NATIONAL TRANSPORTATION SAFETY BOARD

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

FACTUAL REPORT

DCA-15-FR-011

BNSF Train No. DMIDNTW125 Collision with Track Panels Resulting in an Engineering Employee Fatality

Minneapolis, Minnesota
May 25, 2015

Factual Report Prepared by:
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Investigator-in-Charge

Date: September 29, 2015

Accident

NTSB Accident Number:	DCA15FR011
Date of Accident:	May 25, 2015
Time of Accident:	11:39 a.m. (CDT)
Type of Train and No:	Westbound (WB) Train
Railroad Owner:	BNSF Railway (BNSF)
Crew Members:	1 Engineer (hostler), 1 Conductor (utility man),
Location of Accident:	Minneapolis, Minnesota

Synopsis

On May 25, 2015, at 11:39 a.m. central daylight time (CDT)1, a BNSF engineering department foreman suffered fatal injuries while working with a maintenance of way (MOW) crew that had just begun to unload track panels[2] from flat cars. One of the track panels being unloaded struck a two unit locomotive consist passing on the adjacent main track. The foreman was leading a five person MOW work gang that included the foreman, a welder, two heavy machine operators, and a section man. The accident occurred at approximately milepost 9.7 on the BNSF Midway Subdivision in Minneapolis, Minnesota. The passing locomotives were westbound at 13 mph travelling on the BNSF Midway subdivision main track.

The weather was 63 degrees F, with winds of 17 mph.

Parties to the investigation include: Federal Railroad Administration, BNSF Railway, and Brotherhood of Maintenance of Way Employes Division.

1 All times in this report are central daylight time.

2 A track panel consists of two rails affixed to timber crossties with a box anchor patter affixed to the base of the rails and rail joint bars attached at one rail end. The overall length of a track panel is approximately 42 feet.

Figure 1. This is a view looking southeast at accident scene where loader in the background had attempted to lift two track panels (see red arrow). There are two loaded flat cars with two stacks of track panels per car, seven track panels to a stack. Blue arrow indicates direction of travel of locomotives. Green arrow points to likely position of foreman atop a stack of track panels as indicated by train crew. Orange "x" is approximate location of deceased.

Circumstances Prior to the Accident:

According to interviews conducted on-scene, investigators learned that on May 19th or 20th a construction roadmaster had asked for volunteers to perform work for the upcoming weekend (May 23rd and 24th). Four employees responded that they were willing to work over the weekend. The foreman (the deceased) later in the week decided that he too was willing to work the weekend to accomplish a list of tasks. According to the Construction Gang Roadmaster (CGR), he stated that he informed the foreman of a list of tasks, but that the foreman was not to work on the holiday, May 25th.

The foreman and the four volunteers did work on Saturday and Sunday performing various engineering or construction tasks. On Memorial Day, according to employees who worked that day, the same five employees met at their lodging where the foreman conducted a job briefing. Four of the employees stated that the briefing included a discussion about both the work at the switch panel construction and the task of unloading the track panels located on flat cars stored on Old Main 2 Pocket track (a.k.a. Steam track). According to the interviewees, no protection was needed at the switch assembly location. However, where the crew was going to work at the track panel location, the foreman indicated that they would lock out the entrance

locations on the Old Main track for their protection. No other form of protection was implemented.

They said the first task was to finish assembling a switch panel(s)[3]. After completing that task, the crew decided to move to the area where the loaded flats were positioned.

Accident

Upon arriving at the Old Main 2 Pocket track, the foreman and a welder placed locks on the fixed derail (a locked was placed on the derail at the east switch and a the west switch was locked at the switch stand.). The foreman also placed a maintenance-of-way lock on the switch west of the flat cars. (See Figure 2) The foreman instructed the employees to remove the chains and securements holding the track panels to the flat cars. This work included climbing on top of the track panel stacks and working on the adjacent track side near a controlled track, the Midway Subdivision single main track.

Figure 2. A view of the west switch leading into the Old Main 2 Pocket track lined toward another track. The red circle shows where a maintenance of way lock had been applied.

