SYNOPSIS

On October 27, 2017, at approximately 9:25 a.m. PDT, northbound Amtrak Train No. 500 (A500-1-27) collided with an occupied automobile at a private crossing at Horseshoe Bend Estates, USDOT Crossing No. 077853A, BNSF Milepost 90.2. BNSF is the host railroad for Amtrak in the State of Washington where Amtrak trains operate on the BNSF Northwest Division. The accident location is approximately three miles south of Castle Rock, WA, and the collision occurred on BNSF main track 2 on the Seattle Subdivision. The two occupants in the automobile were killed. The automobile was destroyed; the leading locomotive of Amtrak Train 500 sustained $2884.54 in damages. There were no injuries to passengers or crew on board Amtrak Train No. 500. No rail cars derailed because of this accident. This accident occurred on an Amtrak route and it was not PTC preventable.

The highway-rail grade crossing accident at Horseshoe Bend Estates, (USDOT Crossing No. 077538A) occurred during daylight hours; the weather at the time of the accident was clear and dry with a temperature of approximately 47° F.

The Federal Railroad Administration's (FRA) investigation determined the probable cause of this accident was the driver’s failure to stop at the stop sign and yield to the train, FRA Accident/Incident code (M302), Highway user inattentiveness.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # R8-2017-1254

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Amtrak (National Railroad Passenger Corporation)	ATK	150157

GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
BNSF Railway Company	BNSF	NW-1017-204

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
077853A	10/27/2017	9:25 AM

5. Type of Accident/Incident
Hwy-Rail Crossing

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated
0	0	0	0

10. Subdivision
Seattle

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Castle Rock	90.20	WA	COWLITZ

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
47 ˚F	Day	Clear	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Main Track 2	Freight Trains-60, Passenger Trains-80	61.04	North

23. PTC Preventable	24. Primary Cause Code	25. Contributing Cause Code(s)
N/A	[M302] Highway user inattentiveness	

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Passenger Train-Pulling	Yes	A500-1-27

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	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
72.0 MPH	R			0

6. Type of Territory

Signalization:
Signaled

Method of Operation/Authority for Movement:
Signal Indication

Supplemental/Adjunct Codes:
Q

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 *(derailed, struck, etc.)*	ATK 470	1				
(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 b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End e. Remote	11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	1	0	0	0	0	(1) Total in Equipment Consist	0	14	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	0	0	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
2884	0

Number of Crew Members				Length of Time on Duty	
14. Engineers/Operators	15. Firemen	16. Conductors	17. Brakemen	18. Engineer/Operator	19. Conductor
1	0	3	0	Hrs: 2 Mins: 5	Hrs: 2 Mins: 5

Casualties to:	20. Railroad Employees	21. Train Passengers	22. Others	23. EOT Device?	24. Was EOT Device Properly Armed?
				No	N/A
Fatal	0	0	2	25. Caboose Occupied by Crew?	No
Nonfatal	0	0	0		

26. Latitude	27. Longitude
46.238366490	-122.888679160

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CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved
1. Type: Auto		5. Equipment: Train (Units Pulling)
2. Vehicle Speed *(est. mph at impact)*: 10	3. Direction *(geographical)*: East	6. Position of Car Unit in Train: 1
4. Position of Involved Highway User: Moved over Crossing		7. Circumstance: Rail Equipment Struck Highway User
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?: Neither		8b. Was there a hazardous materials release by: Neither

8c. State here the name and quantity of the hazardous material released, if any.
N/A

9. Type of Crossing	10. Signaled Crossing Warning	11. Roadway Conditions
1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other *(spec. in narr.)* 3. Standard FLS 6. Audible 9. Watchman 12. None 8		Dry

12. Location of Warning	13. Crossing Warning Interconnected with Highway Signals	14. Crossing Illuminated by Street Lights or Special Lights
Both Sides	No	No

15. Highway User's Age	16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train	18. Highway User
29	Male	No	Did not stop

19. Driver Passed Standing Highway Vehicle	20. View of Track Obscured by *(primary obstruction)*
No	Not Obstructed

Casualties to:	Killed	Injured	21. Driver was	22. Was Driver in the Vehicle?
			Killed	Yes
23. Highway-Rail Crossing Users	2	0	24. Highway Vehicle Property Damage *(est. dollar damage)*: 611	25. Total Number of Vehicle Occupants *(including driver)*: 2

26. Locomotive Auxiliary Lights?	27. Locomotive Auxiliary Lights Operational?
Yes	Yes
28. Locomotive Headlight Illuminated?	29. Locomotive Audible Warning Sounded?
Yes	Yes

