front of the camera. See figure 3 for the approximate field of view of this camera, with other details annotated from the locomotive Onboard Image Recorder.

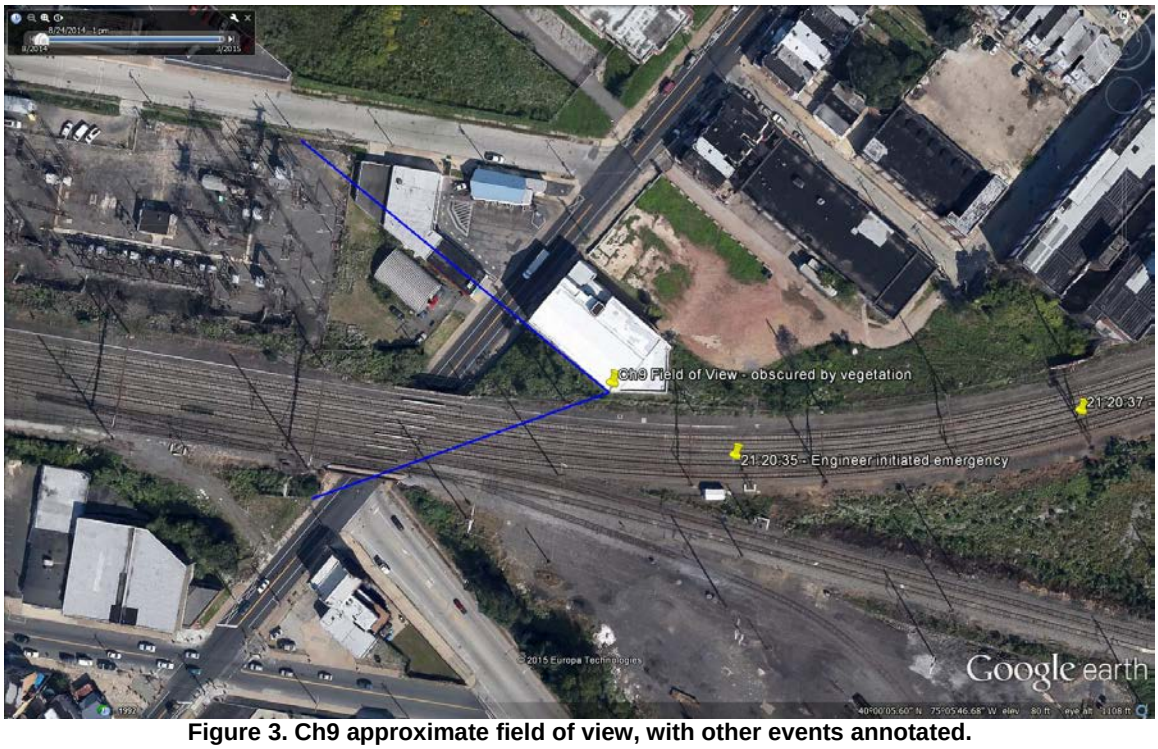

Figure 3. Ch9 approximate field of view, with other events annotated.

Significant events captured by this recording were as follows: At 9:20:28, the headlight of the train was first seen through the vegetation partially obscuring the view of the camera. At 9:20:37, the light from a flash partially illuminated the vegetation around the camera, and the last car from the train left the video image. At 9:20:38, a bright flash illuminated the vegetation around the camera, and a shower of sparks was seen from a power pole on the north side of the track at the far left end of the image. Additional flashes illuminated the scene, and sparks continued to shower from the power pole until 9:20:42.