3 The switch panels arrived preassembled in several panel sections; however, those separate panels generally have to be joined or bolted together prior to installation as a unit.

After the securement chains had been removed, a machine operator of one of the front end loaders (equipped with forks), proceeded to approach the furthest east track panel stack on the east end of the east flat car. Meanwhile the foreman decided to remain on top of the west end track panel stack of the west flat car (opposite end to where the loader was to begin his lift). In his interview, the machine operator stated that he did not know that the foreman was positioned on top of the panels. Just prior to the machine operator attempting the lift, the foreman tapped the top of his hard hat to signal to a second machine operator located at the west flat car that a train was approaching—a term typically used in the railroad industry for this signal is "hot rail."[4] The second machine operator called the other machine operator to inform him of the train approaching; however, the machine operator continued with the lift of two track panels from the far east end of the track panel stacks, because he thought that the train was approaching from the west. As the lift of the top two track panels was being attempted, the top track panel slid off of the second track panel and into the side of the first locomotive passing on the adjacent track.

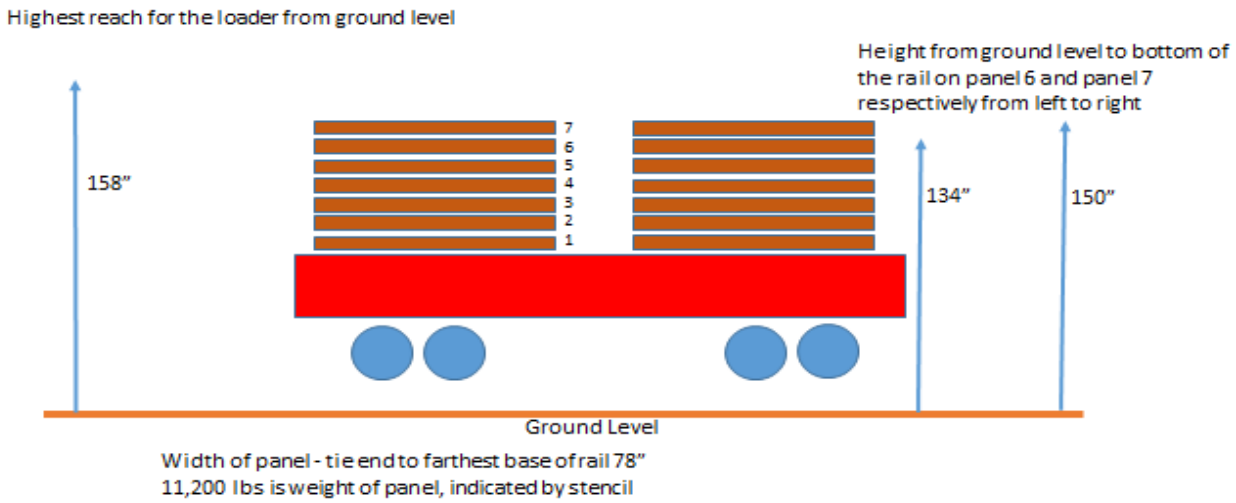

Figure 3. Diagram of east flat car loaded with two stacks of track panels. Diagram shows highest lift capability for front end loader and the measured lift height for the forks to grab two panels.

The ensuing 'domino effect' resulting from the first track panel contacting the locomotive, sent that track panel into other unsecured track panels and those track panels into other unsecured track panels. As the motion of track panel dislodging from the flat cars continued in a very rapid sequence, the foreman went to the ground near the west end of the west flat car. An eye witness to this sequence stated that upon landing on the ground the foreman appeared to be hurt, but in a matter of seconds, a track panel struck him at his location. Before anyone could react to aid the foreman, another track panel fell on top of the previous one with the foreman still under the first fallen track panel.

4 "Hot rail" is a term used to indicate an employee's verbal warning to others of the approach of a train or equipment.

Emergency Response:

The Hennepin County Emergency 911 Center received an emergency call at about 11:45 a.m. on May 25th, 2015, reporting a railroad accident involving a fatality, which occurred in the vicinity of railroad landmark Minneapolis Junction mile post 9.5 in Minneapolis, Minnesota.

