Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch

Accident Investigation Report
HQ-2016-1117

Amtrak ((National Railroad Passenger Corporation) ATK)
Cimarron, KS
March 14, 2016

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

Synopsis

On March 14, 2016, at 12:02 a.m., CDT, an eastbound Amtrak passenger train, ATK 4, traveling on BNSF Railway's (BNSF) La Junta Subdivision, derailed just west of BNSF Milepost 373. The town nearest to the accident was Cimarron, Kansas, located approximately 2 miles away. Cimarron is approximately 15 miles west of Dodge City, Kansas, on the La Junta Subdivision. The rear eight passenger cars were derailed. Damages to track and signals was $363,000 and equipment damages were $2,784,355. Total Federal Railroad Administration (FRA) reportable damages were $3,147,355.

At the time of the accident, it was night and the weather cloudy. The temperature was 46 °F.

FRA's investigation determined the probable cause of the derailment was track damage caused by non-railroad interference with track structure, and will be listed in the FRA Factual Accident/Incident Report as cause code M506. Cimarron Feeders of Kansas, LLC, allowed a feed truck to damage the track structure and failed to notify BNSF prior to the arrival and derailment of Amtrak Passenger Train ATK 4. No contributing factor was identified.

U.S. Department of Transportation
Federal Railroad Administration

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File #HQ-2016-1117

TRAIN SUMMARY

1. Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Amtrak (National Railroad Passenger Corporation)	ATK	141515

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	KS-03161-03

2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident	4. Time of Accident/Incident
	3/14/2016	12:02 AM

5. Type of Accident/Incident
Derailment

6. Cars Carrying HAZMAT	7. HAZMAT Cars Damaged/Derailed	8. Cars Releasing HAZMAT	9. People Evacuated	10. Subdivision
0	0	0	0	La Junta

11. Nearest City/Town	12. Milepost *(to nearest tenth)*	13. State Abbr.	14. County
Cimarron	372.8	KS	GRAY

15. Temperature (F)	16. Visibility	17. Weather	18. Type of Track
46 ˚F	Dark	Cloudy	Main

19. Track Name/Number	20. FRA Track Class	21. Annual Track Density *(gross tons in millions)*	22. Time Table Direction
Single Main Track	Freight Trains-60, Passenger Trains-80	9.17	East

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OPERATING TRAIN #1

1. Type of Equipment Consist:	2. Was Equipment Attended?	3. Train Number/Symbol
Passenger Train-Pulling	Yes	ATK 4

4. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	5. Trailing Tons (gross exluding 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
60 MPH	R			0

6. Type of Territory

Signalization:
Signaled

Method of Operation/Authority for Movement:
Direct Train Control

Supplemental/Adjunct Codes:
P, D

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 32109	5	yes		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 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	2	0	0	0	0	(1) Total in Equipment Consist	0	10	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	0	8	0	0	0

12. Equipment Damage This Consist	13. Track, Signal, Way & Structure Damage
2784355	363000

14. Primary Cause Code
M506 - Track damage caused by non-railroad interference with track structure

15. Contributing Cause Code

Number of Crew Members

16. Engineers/Operators	17. Firemen	18. Conductors	19. Brakemen
1	1	1	1

Length of Time on Duty

20. Engineer/Operator	21. Conductor
Hrs: 3 Mins: 51	Hrs: 3 Mins: 51

Casualties to:	22. Railroad Employees	23. Train Passengers	24. Others
Fatal	0	0	0
Nonfatal	1	55	0