10. Signaled Crossing Warning

1 - Provided minimum 20-second warning
2 - Alleged warning time greater than 60 seconds
3 - Alleged warning time less than 20 seconds
4 - Alleged no warning
5 - Confirmed warning time greater than 60 seconds
6 - Confirmed warning time less than 20 seconds
7 - Confirmed no warning
N/A - N/A

Explanation Code

A - Insulated rail vehicle
B - Storm/lightning damage
C - Vandalism
D - No power/batteries dead
E - Devices down for repair
F - Devices out of service
G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present
H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)
J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits
K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/island circuit
L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction
M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed
N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach
O - Warning time less than 20 seconds attributed to violation of special train operating instructions
P - No warning attributed to signal systems failure to detect the train
R - Other cause(s). Explain in Narrative Description

SKETCHES

Sketch - Sketch

NARRATIVE

Circumstances Prior to the Accident

The crew of Amtrak Train No. 500 came on duty at 7:20 a.m. PDT in Portland, OR on October 27, 2017. The crew of northbound Amtrak Train 500 consisted of an engineer and a qualifying conductor in the leading locomotive and a conductor and assistant conductor in the passenger section of the train. Portland, OR is the home terminal of the qualifying conductor; Seattle, WA is the home terminal for the engineer. Both the engineer and qualifying conductor reported coming on duty following a 13 hour, 15 minute off-duty period.

Amtrak Train 500 was a 15-car passenger train with lead locomotive ATK 470, 12 passenger cars, a power unit and an NPCU (cab car) unit at the trailing end of the train totaling 341 tons and 595 feet long. Required air brake and mechanical inspections were performed in Eugene, OR for Amtrak Train 500 and no discrepancies were noted.

As the northbound train approached the accident area, the locomotive engineer was seated at the controls on the east side of the lead locomotive and the qualifying conductor was seated on the west side of the lead locomotive.

The train was on BNSF's main track 2 as it moved northward toward the accident scene through a 1°43 curve to the left for 2640 feet, a tangent track for about 2270 feet, followed by another leftward curve 3° 10 for 686 feet and a curve to the right of 1° 0 for a little less than a mile. The private crossing (USDOT Crossing No. 077853A) is located near the north end of this last curve. The grade in the immediate vicinity of the accident location is nearly level or just slightly descending. The private road at Horseshoe Bend Estates cuts across the railroad tracks at a 90° angle. The east approach to the crossing is down a slight incline from Pleasant Hill Rd. Sight distance to the crossing is nearly unrestricted at the east approach and to the north from the west approach. The sight distance to the south from the west approach is about 615 feet due to track curvature and vegetation located off the railroad right of way. The track in the accident area is BNSF double main track with traffic control. The railroad timetable direction of Amtrak Train 500 was north.

The Accident

Amtrak Train No. 500 (A500-1-27)

Amtrak Train No. 500 was accelerating following a 3° 10 leftward curve, approximately one mile south of the accident scene, at which it had slowed to approximately 65 mph. As the train approached the accident scene, both the locomotive engineer and the qualifying conductor noted an automobile approach the crossing, and without stopping, it began to traverse the crossing. The engineer indicated he began blowing his horn, and noticed the driver now appeared to see the train and responded by gunning his engine to accelerate over the crossing. Moments later, the train struck the automobile and the engineer engaged the emergency brake. Amtrak Train 500 continued northward, pushing the wrecked automobile, finally coming to a stop near milepost 89.8. According to BNSF's Northwest Division Timetable No. 7, the maximum speed for an Amtrak Talgo train in the area of the accident was 79 mph.

Highway Vehicle

The automobile was traveling east on Horseshoe Bend Estates and approached the private highway-rail

grade crossing, USDOT No. 077853A, at approximately 18.0 mph. Although the driver slowed at the stop sign posted at the crossing, the driver attempted to speed up rapidly in the final half-second prior to Amtrak Train No. 500 colliding with his car. Speeds and distances were estimated utilizing a series of still photos with time stamps taken from the outward facing camera on lead locomotive ATK 470.

Following the collision, the train continued north, pushing the automobile ahead of it, and came to a stop near milepost 89.8. The engineer directed the conductor and assistant conductor to check the condition of the passengers in the wrecked car. First responders arrived within five minutes. The two passengers of the car were declared dead at the scene.

Crew members were interviewed by local law enforcement personnel. All crew members were relieved from duty under the provisions of Amtrak's 49 CFR, Part 272 Critical Incident Stress Plan.

Analysis and Conclusions

Analysis – Toxicological Testing: There were no toxicological tests performed on the train crew.

Conclusion: This accident did not meet the criteria for 49 CFR, Part 219, Subpart C, Post-Accident Toxicological Testing of the employees involved.

