



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

***Accident Investigation Report
HQ-2015-1086***

***BNSF Railway Company (BNSF)
Lesterville, SD
September 19, 2015***

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.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 BNSF Railway Company	1a. Alphabetic Code BNSF	1b. Railroad Accident/Incident No. TC-0915-110
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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. TC-0915-110	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 9/19/2015	4. Time of Accident/Incident 6:18 AM	
5. Type of Accident/Incident Derailment				
6. Cars Carrying HAZMAT 96	7. HAZMAT Cars Damaged/Derailed 7	8. Cars Releasing HAZMAT 3	9. People Evacuated 0	10. Subdivision Aberdeen
11. Nearest City/Town Lesterville		12. Milepost (to nearest tenth)	13. State Abbr. SD	14. County YANKTON
15. Temperature (F) 45 °F	16. Visibility Dawn	17. Weather Fog		18. Type of Track Main
19. Track Name/Number Single Main Track		20. FRA Track Class Freight Trains-25, Passenger Trains-30		21. Annual Track Density (gross tons in millions) 3.41
				22. Time Table Direction East

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train					2. Was Equipment Attended? Yes		3. Train Number/Symbol G-MNXDPK7-17A				
4. Speed (recorded speed, if available) R - Recorded E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 12585		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>Not Signaled</u> Method of Operation/Authority for Movement: <u>Direct Train Control</u> Supplemental/Adjunct Codes: <u>P</u>											
7. Principal Car/Unit (1) First Involved (derailed, struck, etc.)		a. Initial and Number CBTX 716019	b. Position in Train 4	c. Loaded (yes/no) yes	8. If railroad employee(s) tested for drug/ alcohol use, enter the number that were positive in the appropriate box.			Alcohol 0	Drugs 0		
(2) Causing (if mechanical, cause reported)					9. Was this consist transporting passengers?					No	
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		
		b. Manual	c. Remote	d. Manual	e. Remote		a. Freight	b. Pass.	c. Freight	d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	1	(1) Total in Equipment Consist	98	0	0	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	7	0	0	0	0
12. Equipment Damage This Consist 699748			13. Track, Signal, Way & Structure Damage 383261								
14. Primary Cause Code T207 - Broken Rail - Detail fracture from shelling or head check											
15. Contributing Cause Code											
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		0	Hrs: 2	Mins: 48		Hrs: 3	Mins: 33	
Casualties to:	22. Railroad Employees		23. Train Passengers		24. Others	25. EOT Device?			26. Was EOT Device Properly Armed?		
Fatal	0		0		0	Yes			Yes		
Nonfatal	0		0		0	27. Caboose Occupied by Crew?					No
28. Latitude 43.088747000			29. Longitude -97.676927000								

CROSSING INFORMATION

Highway User Involved		Rail Equipment Involved	
1. Type		5. Equipment	
2. Vehicle Speed (<i>est. mph at impact</i>)	3. Direction (<i>geographical</i>)	6. Position of Car Unit in Train	
4. Position of Involved Highway User		7. Circumstance	
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?		8b. Was there a hazardous materials release by	
8c. State here the name and quantity of the hazardous material released, if any.			
9. Type of Crossing Warning 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (<i>spec. in narr.</i>) 3. Standard FLS 6. Audible 9. Watchman 12. None		10. Signaled Crossing Warning	11. Roadway Conditions
12. Location of Warning		13. Crossing Warning Interconnected with Highway Signals	14. Crossing Illuminated by Street Lights or Special Lights
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
19. Driver Passed Standing Highway Vehicle		20. View of Track Obscured by (<i>primary obstruction</i>)	
Casualties to:	Killed	Injured	21. Driver was
23. Highway-Rail Crossing Users		24. Highway Vehicle Property Damage (<i>est. dollar damage</i>)	22. Was Driver in the Vehicle?
26. Locomotive Auxiliary Lights?		25. Total Number of Vehicle Occupants (<i>including driver</i>)	
28. Locomotive Headlight Illuminated?		27. Locomotive Auxiliary Lights Operational?	
		29. Locomotive Audible Warning Sounded?	