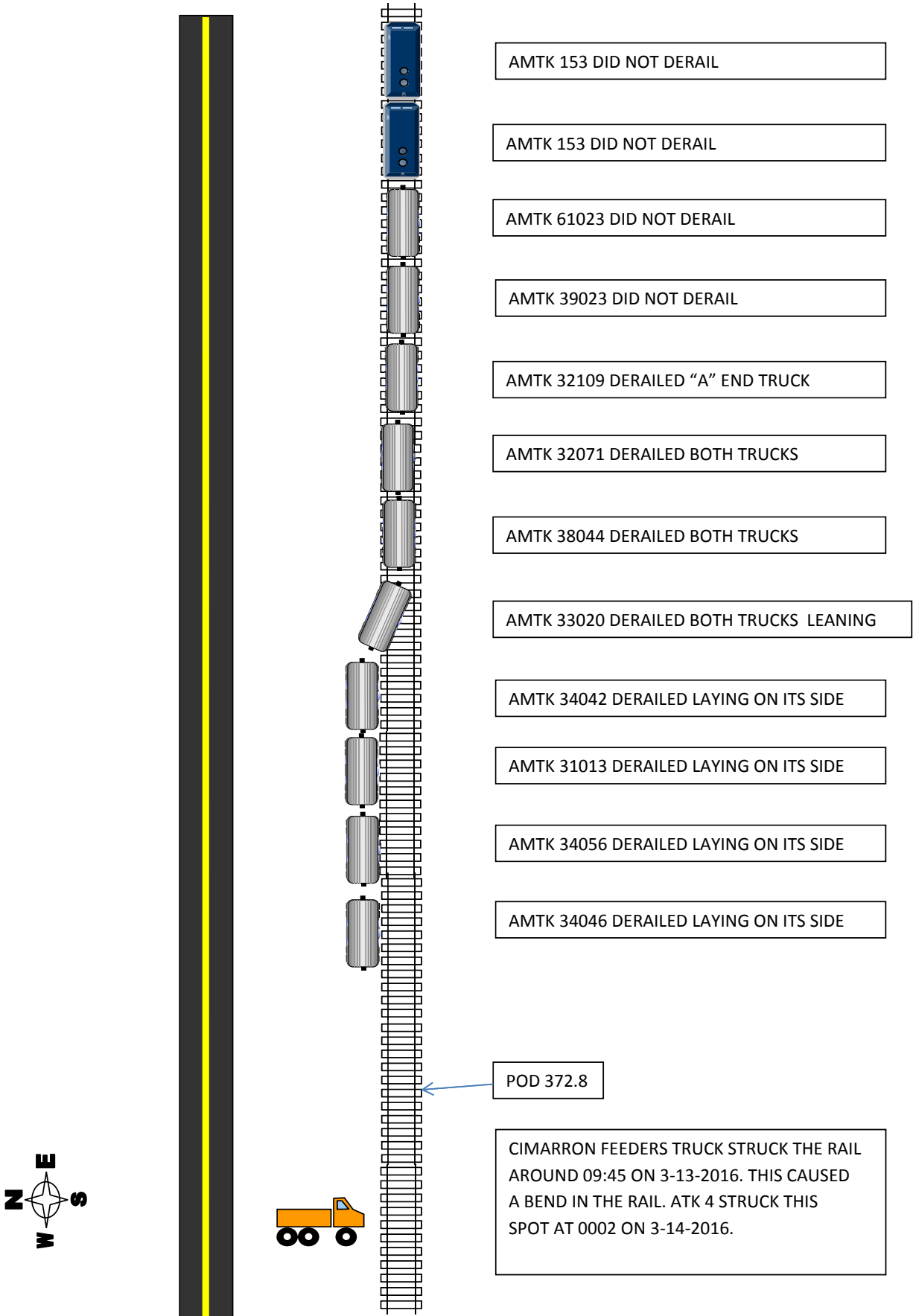
25. EOT Device?	26. Was EOT Device Properly Armed?
No	N/A

27. Caboose Occupied by Crew? N/A

28. Latitude	29. Longitude
37.808482000	-100.381272000

SKETCHES

HQ-2016-1117 Sketch Rev 1



NARRATIVE

Circumstances Prior to the Accident

On Sunday, March 13, 2016, at approximately 9:45 a.m., CDT, an unattended single-axle roto mix commercial feed truck owned by Cimarron Feeders of Kansas, LLC, made an uncontrolled downhill movement approximately 1,340 feet before traversing the highway, and impacting the railroad tracks, near BNSF Railway's (BNSF) Milepost (MP) 373. The impact caused a track misalignment. The Truck Operator (Operator), using his personal vehicle, drove to the point where the truck came to a stop on the north side of the railroad track. The Operator then walked across the tracks, got into the runaway truck, backed the truck off and away from the railroad tracks, and drove back up to the feed plant. The Operator stated he reported the incident to his supervisor. No action was taken by management of Cimarron Feeders to contact BNSF regarding the incident and damage to the tracks.

