



***Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch***

***Accident Investigation Report
HQ-2017-1212***

***Amtrak (ATK)
Steilacoom, WA
July 2, 2017***

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.



SYNOPSIS

On July 2, 2017, at 2:29 p.m., PDT, northbound Amtrak passenger Train 506 derailed after running past the red signal protecting BNSF Railway (BNSF) Bridge 14, and hitting the derail on Main Track No. 2, in Steilacoom, Washington. Locomotive No. Amtrak 467 came to rest on its side and three Talgo passenger cars derailed. Amtrak Train No. 506 is part of the Amtrak Cascades passenger train service, which is funded by the States of Washington and Oregon. The Cascades passenger train service operates between Vancouver, British Columbia, and Eugene, Oregon, using Talgo passenger equipment. The accident occurred on BNSF's Northwest Division, Seattle Subdivision, at Milepost 14.4. Steilacoom is located 12 miles southwest of Tacoma, Washington. BNSF is the host railroad to Amtrak in the State of Washington. Amtrak Train No. 506 was travelling from Portland, Oregon, to Seattle, Washington. BNSF utilizes a traffic control system (TCS) as the method of operation on the Seattle Subdivision. Bridge 14 is defined in BNSF Timetable No. 7 dated November 5, 2014, as a movable lift bridge with a manual interlocking.

There was no hazardous material release. There was an injury to BNSF's bridgetender. There were 13 Amtrak passenger injuries and 2 injured Amtrak employees. Amtrak reported \$178,913 in equipment damages and BNSF reported \$84,912 in track and signal damages.

At the time of the derailment, it was daytime, clear, and the temperature was 78 °F.

FRA determined the probable cause of the accident was H221: Automatic block or interlocking signal displaying a stop indication - failure to comply.

FRA also identified a contributing cause of H605: Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.



FRA FACTUAL RAILROAD ACCIDENT REPORT


FRA File #HQ-2017-1212

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Amtrak (National Railroad Passenger Corporation)	1a. Alphabetic Code ATK	1b. Railroad Accident/Incident No. 148201
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GENERAL INFORMATION

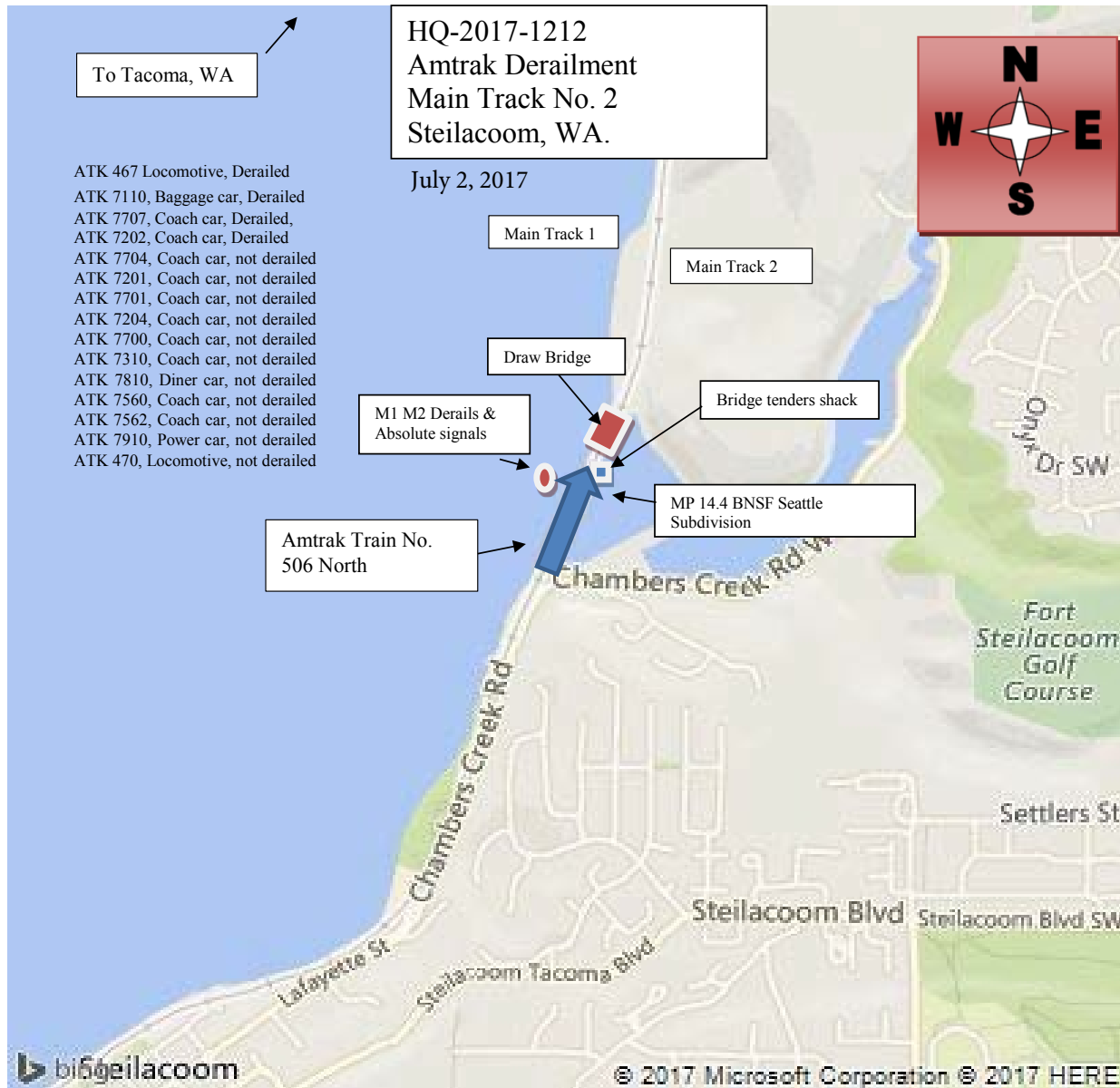
1. Name of Railroad or Other Entity Responsible for Track Maintenance BNSF Railway Company		1a. Alphabetic Code BNSF		1b. Railroad Accident/Incident No. NW-0717-101	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 7/2/2017		4. Time of Accident/Incident 2:29 PM	
5. Type of Accident/Incident Derailment					
6. Cars Carrying HAZMAT 0	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0	9. People Evacuated 0	10. Subdivision Seattle	
11. Nearest City/Town Steilacoom		12. Milepost (to nearest tenth) 14.40	13. State Abbr. WA	14. County PIERCE	
15. Temperature (F) 78 °F	16. Visibility Day	17. Weather Clear		18. Type of Track Main	
19. Track Name/Number Main Track 2		20. FRA Track Class Freight Trains-40, Passenger Trains-60		21. Annual Track Density (gross tons in millions) 30.84	22. Time Table Direction North