The emergency resources dispatched to this incident included medical and ambulance services, as well as, a local police and fire department response. The Hennepin County Office of the Coroner sent a medical examiner to assess the accident.

Damages

BNSF determined the following costs associated with the accident:

- Locomotive = $ 3,817.00
- Track Panels = 27,456.00

$31,273.00

Figure 4. View of the south side of locomotive BNSF 2737 showing damaged hand rails.

Figure 5. A view of damage to the front end nose area of the lower hood of the BNSF 1896, the trailing locomotive.


Figure 6. This is a view of dislodged track panel and damage to front end of trailing locomotive BNSF 1896.

Figure 7. This is a view of dislodged track panels.

Injuries:

The maintenance of way employee was fatally injured as a result of track panels falling on him. No other employees were injured. On May 28, 2015, an autopsy on the fatally injured BNSF employee was conducted. According to the Hennepin County Medical Examiner's autopsy determined the cause of death to be multiple blunt force injuries and the manner of death was accident. There is no significant natural disease identified. According to the FAA Bioaeronautical Research Laboratory Toxicology report, no ethanol or tested-for-drugs were detected.[5]

Method of Operations

On this portion of the Midway Subdivision, including the location where the accident took place, the General Code of Operating Rules (GCOR), Seventh Edition [including BNSF amendments], effective April 1, 2015, were in effect. Train operations on the Midway Subdivision are also governed by the Twin Cities Timetable No. 5, in effect at 0800 Central Continental Time, Wednesday, August 22, 2012. The train dispatcher controls train traffic at control points, and automatic block signals are located between control points which provide block condition information to inform engineers. Railroad operations in the accident area are conducted on a single main track signaled in both directions. The tracks run roughly north and south, and BNSF designates this territory in the timetable as east-west.

5 The FAA Bioaeronautical Research Laboratory specimens are analyzed using immunoassay, chromatography, GC/MS, HPLC/MS, or GC/FTIR. Concentrations (ug/mL) at or above those in () can be determined for, but not limited to, the following drugs: amphetamines (0.010), opiates (0.010), marihuana (0.001), cocaine (0.020), phencyclidine (0.002), benzodiazepines (0.030), barbiturates (0.060), antidepressants (0.100), and antihistamines (0.020). Drugs and/or their metabolites, that are not impairing or abused, may be reported from the initial tests. See the CAMI Drug Information Web Site for additional information (http://jag.cami.jccbi.gov/toxicology/).

According to the train crew interviews, they stated they were operating on “Approach Medium.” Approach Medium means that the engineer can operate the train “Proceed prepared to pass next signal not exceeding 40 MPH and be prepared to enter diverging route at prescribed speed.” The authorized timetable speed for this area was 25 mph.

Mechanical and Equipment:

Investigators inspected and photographed the exterior of the 2 locomotive consist. Additional inspections were conducted on the locomotives and nothing remarkable was noted. No visual defects were found. Investigators inspected the locomotive windshields and no visual impairments were found. No exceptions were noted from the locomotive inspections.

Front Loader Equipment Inspection

The two front end loaders and fork attachments were visually inspected, operation control panel tested for functionality, and various measurements and notes were recorded. Measurements were also recorded of the flat cars loaded with track panels. (See diagrams and pictures below). Both of the front end loaders are model Caterpillar 966M. Specifications for the loaders were provided by BNSF. Inspections of the front end loaders included radio inspection and testing. Both radio units were Kenwood mobile radios mounted in the loader cabs. Both radios were found to be in working order. Programming software was current and within specifications. Radio tests between loaders and between loaders and dispatcher were successful. A review of adjacent radio relay tower for radio transmission, which is located 28 miles away, did not reveal any radio transmissions for channel 55, the channel commonly used by MOW.

Figure 8. This is a front and side view of the front end loader equipment used to off load the track panels.

On-scene Event Recorder Data/Download Review

Preliminary information from a review of the event recorder data indicates that the locomotives consist was moving at 13 mph just before the Hostler initiated an emergency brake application. Throttle was at idle. About 51seconds prior to the engineer initiated emergency brake application the hostler sounded the locomotive horn. Both the hostler and utility man stated that when they sounded the horn they also activated the locomotive bell and kept the bell ringing while they approached and began to pass the MOW personnel and location on the Old Main 2 Pocket track. The activation of the bell is not a parameter captured by the event recorder.