10. Signaled Crossing Warning

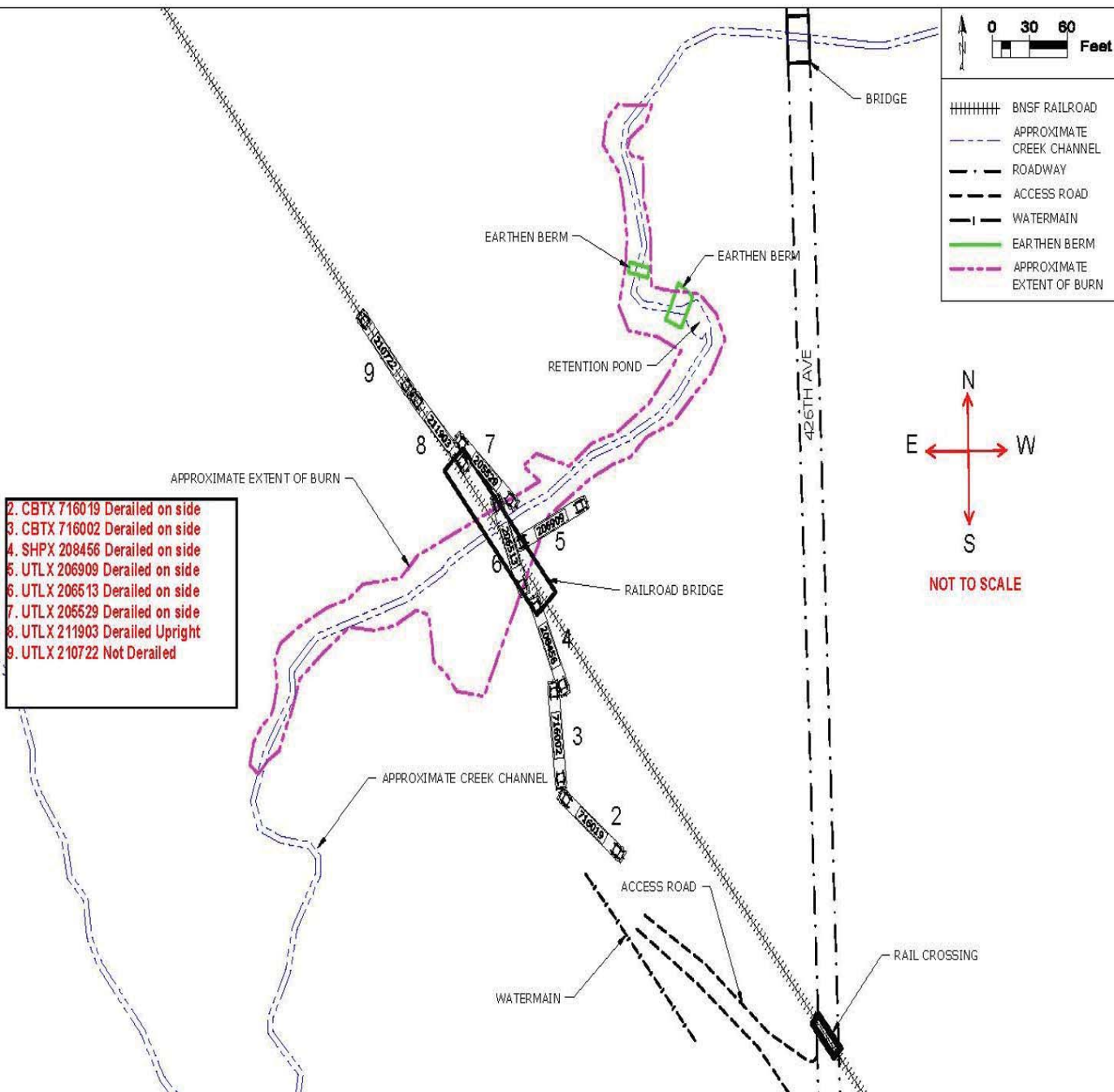
- 1 - Provided minimum 20-second warning
- 2 - Alleged warning time greater than 60 seconds
- 3 - Alleged warning time less than 20 seconds
- 4 - Alleged no warning
- 5 - Confirmed warning time greater than 60 seconds
- 6 - Confirmed warning time less than 20 seconds
- 7 - Confirmed no warning
- N/A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