Analysis - Locomotive safety devices the lead locomotive was equipped with included a headlight, auxiliary lights and an audible warning device as required by federal regulations.

Conclusion: Locomotive safety devices were in full compliance and working per federal requirements.

Analysis - Locomotive Engineer Operating Performance: The locomotive was equipped with a speed indicator and an event recorder as required. The event recorder data was downloaded by the local Amtrak road foreman and data was analyzed by FRA personnel.

Conclusion: The locomotive engineer was in compliance with all applicable railroad operating and train handling rules.

Analysis – Private highway-rail grade crossing, USDOT Crossing No. 077853A: There have been two fatal collisions at this grade crossing in the last three years. The last fatal collision occurred on January 12, 2015 (Amtrak Incident No. 135897).

Amtrak is the only regularly scheduled passenger service that operates over this crossing. BNSF and Union Pacific (UP) trains carrying numerous types of hazardous material shipments traverse this crossing daily.

The crossing is 24 feet wide and is constructed from concrete panels with asphalt between main track 1 and 2. Each approach is equipped with stop signs, Emergency Notification System (ENS) signs and a rectangular sign with the legend "Private Crossing" and the crossbuck symbol. These signs are required by Washington State law at private crossings through which crude oil is transported. The east approach is also equipped with a sign indicating that Horseshoe Bend Estates crossing is a private crossing and a dangerous railroad crossing. Signs on both east and west approaches are mounted on a metal sign post, with the east sign post located approximately eight feet from the crossing and the west 19 feet from the crossing. Both sign posts are in good repair and visible to motorists. ENS signs are posted in compliance with 49 CFR 234 Subpart E.

Horseshoe Bend Estates is a paved, private road which crosses BNSF main track 1 and 2 at a 90° angle from east to west before turning south about 169 feet west of the crossing. From there, the road continues south for several hundred feet, running parallel to the railroad track. Due to vegetation, trains are not generally visible along this section of road.

Conclusion: As a private crossing, Horseshoe Bend Estates, USDOT Crossing No. 077853A, is properly equipped with warning signs. Personnel from the Washington Utilities and Transportation Commission held a meeting at this location with the railroad to determine the possibility of installing additional safeguards at this crossing. Subsequent on-site discussions resulted in several potential safety improvements, including installation of lighted stop signs acquired with Section 130 funding, removal of vegetation and installation of whistle boards at this crossing. The BNSF representative in attendance indicated BNSF would have to investigate the feasibility of the installation of lighted stop signs and whistle boards at Horseshoe Bend Estates. BNSF also plans to reestablish the private crossing agreement with residents who use the crossing.

Analysis – Sight distance at USDOT Crossing No. 077853A: A sight distance analysis was conducted on the west approach at this private crossing equipped with passive warning devices. The analysis revealed sight distance of approximately 615 feet. The recommended sight distance for an automobile departing from a stopped position is approximately 1729 feet, according to the Revised 2nd Ed. of the Railroad-Highway Grade Crossing Handbook, Table 32. The driver of the vehicle in this incident did not stop, even though the crossing was equipped with a stop sign on the day of the accident. Instead, the driver proceeded, without stopping, across the private highway/rail grade crossing at Horseshoe Bend Estates at an estimated average speed of about 14 mph. The necessary sight distance for a vehicle traversing a crossing at 14 mph would be 927 feet, according to the Revised 2nd Ed. of the Railroad-Highway Grade Crossing Handbook, Table 32. In both scenarios described above, the train speed used in Table 32 was the recorded speed of Amtrak Train 500 – 72 mph.

The sight distance south of the private highway/rail grade crossing at Horseshoe Bend Estates, USDOT Crossing No. 077853A is limited by curvature of the track and seasonal vegetation located off railroad property. Removal of some of this vegetation could improve sight distance looking to the south at this location.

Conclusion – This crossing is equipped with stop signs. Motorists complying and stopping on the west approach have a sight distance 1000 feet less than what is recommended. Motorists who ignore the stop sign also have less sight distance than they require based on the speed of trains at this location. Track curvature and seasonal vegetation contribute to reduced sight distance at this crossing.

Analysis – FRA Inspectors reviewed the video from the outward facing on-board cameras on leading locomotive ATK 470.

Conclusion – According to the on-board video camera on leading locomotive ATK 470, the automobile did not stop at the stop sign on the west side of USDOT Crossing No. 077853A located on the west approach to the crossing.

Probable Cause:

The Federal Railroad Administration's (FRA) investigation determined the probable cause of this accident was the driver's failure to stop at the stop sign and yield to the train, FRA Accident/Incident code M302, Highway user inattentiveness.