Track Description

BNSF's Midway Subdivision runs in a timetable east/west direction from Midway Yard and North Town Yard in Minneapolis, Minnesota vicinity. Amtrak trains operate over portions of the Midway Subdivision. The milepost numbering increases in the westward direction with MP 0.5 at Seventh Street to MP 11.4 at Control Point (CP) University. The Midway Subdivision consists of a single main track with an adjacent track (non-controlled) at the accident location on the south side of the main track. The track centers in the area of the accident are approximately 13 ½ feet[6]. Amtrak operates on the main tracks in the vicinity of the accident as FRA Class 2 with a maximum authorized timetable operating speed of 30 mph for passenger trains and 25 mph for freight.

The single main track is constructed with continuous welded rail (CWR) fastened to wood crossties with cut track spikes. The ballast section is composed of clean crushed stone ballast with full cribs and shoulders throughout.

Approximately 45 trains operate over this area daily, with Amtrak operating 2 passenger trains.

A post-accident visual examination of the track was conducted after the engineer had applied an emergency brake application. No track variances were detected.

On-scene Interviews:

Synopsis of Interviews

Investigators conducted ten interviews in St. Paul, MN beginning on May 26, 2015, through to May 28, 2015, while on-scene. The following are a synopsis of the interviews.

Hostler

The hostler on the striking train was hired by BNSF on April 28, 2008. On the day of the accident he went on duty at 6:30 a.m. His trip until the time of the accident was uneventful. He operated his train to Minneapolis Junction where he received an Approach-Medium signal. Moments later he saw the MOW gang, and did not see a flagman. He told investigators that he blew the train's whistle (at least 200 feet from the gang) and left the bell ringing for the entire

6 A scaled engineering drawing of the accident scene provided measurements.

time he operated the train slowly (10-15 mph) through the area where the work was being conducted. He saw one front end loader. He also observed a worker (foreman) kneeling on top of the track panels (stacked on a flat car). He saw the foreman respond to the sound of the train and made eye contact with him. He told investigators that he hadn't seen to many other things because his attention was primarily focused on the tracks ahead of him. As his train passed the workers, he felt and heard something strike it and (he believed that he) placed the train into emergency. After his train stopped he got on the radio and asked for medical responders. The utility employee/conductor exited the train and returned few minutes later and stated that the MOW workers he had spoken to indicated that they were all okay. About twenty minutes later a police officer arrived at the engine and informed him that someone was found "under the ties." He was later taken to a facility where he provided blood and urine specimens for post-accident toxicological testing.

The hostler was off duty on the two days prior to the accident. He told investigators that on the day of the accident he felt good and alert.

Utility Employee (UE)

The UE said he hired out with the BNSF April 2011, and said he has worked several different positions to include conductor, switchman, brakeman, pilot and UE. He said the day of the accident he was working as a UE or conductor of the train movement. He reported on duty on 5/25 at 06:30. He said that the day was uneventful up and until the accident.

The UE stated that he and the hostler had a conversation regarding the amount of work going on around the Midway Subdivision. The UE discussed seeing the flat cars loaded with track panels, and that he saw one front end loader and one man atop (and "crouched down") one of the stacks of track panels. The UE said the hostler sounded his horn and kept the bell ringing. As the lead locomotive began to pass the cars loaded with track panels the UE said he heard a "sound" and he felt a "jarring" of the locomotives. The Hostler put the locomotives into emergency braking and the UE announced EMERGENCY EMERGENCY EMERGENCY over radio channel 70. The UE then exited the cab of the lead locomotive and attempted to assess if there were any injuries to any MOW workers. The UE could not hear from the front of the locomotive, so the UE climbed off the locomotive and walked around the end some empty flat cars that were spotted with and coupled to the loaded track panel flat cars. The UE asked three people (MOW personnel) if they were okay – all three reportedly responded "yes".