 U.S. Department of Transportation Federal Railroad Administration		FRA FACTUAL RAILROAD ACCIDENT REPORT				FRA File #HQ-2017-1212							
OPERATING TRAIN #1													
1. Type of Equipment Consist: Passenger Train-Pulling					2. Was Equipment Attended? Yes		3. Train Number/Symbol A-506-1-02						
4. Speed (recorded speed, if available) R - Recorded 15.0 MPH E - Estimated		Code R	5. Trailing Tons (gross excluding power units)		6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter			Code 0					
6. Type of Territory Signalization: <u> Signaled </u> Method of Operation/Authority for Movement: <u> Signal Indication </u> Supplemental/Adjunct Codes: <u> Q </u>													
7. Principal Car/Unit		a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box		Alcohol	Drugs					
(1) First Involved (<i>derailed, struck, etc.</i>)		AMT 467	1				0	0					
(2) Causing (if mechanical, cause reported)					9. Was this consist transporting passengers?			Yes					
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)		a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)		Loaded		Empty		e. Caboose
			b. Manual	c. Remote	d. Manual	e. Remote			a. Freight	b. Pass.	c. Freight	d. Pass.	
(1) Total in Train		1	0	0	0	1	(1) Total in Equipment Consist		0	13	0	0	0
(2) Total Derailed		1	0	0	0	0	(2) Total Derailed		0	3	0	0	0
12. Equipment Damage This Consist 178913			13. Track, Signal, Way & Structure Damage 84912										
14. Primary Cause Code H221 - Automatic block or interlocking signal displaying a stop indication - failure to comply.*													
15. Contributing Cause Code H605 - Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.													
Number of Crew Members								Length of Time on Duty					
16. Engineers/Operators		17. Firemen		18. Conductors		19. Brakemen		20. Engineer/Operator		21. Conductor			
1		0		1		1		Hrs: 3 Mins: 29		Hrs: 3 Mins: 29			
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?		26. Was EOT Device Properly Armed?			
Fatal		0		0		0		No		N/A			
Nonfatal		3		13		0		27. Caboose Occupied by Crew?				No	
28. Latitude 47.184987000				29. Longitude -122.585612000									



SKETCHES

HQ-2017-1212 Sketch



NARRATIVE

Circumstances Prior to the Accident

The crew of northbound Amtrak Train 506 (Train 506) consisted of an engineer, conductor, and an assistant conductor who reported for duty on July 2, 2017, at 11:00 a.m., PDT at Amtrak Union Station in Portland, Oregon. The employees received the statutory off-duty period prior to reporting for duty.