The afternoon of March 13, 2016, Amtrak called a crew for Train ATK 4 (ATK 4); the Los Angeles to Chicago train also referred to as the Southwest Chief. The crew of ATK 4 consisted of a locomotive engineer, student engineer (fireman), conductor, and an assistant conductor (brakeman). They went on duty on March 13, 2016, at 7:11 p.m., MDT, in La Junta, Colorado, which is the home terminal for the crew. Prior to reporting, the Engineer and Student Engineer had been off duty for 58 hours and 29 minutes. The Conductor was off duty for 82 hours and 20 minutes. The Assistant Conductor was off duty for 82 hours and 28 minutes. This is more than the required statutory off-duty rest period for all crew members.

ATK 4 consisted of 2 locomotives (all on the head-end), 10 loaded passenger cars, and 0 empties. ATK 4 was 1,130 feet long and weighed 721 tons. On March 12, 2016, at 3:30 p.m., PST, a Class 1 air brake test and daily inspections were conducted on ATK 4 at the Los Angeles, California, Amtrak mechanical facility by qualified mechanical personnel. The following inspections were conducted pursuant to Title 49 Code of Federal Regulations (CFR) Part 238, Subpart D. This regulation consists of Title 49 CFR Sections 238.303, *Exterior calendar day mechanical inspection of passenger equipment*; 238.305, *Interior calendar day inspection of passenger cars*; and 238.313, *Class 1 brake test*. On March 13, 2016, at 11:53 a.m., MDT, an intermediate air brake inspection was completed at the Albuquerque, New Mexico, terminal by qualified mechanical personnel. The crew of ATK 4 had a briefing with the inbound crew before departing La Junta at 7:41 p.m., MDT. The Conductor and the Assistant Conductor were in the body of the train performing their duties. The Engineer and the Student Engineer were located in the lead locomotive. The Engineer was seated on the left (north) side; the Student Engineer was on the right (south) side, at the controls of the locomotive. On March 13, 2016, at 11:29 p.m., CDT, ATK 4 arrived in Garden City, Kansas, where the Engineer and Student Engineer changed positions. The Engineer was now at the controls of the locomotive. The trip was uneventful until the derailment.

The method of operation on BNSF's La Junta Subdivision consists of areas with signal indications of a traffic control system, and additional areas of track warrant control supplemented by signal indications of

an automatic block signal (ABS) system. The entire subdivision is equipped with Automatic Train Stop. Authority to operate on the La Junta Subdivision is granted by BNSF's Dispatcher located at BNSF's Network Operations Center (NOC) in Fort Worth, Texas.

As ATK 4 approached the area where the accident occurred from west of the site on single main track, it encountered a descending grade. From about MP 374.2 to about MP 374.0, ATK 4 traversed a 0.0-degree, 38-minute curve onto straight track to MP 373.5 before entering another curve that ended at MP 373.4. ATK 4 continued on straight track up to the misalignment at MP 373.07. The La Junta Subdivision operates east to west with milepost numbers decreasing when traveling west to east. The derailment occurred near Cimarron, Kansas.

The maximum authorized speed on the La Junta Subdivision is 79 mph for passenger trains, and 55 mph for freight trains with permanent speed restrictions between posted timetable mileposts. Additionally, train movements on the La Junta Subdivision are governed by operating rules, timetable instructions, and signal indications.

The Accident

At 12:02 a.m., CDT, ATK 4 was traveling at 60 mph when the Engineer first noticed a misalignment of track and initiated an emergency brake application. The two leading locomotives and the first two cars traversed the misalignment; the third through tenth cars derailed near MP 372.8 in the vicinity of Cimarron. Cars 3 through 5 derailed upright, Car 6 derailed leaning to the north, and Cars 7 through 10 derailed on their side to the north of the rail. The event recorder data downloaded from lead Locomotive No. ATK 153 indicated the train was traveling at approximately 60 mph when the Engineer initiated the emergency brake application.

At the time of the accident, it was night and the weather cloudy. The temperature was 46 °F. Damages to track and signals was $363,000 and equipment damages were $2,784,355. Total Federal Railroad Administration (FRA) reportable damages were $3,147,355.

There were no injuries to Amtrak's operating crew members. There was one injury to Amtrak's train attendant employee. The four operating crew members were transported to an area hospital and tested under FRA's mandatory post-accident toxicological test requirements because this accident exceeded the $1 million-major accident threshold. There were approximately 130 passengers on board; 55 were transported and/or treated for injuries at 2 area medical centers. The American Red Cross responded to assist with passengers.

Analysis and Conclusions

Analysis - Toxicological Testing: FRA Post-Accident Forensic Toxicology Testing was performed on the four Amtrak operating crew members.