SYNOPSIS

On September 19, 2015, at 6:18 am (CDT), an eastbound BNSF Railway (BNSF) Train G-MNXDPK7-17A, a loaded ethanol train, derailed seven cars at Milepost (MP) 596.7, on the Aberdeen Subdivision of BNSF's Twin Cities Division near Lesterville, South Dakota (SD). Lesterville is 78 miles southwest of Sioux Falls and 190 miles north of Omaha, Nebraska. The territory is non-signaled single main track and the method of operation is by track warrant control (TWC).

G-MNXDPK7-17A originated in Mina, South Dakota, and was destined for Deer Park, Texas. The train had three locomotives (two in the lead and one rear-end Distributive Power (DPU) locomotive), 98 loads, 0 empties, 12,585 trailing tons, and was 6,044 feet in total length. Two of the loads were sand buffer cars (one on each end of the train); the remainder of railroad cars in the train consisted of tank cars loaded with Alcohols, N.O.S., UN1987, Class 3, PG II (ethanol). Recorded locomotive event recorders verify train speed as 10 mph at time of derailment and smooth operation prior to the occurrence of an undesired emergency brake application. Train handling is not a contributing factor to the derailment. The seven cars that derailed were railcars 2 through 8 behind the leading locomotives, which held consist positions 4 through 10. Three of the derailed cars were breached and released product which caught fire. A BNSF railroad bridge at MP 596.7 was burnt to a total loss due to the breached ethanol cars and resulting fire.

There were no injuries to the train crew or the public, and no evacuations were necessary. This is not an Amtrak route. This accident was not PTC-preventable.

The railroad damages reported were: \$699,748 for equipment and \$383,261 for track and structures, with a total of \$1,083,009 in reported damages.

At the time of accident/incident, it was daylight (dawn) with heavy fog, winds out of the west at 8 mph, and a temperature of 45° F.

FRA's investigation was unable to determine any possible contributing factors to this accident/incident.

FRA's investigation determined that the probable cause of this accident/incident was due to a broken rail. (FRA cause code T207 Broken Rail - Detail Fracture from shelling or head check)

NARRATIVE

CIRCUMSTANCE PRIOR TO THE ACCIDENT/INCIDENT:

BNSF's train crew went on-duty at Sioux City, Iowa, on September 19, 2015. The two-person crew consisted of an Engineer and a Conductor. The Conductor went on-duty at 2:45 a.m.; the Engineer went on duty 45 minutes later at 3:30 a.m.. This was the home terminal for both employees, and both employees received a statutory off duty period prior to reporting for duty.

After collecting the necessary paperwork, the crew departed Sioux City via crew van en route to their train which was tied-down (parked) at Scotland, South Dakota (Milepost (MP) 602.3)). The train crew took charge of the unit train loaded with ethanol, Train G-MNXDPK7-17A. The train had 3 locomotives (2 in the lead and one rear end DPU locomotive), 98 loads, 0 empties, 12,585 trailing tons, and was 6,044 feet in total length. The train which had originated in Mina, South Dakota, was scheduled to travel to Deer Park, Texas.

At Scotland, the train crew released the handbrakes on the cars and locomotives, then they contacted BNSF's train dispatcher to get a track warrant to proceed timetable east. BNSF's Train Dispatcher granted authority to the crew to proceed timetable east from MP 605 to MP 566 at 5:40 a.m. The train departed Scotland at 5:43 a.m., as recorded by the event recorder on Lead Locomotive BNSF 4736.