Seattle, Washington, is the home terminal for the Engineer. Portland, Oregon is the home terminal for the Conductor and the Assistant Conductor.

Train 506 was scheduled to operate from Portland to Seattle, and originated in Eugene, Oregon, on July 2, 2017. The train consisted of 2 locomotives, with one on each end of the consist, one baggage car, and 12 Talgo passenger cars. Train 506 weighed 264 tons and was 668 feet in length. The train received a Class I initial terminal air test in Eugene and departed the Portland Station at 11:41 p.m.

The Engineer was seated at the controls on the right (east) side of the locomotive. The Conductor and the Assistant Conductor were seated in the dining car which was the fourth car from the rear of the train.

The Assistant Conductor was seated on the west side of the dining car and the Conductor was seated on the east side of the dining car, and both conductors were facing north.

In the accident area, trains operate on two main tracks owned and operated by BNSF Railway (BNSF).

Trains operate by signal indication of a traffic control system that is controlled by a BNSF dispatcher located in Ft. Worth, Texas. Bridge 14 is defined in BNSF Timetable No. 7 dated November 5, 2014, as a movable lift bridge with a manual interlocking.

The track near the accident is predominantly composed of 141- and 136-pound continuous welded rail on Main Track No. 2. The 141-pound rail was laid between 2011 and 2013, with a section of 136-pound rail on the south-end of the bridge laid in 1996. The rail is fastened to wood ties with conventional spikes and anchors for the type of rail on Main Track No. 2 approaching the south-end of the bridge.

Approaching the accident site from the south traveling north on Main Track No. 2 starting at MP 14.88, there is in succession tangent track, followed by a 3-degree curve and then tangent track for approximately 1000 feet to the absolute signal protecting BNSF Bridge 14 at MP 14.4 followed by the derail at MP 14.36. The tangent track continues north across BNSF Bridge 14 followed by a 3-degree curve which is approximately 1,100 feet in length. The grade is .28-degree ascending on the 1 mile of track prior to accident site, and the mile after the accident site the grade descends .28-degrees.

The geographic direction was north and the railroad timetable direction is north. Timetable directions are used throughout this report.

The Accident

According to event recorder data and post-accident statements from the Engineer, Train 506 passed the approach medium signal at MP 19.4 at a recorded speed of 61 mph at 2:23 p.m. The train passed the approach signal at MP 16.6 at a recorded speed of 64 mph at 2:25 p.m. When the Engineer came around the curve at the park, he noticed BNSF's bridgetender in his orange vest walking along the right-of-way, and then he noticed the red signal. The Engineer made an emergency application of the air brakes and remembers calling out "emergency, emergency, emergency" over the radio. The train passed the stop signal at MP 14.383 at a recorded speed of 32 mph at 2:28 p.m., then hit the derail protecting

Bridge 14 at 15 mph, and derailed at 2:29 p.m.

Lead Locomotive ATK 467 landed on its side. The baggage car behind the locomotive, and two passenger cars also derailed and were leaning to the east, towards Chambers Bay.

Emergency response reports indicate that police and fire departments were on-scene within 15 minutes.

Responders came from West Pierce Fire and Rescue, Tacoma Fire Department, Steilacoom Police Department, Pierce County Sheriff's Office, Lakewood Police Department, along with personnel from the Washington State Department of Ecology with assistance from McNeil and Anderson Island's marine response units. Officials from BNSF and Amtrak also arrived at the derailment, in addition to Federal Railroad Administration (FRA) inspectors from Region 8.

BNSF's bridgetender sustained minor injuries when he jumped from the embankment approximately 15 feet into the water to avoid being struck by the oncoming Amtrak train that derailed after running past the red signal and hitting the derail protecting Bridge 14. Amtrak's Train Attendant and Conductor also sustained minor injuries, along with 13 passengers on the train. Emergency responders reported there were three passengers on the train who were unable to walk out, however, they were not injured. The other passengers walked approximately 500 yards from the train to the marina parking lot. Three passengers experienced heat stroke while waiting for buses.