Conclusion: The test results obtained from FRA's Alcohol and Drug Control Program Manager were negative for all employees.

Analysis - Fatigue Analysis: FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is considered to be comparable to blood alcohol content of 0.05. At or above this baseline, FRA does not consider fatigue as probable for any employee. Software sleep settings vary according to the information obtained from each employee. If any employee does not provide sleep information, FRA uses the default software settings.

FRA used a fatigue analysis software program to create an analysis model of the overall effectiveness rate of each crew member at the time of the accident. This model was produced through calculations made using collected work/rest data from the recent past of the crew members.

FRA obtained fatigue-related information, including a 10-day work history, for all four crew members involved in this accident.
Conclusion: Upon analysis of that information, FRA concluded that fatigue was not probable for any of the four crew members.

Analysis – Signal Data and Inspections: A team comprised of National Transportation Safety Board (NTSB) investigators and FRA inspectors conducted a post-accident Joint Signal Review. The team's findings are concurrently being reported by both agencies.

Signal Data Logs

Field signal equipment maintains logs of signal data for each individual location. Therefore, each location stands alone and is not synchronized with other locations. This data was compiled into Table 1 "BNSF post-accident ABS signal data." Table 1 data summarizes ABS signal events recorded for ATK 4 as it travelled eastbound from East Siding Switch (ESS) Charleston MP 382.8 to the point of derailment at MP 372.8. It must be noted that the times reflected in Table 1 are CDT (prior to Daylight Savings Time becoming effective at 2:00 a.m., on March 13, 2016).

Signal Location - ABS Eastbound Signal Time of East Track ABS Eastbound Signal
Aspect Occupancy Aspect After Occupancy
• MP 382.8 - ESS CHARLESTON Green 22:55:26 CST Red
• MP 380.1 - INTERMEDIATE Green 22:57:50 CST Red
• MP 377.3 - INTERMEDIATE Green 22:56:53 CST Red
• MP 374.1 - INTERMEDIATE Green 23:05:42 CST Red
In addition to wayside signal data, downloads were obtained from defect detectors that ATK 4 travelled passed. Table 2 "Data from defect detectors for Amtrak Train No. 4" summarizes the data from the hot bearing and dragging equipment detectors.

Location Train Speed IN/OUT Defects

• MP 418.1 - Deerfield ATK 4/Southwest Chief 78/78 mph No Defects
• MP 397.7 - Garden City ATK 4/Southwest Chief 61/60 mph No Defects
• MP 380.2 - Ingalls ATK 4/Southwest Chief 61/61 mph No Defects
Highway-rail Grade Crossing Warning System

Main Street crosses BNSF's main track at MP 377.3. The highway-rail grade crossing was equipped with a Safetran grade crossing predictor. The data log from the highway-rail grade crossing warning system was downloaded and summarized in Table 3 "Data from Main Street highway grade crossing warning device."

Location Train Warning Time Train Speed
• MP 377.3 – Main Street, ATK 4 Southwest Chief 33 seconds 60 mph
• DOT # 012-910F
Post-Accident Signal System Examination and Testing: The post-accident inspection found all signal equipment secured with no indications of tampering or vandalism. Absolute and intermediate signals were examined and all locations equipped with data loggers were downloaded. Signal aspects were verified and ground tests were performed. Post-accident signal lamp voltage measurements were recorded. There were no defects noted during the examination of the signal system or the associated signal appurtenances.

BNSF Signal System Trouble/Remedy Tickets: Signal system trouble/remedy tickets logged by BNSF's NOC for ESS Charleston MP 382.8 to and including West End Cimarron, Kansas, were reviewed for the 12-month period preceding the accident. No exceptions were noted.

BNSF Railroad Maintenance Records: Railroad maintenance, and inspection and test records for the ESS Charleston (to and including the West End Cimarron ABS signal block) were provided. This information reflected records of monthly, quarterly, semi-annual, annual, 2-year, 4-year, and 10-year inspections. No exceptions were noted.

Damages: There was no damage to BNSF's signal system due to this derailment.

Conclusion: FRA concluded there were no exceptions associated with the signal systems.