As they departed Scotland, the Conductor was seated in the conductor's seat on the north (left) side of the locomotive and the Engineer was seated at the controls in the Engineer's seat on the south (right) side of the leading locomotive. In the area of the accident/incident, BNSF's Aberdeen Subdivision is single main track territory. The method of operations is by track warrant control given by a BNSF train dispatcher located in Fort Worth, Texas. Per BNSF's Twin Cities Division Timetable, dated May 27, 2015 (including updates through September 10, 2015), in the area of the accident/incident the maximum authorized timetable speed for freight trains is 25 mph. Train G-MNXDPK7-17A was operating under a 10 mph Form A speed restriction between MP 600.8 and MP 587.9 as listed on the train crew's General Track Bulletin No. 32595, item number 12, restriction number 7493.

Approaching the point of derailment (POD) from the west at MP 600.0 to MP 595.0 the track is tangent. The following are the grades between MP 600.0 and MP 595.0:

- Between MP 600 and MP 599.6 the grade is ascending 0.1 percent
- Between MP 599.6 and MP 599.1 the track is level
- Between MP 599.1 and MP 598.2 the grade is descending 0.62 percent
- Between MP 598.2 and MP 597.8 the grade is descending 0.11 percent
- Between MP 597.8 and MP 597.5 the track is level
- Between MP 597.5 and MP 597.1 the grade is ascending 0.69 percent
- Between MP 597.1 and MP 597.0 the track is level
- Between MP 597.0 and MP 596.8 the grade is descending 0.41 percent
- Between MP 596.8 and MP 596.6 the track is level
- Between MP 596.6 and MP 596.3 the grade is ascending 0.38 percent
- Between MP 596.3 and MP 595.9 the grade is descending 0.25 percent
- Between MP 595.9 and MP 595.7 the track is level
- Between MP 595.7 and MP 595.3 the grade is ascending 0.59 percent
- Between MP 595.3 and MP 595.0 the grade is ascending 0.28 percent

This is single main track and track warrant territory, as indicated by the railroad timetable. The railroad timetable direction for G-MNXDPK7-17A was east. The geographic direction was southeast. Timetable directions are used throughout this report.

The Accident:

According to train crew interviews, the trip was uneventful prior to the occurrence of the accident and train handling was not a factor. There was heavy fog and poor visibility. The train crew stated that visibility and sight distance was between 50 feet to 100 feet. The outward facing camera on Lead Locomotive BNSF 4736 verified that there was heavy fog and that visibility was poor.

Event recorder data on the Lead Locomotive BNSF 4736 and DPU Locomotive BNSF 4323 indicated both units were in throttle position two as the train approached the BNSF railroad bridge located at MP 596.7. As the train traversed over the railroad bridge at MP 596.7, the crew did not hear or see anything unusual. Shortly after, the head-end of the train having cleared the railroad bridge, the train experienced an undesired emergency brake application (UDE) at 10 mph as recorded on the lead locomotives BNSF 4736's event recorder. The train traveled 80 feet before coming to rest after the UDE.

As soon as the train came to a rest, the train crew noticed that railroad cars behind the lead locomotive consist had caught fire. The outward facing camera on the second locomotive, BNSF 5664, which was facing toward the west showed darkness and then suddenly displayed a halo of light indicative of the ensuing fire resulting after the UDE and derailment of the seven ethanol cars.

During the investigation interview, the Engineer stated that after noticing the cars on fire he dialed 911 from the radio on the lead locomotive. He further stated that BNSF's dispatcher immediately responded to the 911 tone. The Engineer then informed the train dispatcher that their train had experienced an UDE and that they were in emergency with some railroad cars on fire.

The train crew reported that emergency personnel arrived on-scene approximately 1 hour and 15 minutes after they had notified the train dispatcher. The train crew offered the train consist containing emergency response information to the emergency personnel, but they declined to take possession of the train consist.

Hazardous Materials-

Of the 7 derailed tank cars, 3 were breached and leaked 49,748 gallons of Ethanol. Below is a list of the 3 Ethanol rail cars which leaked product and the amount of product released from each car.

