NATIONAL TRANSPORTATION SAFETY BOARD

Office of Railroad, Pipeline and Hazardous Materials Investigations
Washington, DC

TRACK & ENGINEERING GROUP CHAIRMAN
FACTUAL REPORT

DCA-14-MR-004

Collision and Derailment with Hazardous Materials Release
Eastbound BNSF U FYNHAY4-05 (Petroleum Train) with Westbound BNSF Train G RYLRGT9-26 (Grain Train) at Casselton, North Dakota

Casselton, North Dakota
BNSF's KO Subdivision
December 30, 2013

Preliminary Factual Report Prepared by: Date: January 23, 2014
R. A. Hipskind,
Track and Engineering Group Chairman

Accident

NTSB Accident Number:	DCA-14-MR- 004
Date of Accident:	December 30, 2013
Time of Accident:	2:11 p.m. (CDT)
Type of Train and No:	U FYNHAY4-05 (Petroleum Train) & G RYLRGT9-26 (Grain Train)
Transit Owner:	BNSF Railway (BNSF)
Transit Operator:	BNSF
Crew Members:	Petroleum train—engineer & conductor Grain train—engineer, student engineer & conductor
Location of Accident:	Casselton, ND

Synopsis

On Monday, December 30, 2013, at 2:11 pm CST, westbound BNSF Railway grain train G-RYLRGT9-26A consisting of two head end locomotives, one rear distributive locomotive power unit (DPU) and 112 cars derailed 13 loaded cars (the 43rd through 55th) at MP 28.5 of the KO Subdivision, Twin Cities Division in Casselton, North Dakota while traveling on main track 1. The derailment occurred in the middle of the train resulting in one of the grain cars, the 45th car in the line, fouling main track 2. Eastbound BNSF petroleum crude oil train U-FYNHAY4-05T consisting of two head end locomotives, one rear DPU and 106 cars, collided with BNSF grain car 486653 of the grain train and derailed the leading locomotives and cars 1 through 20 to the south on main track 2. After the collision an undetermined amount of petroleum crude oil was released from 18 loaded tank cars fueling a fire.

Local emergency officials ordered a voluntary evacuation of the town of Casselton. Approximately 1400 civilians from the town of Casselton were reported to have evacuated. No civilian injuries were reported. The train crew from U-FYNHAY4-05T, consisting of an engineer and a conductor, escaped from the rear door of the lead locomotives uninjured. The crew from train G-RYLRGT9-26A was not injured.

BNSF has estimated damages at $6.1 million; this does not include lading or environmental remediation. The weather at the time of the accident was cloudy and -1° Fahrenheit, winds north at 7 mph.

The parties to the investigation include the Federal Railroad Administration (FRA), the US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), the BNSF Railway, the Brotherhood of Locomotive Engineers and Trainmen (BLET), the International Association of Sheet Metal, Air, Rail and Transportation Workers (SMART)1 and Trinity Rail Car.

1 Formally the United Transportation Union (UTU)

Circumstances Prior to the Accident:

On December 30, 2013, at 2:11 pm CST, westbound BNSF grain train G-RYLRGT9-26A consisting of two head end locomotives, one rear DPU[1] and 112 cars was operating on main track 1 near Casselton, ND. The train experienced an uninitiated emergency brake application. Immediately a crewmember radioed an emergency announcement on channel 70. At the same time, a signal maintainer was in a vehicle on an access road near the west switch of the crossover located at milepost 28.5. He had noticed that the switch heater covers were damaged and radioed on channel 70 to the grain train and asked if they were aware that their train might be dragging equipment. Simultaneously, the petroleum train was operating eastbound on main track 2 and had passed the head portion of the grain train. The crew of that train was in the process of clearing their authority to hold a track warrant from the subdivision that they had recently exited.

Prior to the westbound grain train's derailment, it was traversing straight track (main track 2) from Dalrymple at milepost 25.5 on a slight ascending grade that varied from .00% to .27%. Prior to the eastbound petroleum train's collision with the fouled car and subsequent derailment, it was on straight track (main track 1) from milepost 30.0 to 28.5 on a slight descending grade that varied from .04% to .13%.

Figure 1. Global view of derailment area.

[1] DPU refers to distributive locomotive power, generally located as the rear end of a train..

The Accident:

The grain train went into emergency due to a train separation that occurred in the middle portion of the train. The train separated when 13 loaded grain cars derailed with at least one of the cars fouling main track 2. It was later learned that the grain train derailed 13 loaded cars (the 44th through 56th) at MP 28.5. As eastbound BNSF petroleum oil train proceeded on main track 2, the crew observed the car fouling their route and the engineer made an emergency brake application prior to taking protective measures for their safety. The leading locomotive struck the grain car and the both locomotives and the head 21 cars derailed primarily to the south of main track 2.