Analysis - Mechanical:

Wreckage Description

Cars ATK 61023 and ATK 39023 did not derail and remained in the upright position. ATK 32109 remained upright, but derailed the rear A-end truck and received damage to the brake discs and truck bolster safety hangers due to the impact with the ballast, rail ties, and spikes. Cars ATK 32071 and ATK 38044 derailed both trucks each and remained upright. Both trucks on ATK 32071 and ATK 38044 received damage to the brake discs and truck bolster safety hangers due to the impact with the ballast,

rail ties, and spikes. ATK 33020 derailed both trucks and came to a stop leaning approximately 30 degrees towards the right side. Both trucks on ATK 33020 received damage to the brake discs and truck bolster safety hangers due to the impact with the ballast, rail ties, and spikes. Cars ATK 34042, ATK 31013, ATK 34056, and ATK 34046 derailed all trucks and came to a rest laying on their right sides. Cars ATK 34042, ATK 31013, ATK 34056, and ATK 34046 received damage to car body structures, doors, windows, train lines, side lighting, emergency stenciling, and trucks on each car received damage to the brake discs and truck bolster safety hangers due to the impact with the ballast, rail ties, and spikes. The B-end coupler of ATK 34042 was damaged and required replacement.

Railroad Equipment Involved in the Collision

The locomotives on ATK 4 were positioned in the lead position and were not derailed. The locomotive consist consisted of the following:
1. ATK 153 Fwd., GE P42DC Built 2016, Not Derailed
2. ATK 152 Fwd., GE P42DC Built 2016, Not Derailed
The 10 passenger cars consisted of the following:
• Car position 1 ATK 61023, A-end fwd., LDSL Baggage
• Car position 2 ATK 39023, B-end fwd., Superliner II/Dorm
• Car position 3 ATK 32109, B-end fwd., Superliner II/Sleeper
• Car position 4 ATK 32071, A-end fwd., Superliner II/Sleeper
• Car position 5 ATK 38044, A-end fwd., Superliner II/Dinning
• Car position 6 ATK 33020, B-end fwd., Superliner I/Lounge
• Car position 7 ATK 34042, B-end fwd., Superliner I/Coach
• Car position 8 ATK 31013, B-end fwd., Superliner I/Coach/Baggage
• Car position 9 ATK 34056, B-end fwd., Superliner I/Coach
• Car position 10 ATK 34046, B-end fwd., Superliner I/Coach
Equipment damage was estimated by Amtrak to be approximately $1,000,000.

The Superliner is a bi-level passenger car used on long-haul Amtrak trains that do not use the Northeast Corridor. The initial cars, Superliner I models, were built by Pullman-Standard in the late 1970s and a second order of cars, Superliner II models, were built in the mid-1990s by Pullman's successor, Bombardier Transportation. Pullman used a German-designed two-axle truck for the Superliner I car. Bombardier used a two-axle General Steel Castings truck for the Superliner II car. Both models of the Superliner cars are constructed with approximately the same dimensions; length of 85 feet, width of 10 feet 2 inches, and height of 16 feet 2 inches.

Pre-Departure Inspections

On March 12, 2016, at 3:30 p.m., PDT, a Class 1 air brake test and daily inspections were conducted on ATK 4 at the Los Angeles Amtrak mechanical facility by qualified mechanical personnel. The following inspections were conducted pursuant to Title 49 CFR Part 238, Subpart D. This regulation consists of §§

238.303, 238.305, and 238.313. On March 13, 2016, at 11:53 a.m., MDT, an intermediate air brake inspection was completed at the Albuquerque Terminal by qualified mechanical personnel.
An exterior calendar day mechanical inspection consists of examination of the following components and systems:
• Battery venting
• Coupler systems
• Suspension systems
• Wheels
• Grounding and jumper cables
• High voltage markings
• Air compressor
• Rescue access markings
An interior calendar day mechanical inspection consists of examination of the following components and systems:
• Moving parts and electrical system safety guards
• Floors and passageways
• Manual door releases
• Emergency equipment and signage
• Doors
• Public address and intercom
A Class 1 brake test consists of the following inspections and tests:
• Friction brakes apply and release as intended
• Brake shoes and pads are properly seated and aligned
• Piston travel
• Communicating signal system
• Operation of the Engineer's brake controller
• Brake pipe leakage
• Emergency brake application and deadman pedal
• Air valves are properly aligned
• Brake rigging operation
• Brake disc inspection
• Communication of the brake pipe pressure to the rear of the train
Equipment Post-Accident Inspections

On April 16, 2016, the mechanical group conducted an FRA Class 1 air brake test and pre-departure inspection on ATK 4. The train was reassembled in its original configuration from the time of the incident. The following is a summary of the observations:
• The branch pipe to the "AL" side of the A-1 air bracket was repaired due to post-derailment damage.
• Brake pipe pressure was 153 psi.
• Brake cylinder pressure was 74 psi.
• Equalizing reservoir pressure was 111 psi.