Consist Position	Car Number	Released Volume (GAL)
4	CBTX 716019	5
6	SHPX 208456	27,647
8	UTLX 206513	22,096

There was no explosion, no fatalities, no injuries, no evacuation, and no waterway was affected as a result of direct or indirect exposure to the release of the ethanol. BNSF's HAZ-MAT team, which responded to the accident/incident, managed to contain the spilled product with earthen dams. However, the BNSF railroad bridge at MP 596.7 was burnt to a total loss due to the breached ethanol cars and resulting fire.

Emergency Response:

The Scotland Volunteer Fire Department (Scotland FD) responded to the accident on September 19, along with the Lesterville Volunteer Fire Department (Lesterville FD) and BNSF's HAZ-MAT team.

The Scotland FD was notified at 6:40 a.m. and arrived on scene at 6:50. They opened an incident command center at approximately 8:00 a.m. and had the site contained by 10:00 a.m.

The Lesterville FD was notified at 7:36 a.m. and arrived on scene at 7:41 a.m.

The Lesterville FD was notified at 7:36 a.m. and arrived on scene at 7:41 a.m.

BNSF's HAZ-MAT team arrived on scene at approximately 12:15 p.m. The fire was extinguished at approximately 12:45 p.m. and the two fire departments started to cool down the cars from 2 p.m. to 6 p.m.

Post-Accident Investigation:

On September 19, 2015, the Federal Railroad Administration (FRA) began an investigation of this accident. FRA's Region 8 management assigned a Chief Inspector as Investigator/Inspector-in-Charge (IIC) of this investigation. They also sent a Deputy Regional Administrator, an Operating Practices Inspector, a Hazardous Material Inspectors, a Motive Power and Equipment Inspector, a Track Inspector, a Bridge Specialist, and a Track Integrity Specialist to assist the IIC. FRA worked in conjunction with the go-team from the National Transportation Safety Board and two inspectors from the Pipeline and Hazardous Materials Safety Administration. The following analysis and conclusions, as well as any possible contributing factors and the probable cause in this report represent the findings of FRA's investigation.

Analysis and Conclusions:

Analysis- FRA Post Accident Toxicological Testing:

This accident/incident met the criteria for FRA Post-Accident Toxicology Testing, as required under Title 49 Code of Federal Regulations (CFR) Part 219, Subpart C.

Conclusion:

The crew was tested under FRA authority and the results were negative for both crewmembers.

Analysis- Emergency Response:

Local emergency responders from the Scotland FD and Lesterville FD responded to the accident/incident. In addition, a BNSF HAZ-MAT response team also responded to the accident/incident.

Conclusion:

FRA concluded that the emergency response was both immediate and thorough with all precautions taken to ensure the safety of the general and traveling public within the area of the accident/incident.

Analysis- Crew Fatigue:

FRA obtained and analyzed a 10-day work/rest history for the crewmembers of BNSF Unit Train G-MNXDPK7-17A.

Conclusion:

Upon analysis of that information with FRA's Fatigue Avoidance Scheduling Tool (FAST) program, FRA concluded that fatigue was probable for both crew members and that the employees may have been working at a diminished level of safety (effectiveness) due to mental and/or physical attributes associated with fatigue. However, FRA determined that fatigue was not a contributing or causal factor to this accident/incident and that any actions or lack of actions by the employees would not have prevented this accident/incident.

Analysis- Locomotive Event Recorder:

FRA obtained and analyzed a copy of the Locomotive Event Recorder for Leading Locomotive BNSF 4736 of the G-MNXDPK7-17A.

Conclusion:

FRA's analysis of the locomotive event recorder downloads concurred with BNSF's analysis. The speed of the G-MNXDPK7-17A when an UDE was initiated and the ensuing derailment occurred was 10 mph. FRA's analysis noted no exceptions to proper train handling on the part of the train crew.

Analysis- Outward Facing Locomotive Camera:

FRA reviewed the locomotive download off of the leading locomotive and also the second locomotive of train G-MNXDPK7-17A.

Conclusion:

FRA verified that it was quite foggy and there was nothing unusual with the condition of the track or any other unusual conditions prior to the derailment.