After the collision both crewmembers of the petroleum train exited the locomotive and cleared the immediate area. As they placed themselves in a safer position from the train an undetermined amount of petroleum crude oil was released fueling a fire allowing cars to explode.

Track Description:

The main tracks are constructed on 136 pound continuous welded rail affixed to wooden crossties with elastic fasteners. The derailment occurred in a No. 20 turnout.

BNSF inspects and maintains the KO Subdivision according to BNSF policy which calls for four complete inspections per week. The track was last inspected on December 29, 2013, by a qualified BNSF track inspector. No defects were noted on that report in the area of the collision/derailment.

The BNSF KO Subdivision is a multiple main track (main tracks 1 & 2) system. The tracks are signaled for train movement on either track in either direction. The predominant rail section is 132 pound continuous welded rail (CWR). The rail is fastened to conventional wooded crossties through double shouldered tie plates with one anchor and one rail spike on each side of the rail. BNSF operates an average of 17 trains within a twenty-four hour period, which amounts to about 66.2 million gross tons (mgt) annually for the line.

Figure 2. View looking west (direction the train was travelling) from near the point of derailment.

Derailed Cars:

The petroleum train derailed the lead and second locomotives, a buffer car of sand and the head 20 loads of petroleum product. The grain train derailed 13 loads of grain, the 44th through the 56th cars of the train.

Damages Estimates:

BNSF engineering personnel estimated total track structural damages at $486,000. This figure includes costs for the installation of replacement rail and crossties associated with damage from the accident. BNSF estimated the total damages for the accident at $6.1 million.

Post-Accident Inspection/Testing of Track

Investigators measured the track geometry preceding marks found in the west switch of the crossover located at milepost 28.5 and noted the following:

The track inspection field notes noted:

- The maximum measurement allowed for gage in FRA Class 4 track, a maximum authorized speed of 60 mph (freight) is 57 1/2 inches. Track notes determined that the widest gage prior to the POD was 56 5/8 inches; or about 7/8 of an inch under the FRA maximum allowable limit.

- The maximum allowed deviation for alignment measured with a 62' chord in FRA Class 4 track is 1 1/2 inches for tangent track. Track notes determined that the greatest alignment deviation prior to the disturbed track was ½ of an inch; or 1 inch under the FRA maximum allowable limit.

- The maximum allowable deviation from zero crosslevel at any point on tangent or reverse crosslevel elevation on curves may not be more than 1 1/4 inches for Class 4 track. Track notes determined that the maximum crosslevel prior to the disturbed track was 1/4 of an inch; or 1 inch under the FRA maximum allowable limit.

This is the last segment of track the grain train traveled over prior to the December 30, 2013, derailment. Investigators post-accident inspection from mile post 25.2 (east of the accident site) to the beginning of the disturbed track, found there were no visual exceptions.

Point of Derailment[2]:

Investigators observed marks at the frog area and on top of the closure rail extending from the switch point area to the frog. The rail exhibited several marks but there were no wheel flange marks departing the rail head.

Investigators identified the point of derailment (POC) at a location where the outside edge (field side) of the south rail showed an indication of wheel flange trailing off to the field side and continuously marking the field side OTM in a westerly direction. The initial mark was located 60 feet 3 inches from the frog point and 96 feet 6 inches from the switch point. On the opposite rail, marks indicated a wheel flange trailing to the inside of the rail head and downward onto the track and OTM marking elastic clips and proceeding in a continuous manner to the heel block location. Investigators observed and documented a deep strike mark at the heel block. The switch crossties supporting the switch point area were damaged and the track west of the switch was destroyed.