Amtrak reported \$178,913 in equipment damages and BNSF reported \$84,912 in track and signal damages adding up to \$263,825 in total damages.

BNSF estimated up to 200 gallons of lube oil spilled from the locomotive along with 30 to 50 gallons of diesel fuel. There were no impacts to the water and all materials were in the soil. The environmental contractor vacuumed the impacted ballast and soil. Soil samples have been collected. The Washington State Department of Ecology approved the clean-up plan. Approximately 1,260 gallons was vacuumed from the locomotive fuel tank.

Analysis and Conclusions

Analysis -Forensic Passenger Accident Investigation Information: FRA inspected the damage to the passenger cars after the derailment and reviewed injury records related to the event. Forensic evidence could not be collected to further understand passenger or equipment placement and better enhance passenger car safety. A review of first responder records indicated no passengers were treated for injuries on the train.

Conclusion: FRA was not able to collect forensic information that might identify conditions that could have contributed to the cause or severity of this accident.

Analysis- FRA Post Accident Toxicological Testing: The accident/incident met the criteria for FRA Post-Accident Toxicology Testing as required under Title 49 Code of Federal Regulations Part 219, Subpart C. The crew was tested at St. Clare Hospital in Lakewood, Washington. Test results were negative for the train crew of Train 506.

Conclusion: Drug and alcohol use did not contribute to the cause or severity of this accident.

Analysis- Crew Fatigue: FRA performed a fatigue analysis using the Fatigue Avoidance Scheduling Tool (FAST). FRA uses an overall effectiveness rating of 77.5 percent as the baseline for fatigue analysis, which is equivalent to a blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default

software settings.

FRA obtained and analyzed the 10-day work history for the train crew of Train 506 which included the Engineer, the Conductor, and the Assistant Conductor. FRA concluded that fatigue was not probable for any of the employees at the time of the accident.

Conclusion: FRA determined fatigue did not contribute to the cause or severity of this accident.

Analysis- FRA Mechanical Investigation: FRA assigned one Motive Power and Equipment inspector to the derailment investigation team. The Inspector conducted a thorough and complete inspection of the lead locomotive and along with the remainder of the Amtrak Train No. 506 consist. No causal exceptions were noted during the mechanical inspection.

Conclusion: No mechanical condition contributed to the cause or severity of this accident.

Analysis- FRA Signal Investigation: FRA assigned one Signal and Train Control inspector to the derailment investigation team. The Inspector reviewed the signal logs related to the signal system at Bridge 14 including Positive Train Control (PTC) records for the subdivision. No causal exceptions were noted during the signal records review. Although PTC is operating on BNSF's Seattle Subdivision as an overlay, Amtrak locomotives 467 and 470 are not equipped with PTC equipment.

Conclusion: The signal system did not contribute to the cause or severity of this accident.

Analysis- Locomotive Event Recorder and Outward Facing Camera: FRA obtained and analyzed a copy of the locomotive event recorders for leading ATK 467. Upon analysis of the event recorders, FRA determined that Train 506 was traveling at a speed of 32 mph when the train passed the red signal and was travelling at 15 mph when the train hit the derail protecting Bridge 14.

Two FRA inspectors viewed the video footage from the lead locomotive, Amtrak 467, at Amtrak division headquarters in Seattle, 9 hours after the derailment. FRA Inspectors verified the Engineer proceeded past an approach medium, an approach, and finally past the stop signal and hit the derail protecting Bridge 14 derailing Amtrak Train No. 506. The Engineer did not take any action to comply with these signal indications until initiating the emergency brake application immediately before passing the stop signal.

Conclusion: FRA determined the probable cause of this accident was the failure of the engineer to comply with the restrictive signals approaching Bridge 14.

Overall Conclusions

BNSF, the host railroad, was in full compliance with its own operating rules and all applicable Federal standards. The Amtrak Engineer was in the cab of the locomotive by himself and responsible for reporting restrictive signal indications to the Conductor via radio and operating the train in accordance with railroad operating rules and signal indications. The mechanical condition of the equipment and operation of the signal system did not contribute to the accident. FRA determined the Engineer of Train 506 lost situational awareness and failed to comply with three restrictive signals, including the stop signal, before derailing on the derail that protects Bridge 14.

Probable Cause and Contributing Factors

FRA determined the probable cause of the accident was H221: Automatic block or interlocking signal displaying a stop indication - failure to comply.

FRA also identified a contributing cause of H605: Failure to comply with restricted speed in connection with the restrictive indication of a block or interlocking signal.