The UE said that he met with his trainmaster and a local police officer. At that time the Hostler and UE were advised that there had indeed been a death as a result of the accident. The Hostler and UE were taken to Midway Yard, where they provided a statement and then went to Hennepin County Medical Center for FRA required blood and urine toxicological testing.

Machine Operator 1[7]

Machine Operator 1 (MO1) said he hired out with the BNSF as a maintenance-of-way laborer in May 2011. He said he has worked in several different truck driver and equipment

7 Machine operator 1 as used here is the same as Operator A used previously in this report.

operator positions. He said he is currently assigned to BNSF Construction Gang #08 as a Group 2 (Excavator) Machine Operator.

MO1 said during a job briefing, on the morning of Wednesday, May 20th; he asked the BNSF Foreman, if he could work on the up-coming weekend. He said the entire construction gang was present. He said that he and others volunteered for weekend work. He said he understood it to be work on Saturday through Monday, since Monday would be a Holiday. He said the foreman told him they would be working on their own construction projects over those three days.

MO1 said the five person crew met in the hotel lobby at about 8 a.m. and had a job briefing for the day's work. He said they discussed the need to use derails for protection with the cars they were to unload. He said they would be building a switch panel at Union Yard and unload some track panels from some rail cars at Minneapolis Junction. He said the work on the switch was completed. MO1 said he then loaded tools into the 550 truck and loaded forks for MO2. MO1 said he then fueled his loader on the way to Minneapolis Junction.

MO1 said he had a discussion with the other loader operator while they waited at the cars with track panels to be unloaded. He said they discussed what protection would be needed for unloading the track panels. He said they both agreed that the track protection in place was correct.

MO1 said after the track protection was set up and confirmed by the foreman, all five of them worked at removing the chains from the two rail cars that held four stacks of seven panels. He said they did not need track protection on the main track, located next to the cars to be unloaded, as it was greater than four feet away. He said after the chains were removed he got back into his loader cab and started to unload two panels as it was safer to handle two.

MO1 said his loader was positioned with the lift forks pointed toward the east stack of track panels. He said he then heard MO2 announced on the radio "hot rail". He said at that time, he saw a head light to the West and continued to unload panels not anticipating fouling the main track. He said he acknowledged the report of an approaching train but did not respond over the radio. MO1 said as the train approached he had already positioned his forks under the top two track panels on the east end of the east flat car of track panels. He said as he began to pick up the panels, the top panel began to slide off in the direction of the main track. He said he saw the panel slide away and that he may have hit it with his forks. He said the panel quickly came up after striking the locomotive and impacted the top of the second stack of panels. He said this impact caused these panels to also strike the third stack of panels. He said at that time he saw, a track panel fall onto someone. He said he then realized it was the foreman and backed up and got out of the machine.

MO1 said he had used his loader previously to move similar panels on ground. He said he had not unloaded rail panels off a flat car before. He said he had seen it done before and was sure he and the loader could handle two panels at a time. He had only seen one panel lifted off a rail car at a time with an excavator.

MO1 was asked if he had any comments for the interviewers at the conclusion. He said he did. He stated that better machine operator training was needed. He also said that fewer panels should be loaded on the flats so that visibility would be better while unloading. He also thought that using longer forks would make it safer to unload due to the ability to better view where the forks are meeting the panels while making the lift.

Machine Operator 2 (MO2)

MO2 said he hired out with the BNSF as a maintenance-of-way laborer in August, 2007. He said he has worked in several different, large maintenance gangs. He said he is currently assigned to BNSF Construction Gang #08 as a Group 2 Machine Operator.

MO2 said during a job briefing on the morning of Tuesday or Wednesday (May 19th or 20th) he was asked by the BNSF Project Manager if he would like to work on the up-coming weekend. He said the entire construction gang was present. He said that he and three others volunteered for weekend work. He said he understood it to be work on Sunday through Monday, since Monday would be a holiday. He said they were told it would be work with local track workers working on repairing FRA track defects. He said later on that week the foreman had changed his mind to go home over the weekend and decided to stay. He said the foreman told him he would be his Employee-In-Charge over the weekend. He said the foreman told him they would be working on their own construction projects over those three days instead of helping with the track defects.