Analysis- FRA Hazardous Materials Inspection:

FRA's Hazardous Materials Inspector conducted a thorough investigation of the paper work and handling of the cars from both the shipper and railroad.

Conclusion:

BNSF Train G-MNXDPK7-17A was a unit train and key train with 3 locomotives, 2 buffer cars and a total of 96 loaded tank cars containing denatured fuel (ethanol), which is designated by the U.S. Department of Transportation as a Class 3 hazardous material. Commercial transport of ethanol is subject to the regulatory requirements of the Hazardous Materials Regulations (HMR) in Title 49 of the CFR. The train was transporting a shipment of ethanol from Glacial Lake Energy Company's Ethanol Plant in Mina, South Dakota to Valero's Marketing and Supply Company in Deer Park, Texas,

The train consist matched the physical placement of the cars in the train with no exceptions taken. This was cross-checked with field observation and reviewing the automatic equipment identification scan report.

Seven tank cars derailed in car positions 2 through 8 (train consist positions 4 through 10). Three of the derailed cars were breached and fueled a post-accident fire. A total of 49,743 gallons of denatured fuel ethanol were released from two tank cars (consist positions 6 and 8) that were punctured by coupler impact. A third tank car, in consist position 4, leaked 5 gallons of product from a bottom outlet valve.

Analysis- FRA Mechanical Investigation

All derailed cars from train G-MNXDPK7-17A were examined for mechanical defects and possible contributing or causal factors.

Conclusion:

On September 20, 2015, the two leading locomotives, BNSF 4736 and BNSF 5664, along with the leading buffer car, GACX 56780, were inspected at the point where they were repositioned near the derailment site. The two locomotives and the hopper car became separated from car CBTX 716019, which was the first car to derail.

The mechanical group inspected the wheels on both locomotives and the hopper car. Fresh transverse batter marks were observed on several of the wheels that ran on the south rail. Batter marks are fresh impact marks to the wheel perpendicular to the wheel's tread. The wheel flange and the wheel tread showed indications of fresh wheel batter marks.

On September 20, 2015, FRA's Motive Power and Equipment Inspector completed an FRA Class I brake test and an air leakage test on Locomotive BNSF 4736, Locomotive BNSF 5664, and Buffer Car GACX 56780 with no exceptions noted. The brakes set and released as required.

On September 21, 2015, the inspector completed a mechanical walking inspection and an FRA Class I brake test on the 90 cars and one DPU that did not derail. All brakes applied and released as designed with the exception of one car with brakes that did not apply. The inspector documented several minor defects but nothing causal or contributing to the accident.

Investigators examined the derailed tank cars, truck assemblies, and wheel sets after the post recovery. All wheel sets, 28 total, 14 bolster assemblies, and 28 side frames were accounted for. All wheels were found to be intact with no cracks observed. Several wheels showed indications of thermal exposure consistent with the tank car fire.

Analysis- FRA Bridge Inspection

An FRA Bridge Specialist conducted a thorough investigation of BNSF's bridge inspection history for the BNSF railroad bridge at MP 596.7.

Conclusion:

The bridge was destroyed from the ensuing fire. Therefore, bridge inspection reports and open exceptions had to be reviewed to determine the bridge's integrity. The BNSF

The bridge was destroyed from the ensuing fire. Therefore, bridge inspection reports and open exceptions had to be reviewed to determine the bridge's integrity. The BNSF railroad bridge at MP 596.7 was constructed in 1954 and spans Prairie Creek at a height of 26 feet. The timber pile and timber cap bridge is an open deck structure consisting of 7 spans with 6 spans 16 feet in length and one 15 foot span for a total length of 111 feet.

A review of BNSF inspection records shows bridge inspections were performed per their Bridge Management Program and were performed on a timely basis. A review of BNSF's capacity records for the railroad bridge at MP 596.7, Twin Cities Division, Aberdeen Subdivision, also shows a safe load capacity determination. The Cooper load rating is as follows: Normal rating E-60 with a Maximum Rating at 10 mph E-76.