• Main reservoir pressure was 134 psi.
• A successful emergency brake application was conducted from the Engineer's automatic brake controller, Conductor's emergency brake button, and by opening the brake pipe at the rear of the rear car (ATK 34046).
• The brake pipe was reduced by 20 psi and the Engineer's automatic brake was put into test mode to check for brake pipe leakage.
• The brake pipe had a one psi leakage in 90 seconds.
• The air brakes were re-charged and given another 20-psi brake pipe reduction to conduct an inspection of ATK 4s brake application.
• There were no exceptions noted.
• An alerter functionality test was conducted to verify operation. With all the brakes released and the isolation switch in the run position, the alerter was initiated and successfully put the train into emergency after running its 25-second cycle.

Conclusion: FRA concluded there were no mechanical causal defects related to the accident.

Analysis - Dispatcher Records: The dispatcher train sheet records were examined and compared with signal recordings, with no irregularities noted. The dispatcher voice recordings did not reveal any irregularities. Interviews with the dispatchers did not reveal any exceptions.

Conclusion: FRA concluded there were no exceptions associated with the dispatcher train sheets, signal recordings, voice recordings, or the Dispatcher's handling of the event.

Analysis - Locomotive Engineer and Conductor Operating Performance: The NTSB structured a working group to perform operating interviews, conduct re-enactments, and review event recorder data. The working group consisted of representatives of the NTSB, BNSF, Amtrak, members of the Safety Task Force, and FRA. FRA reviewed disciplinary records separately.

The NTSB Working Group:
• Railroad Accident Investigator, Washington, D.C.
FRA:
• Operating Practices Inspector, Kansas City, Missouri
• Operating Practices Inspector, Wichita, Kansas
• Passenger Railroad Safety Specialist, Washington, DC
• Amtrak Operations:
• Operations Manager, Los Angeles, CA
• Safety Task Force
• International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART) Representative
• Brotherhood of Locomotive Engineers and Trainmen (BLET) Representative

Operational Testing, Training, and Discipline Records for the crew of ATK 4: A review of the crew members' discipline record showed there was no discipline assessed on any of the four crew members. Operational testing had been performed for a total of 71 observations on the Engineer by 7 Amtrak

supervisors from January 2014 until March 2016, with 0 failures noted. The Conductor's record indicated 55 observations by 9 Amtrak supervisors from January 2014 until March 2016, with 0 failures noted. The Student Engineer's record indicated 49 observations by 7 Amtrak supervisors from January 2014 until February 2016, with 1 failure noted. The Assistant Conductor's record indicated 22 observations by 4 Amtrak supervisors from August 2015 until March 2016, with 0 failures noted. The observations were duly documented.

Training Records for the crew of ATK 4: A review of the crew's records indicate that all four employees had completed required safety and operating courses with passing scores. Records supplied by Amtrak for the crew members indicate the Engineer was current with the requirements of Title 49 CFR Part 240, Engineer Certification. The Engineer completed her triennial knowledge examination on June 24, 2015, and received her annual check ride on January 19, 2016. The crew members had received regular training, rules examinations, and various safety training, including emergency preparedness.

Conclusion: FRA noted no exceptions in the Engineer certification records or in the operational testing records supplied for the crew.

Overall Conclusions

The investigation shows that fatigue and train handling were not factors in the derailment. There was no evidence recovered to indicate that any mechanical failure had occurred. A track inspection after the incident on the main track in the area of the derailment indicated there was a defect at the locations where Cimarron Feeder's truck struck the track. Inspection of the accident site and video from the locomotive verified this condition.

Probable Cause and Contributing Factors

FRA's investigation determined the probable cause was track damage caused by non-railroad interference with track structure, and will be listed in FRA's Factual Accident/Incident Report as cause code M506. Cimarron Feeders of Kansas, LLC, allowed a feed truck to damage the track structure and failed to notify BNSF prior to the arrival and derailment of Amtrak Passenger Train ATK 4. No contributing factor was identified.