2 Point of derailment (POD) GPS coordinates are N46.901067, W97.2278290

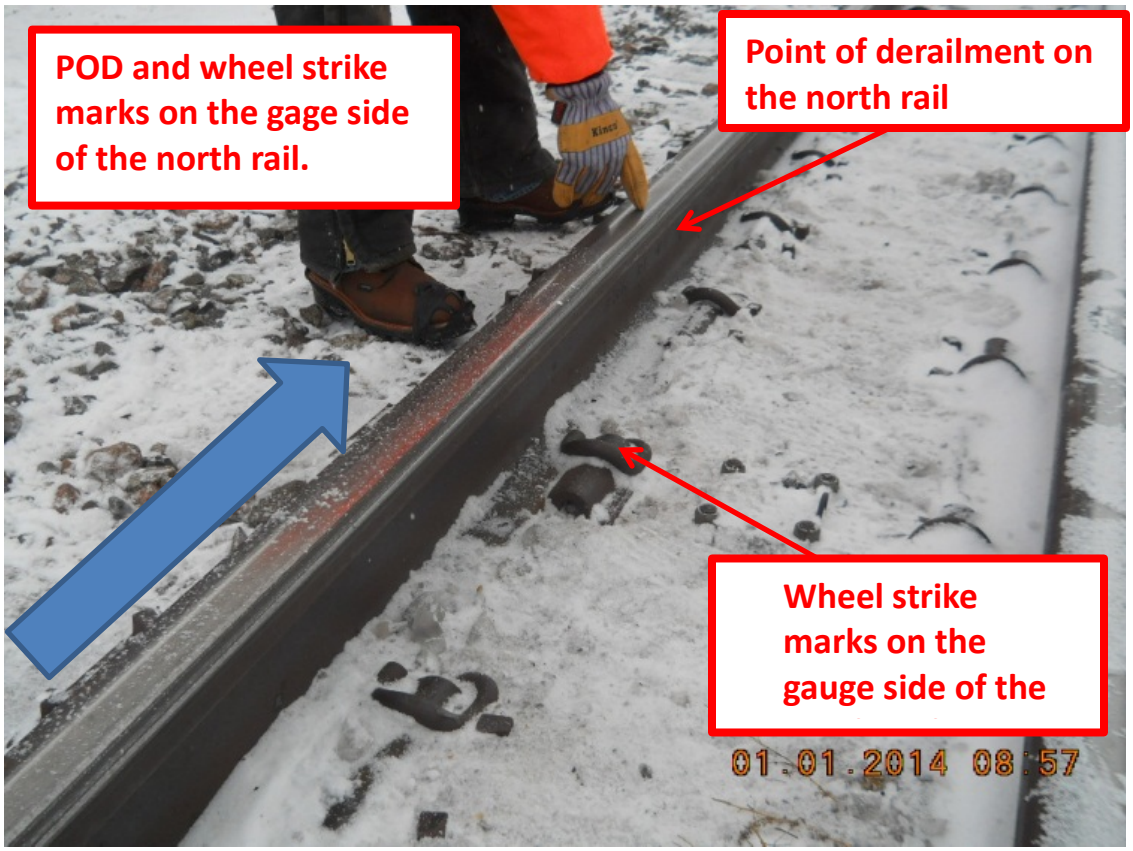

Figure 3. View of derailment marks; blue arrow indicates direction of train travel.

Figure 4. View of south rail derailment marks; blue arrow indicates direction of train travel.

Figure 5. Strike mark located at left hand switch point heel block

Geometry Tests

BNSF operated their track measurement geometry vehicle (car 87) over the K O subdivision, main track 1 on November 13, 2013. The BNSF geometry data generated no exceptions for this area.

Internal Rail Tests Data:

Herzog Reports Review:

On December 10, 2013, an ultrasonic rail test was conducted on BNSF's K O subdivision. Herzog vehicle HRZ134 conducted this inspection. No defects were recorded in the vicinity of the derailment.

Track Inspection Records:

FRA regulations found in 49 CFR 213 require that a rail carrier's track inspection records be prepared and signed on the day of the inspection for frequency of compliance with the Federal Railroad Administration Track Safety Standards (FRA/TSS). FRA track inspection records are required to reflect actual field conditions and deviations from the FRA TSS. BNSF has elected to maintain to FRA Class 4 standards requiring BNSF

personnel to inspect the main track at least twice per calendar week. However, BNSF inspects this area of main line tracks a minimum of four times per week.

Track inspection records for the BNSF K O subdivision were examined from October 22, 2013, through to December 31, 2013. The records show that the frequency of inspections is in compliance with federal regulations.

The track in the area of the derailment was last inspected on December 29, 2013, by a FRA qualified BNSF track inspector (T/I). The T/I noted no defects in the affected area.

Regulatory Track Inspection History

On March 21, 2013, FRA conducted a walking inspection of six switches in the Casselton area. No defects were noted for the switch where the derailment occurred.

Parties to the Investigation - Acknowledgment Signatures

The undersigned designated *Party to the Investigation* representatives attest that the information contained in this report is a factually accurate representation of the information collected during the investigation, to the extent of their best knowledge and contribution in this investigation.

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_____//s//_____ Date ___2-10-14____
Richard A. Hipskind, NTSB

_____//s//_____ Date ___2-10-14_____
Douglas J. Jensen, BNSF

_____//s//_____ Date ___2-11-14_____
Blain R. Luck, FRA

_____//s//_____ Date ___2-11-14_____
Quinn Ligon, FRA