FRA's investigation concluded that derailment POD was on the track structure on the east end of the railroad bridge at MP 596.7 in the bridge approach and not on the bridge structure. However, the resulting derailment from the broken rail which resulted in the breached ethanol cars and ensuing fire was on the bridge structure which resulted in the total loss of the bridge.

Analysis- FRA Track Inspection

FRA Investigators conducted a thorough walking inspection of the Aberdeen Subdivision from MP 596.65 and MP 598.7.

Conclusion:

FRA's inspector conducted a track inspection on September 19, 2015, between MP 596.65 and MP 598.7. The inspection found a breakout in the railhead on the north rail at MP 596.65 (about 250 feet east of the POD). The inspector also noted that at MP 596.68 there was a shelled, spalled, and corrugated (SSC) rail that had been marked by a BNSF rail detector operator. At some point, this SSC rail developed a 6-inch vertical split head. With the 10 mph speed restriction that was currently in place, this defect was determined to be compliant with FRA's Track Safety Standards 49 CFR Part 213.

FRA and BNSF inspectors conducted a joint track inspection on September 20, 2015, between MP 595.2 and MP 599.8. The inspection team found nine track defects that included the following:

- At MP 597.5, and at MP 599.5, insufficient fasteners at a rail joint;
- At MP 590.02, a culvert was separated and partially plugged;
- At MP 599.07, a culvert was 40 percent silted shut on the north end;
- At MP 598.8, at MP 599.3, and at MP 599.4, incorrectly-sized joint bars were installed;
- At MP 598.85, loose joint bars; and
- At MP 595.3, center cracked joint bar.

FRA's Track Inspector noted that at both MP 595.5 and MP 595.2, an SSC rail had been marked by a BNSF rail detector operator and at some point these SSC rails developed a 96-inch vertical split head and a 72-inch vertical split head defect, respectively. With the 10 mph speed restriction that was currently in place, these defects were also determined to be compliant with FRA's Track Safety Standards.

There were two additional locations discovered by the inspectors that were not marked as an SSC rail, but had rail defects (3-inch horizontal split head at MP 596.6, and a 60-inch vertical split head at MP 595.2). Again with the 10 mph speed restriction that was currently in place, both of these defects were determined to be compliant with FRA's Track Safety Standards.

FRA's investigation discovered the rail in the area of the derailment was manufactured in 1908 and that it and the other track material (OTM) was a Chicago, Milwaukee, St. Paul & Pacific (Milwaukee Railroad) Standard. The rail and OTM was installed by the Milwaukee Railroad in 1929. The standard punch in the tie plates was for a 9/16 of an inch track spike. At some point, BNSF placed new ties and used track spikes that measured 5/8 of an inch instead of the 9/16 spikes. BNSF placed a single spike on the field side of the rail and placed two spikes on the gauge side of the rail. In some locations FRA's investigators discovered that some of the ties that had been spiked with the 5/8 of an inch spikes instead of the 9/16 of an inch spikes are gripping the rail so tight that there is a skewing of the ties resulting in tight rail as well as running rail causing the skewing of ties. FRA's Track Inspector discovered that both rails were moving longitudinally up to 3 1/2 inches due to the anchors not being properly adjusted and against the ties. FRA's Track Inspector discovered that between MP 595.20 and MP 599.8, both rails were moving longitudinally up to 3 1/2 inches in some locations and at MP 596.85 the rail was found to be running 4 1/2 inches on the left (North) rail and 5 inches on the right (South) rail due to the anchors not being properly adjusted and against the ties. This caused the ties to skew in some of the joint area locations. Additionally, FRA's investigation was able to determine after piecing back the pieces of broken rail at the POD that the rail showed signs of being curve worn which is indicative of rail car wheels encountering consistent tight gauge at that location.

Possible Contributing Factors:

FRA's investigation was unable to determine any possible contributing factors to this accident/incident.

Probable Cause:

FRA's investigation determined that the probable cause of this accident/incident was due to a broken rail. (FRA cause code T207 Broken Rail - Detail Fracture from shelling or head check)