MO2 said at about 8 a.m., the five person crew met in the hotel lobby and had a job briefing for the day's up-coming work. He said the briefing was short and to the point. He said they discussed the need to use derails for protection with the cars they were to unload. He said they would be building a switch panel at Union Yard and unload some track panels from some rail cars at Minneapolis Junction. He said the work on the switch was completed with no problems. He said he then fueled his loader on the way to Minneapolis Junction. He said the crew van followed him to Minneapolis Junction where they waited for the foreman to arrive and place derails on the track for protection.

MO2 said he had a discussion with the other loader operator (while they waited for the foreman at the cars with track panels to be un-loaded) about what protection would be needed for unloading the track panels. He said they both agreed that the track protection in place was correct and sufficient. He said they talked about adjacent track protection requirement only applied if they had on-track equipment, for which they were not using. Both agreed that this protection was not required.

MO2 said after the track protection was set up and confirmed by the foreman, all five of them worked at removing the chains from the two rail cars that held four stacks of seven panels each -- or 28 track panels. He said they did not need track protection on the main track located next to the cars to be unloaded as it was greater than four feet away, negating the requirement for track protection on that side while they worked there. He said after the chains were removed he got back into his loader cab.

MO2 said his loader was positioned with the lift forks pointed toward the west stack of track panels. He said he then noticed the foreman still on the top of the track panels on the west end of the west stack. He said he then noticed the other loader moving up to the east stack of track panels on the east car. He said that at that time, the foreman made a motion with a hand toward his hard hat, indicating an approaching train on the next track. He said he made a radio call to the other loader and reported "hot rail", indicating there was an approaching train. He said the other operator acknowledged the report of an approaching train over the radio. He said he then saw an approaching locomotive from the east.

MO2 said as the train approached, the other loader operator began to slide his forks under the top two track panels on the east end of the east flat car of track panels. He said as he began to pick up the panels, the top panel began to slide off the second panel in the direction of the main track. He said he saw the panel slide away toward the approaching train. He said he hoped it would not hit the locomotive, but the panel quickly came up after striking the locomotive and impacted the top of the second stack of panels. He said this impact caused these panels to strike the third stack of panels. He said at that time he saw the foreman either jump or was knocked off by the sudden movement of the track panels. He said the foreman landed on the ground next the second loaded flat car on the field side. He said he saw that the fall injured him, and before he could get to him to render aid, a track panel fell onto him. He said he prepared to go in and lift that panel off of him with his loader but a second panel then fell on top of first, causing a fatal injury to the foreman.

MO2 said he had used his loader to move similar panels before on the ground. He said he had not unloaded rail panels off a flat car before. He said he had seen it done before and was sure the loader could handle two panels at a time. He said he had not seen a loader unload two panels at a time. He had only seen one panel lifted off a rail car at a time. He said he did not see anything wrong with how the other operator operated his loader.

MO2 was asked if he had any comments for the interviewers at the conclusion. He said he did. He stated that the adjacent track protection rule is cloudy and hard to understand. He said something should be done to change this. He said that if they had done something wrong, as far as incorrect track protection was concerned, the entire railroad work force needs remedial training on this rule.

Welder

The welder hired in 2011, and he worked regional gangs around home. This would have been his third week on this gang because he recently bid on to the gang.

On May 25, 2015, the five BNSF employees started out at the hotel at 8:00 a.m. for their briefing. They briefed that they would finish a switch panel assembly and then unload switch panels. After finishing the switch assembly they talked about getting lunch but then decided to unload the panels.

MO2 headed to the panel location. MO2 and the construction gang laborer (CGL) were first to arrive. The welder rode with the foreman and followed MO1 over to the panel location. Upon arriving the foreman and welder put locks on the derails and checked the switches. After getting derails locked out, all 5 started taking the chains off the panels. Some were kind of rough but nothing they could not handle.

MO1 and MO2 then got into position. The welder then climbed down from the panels and headed to the pickup. It was then that he realized that the foreman was still on the panels. He then noticed that MO1 was sticking his forks under the panels to start the unloading process. The top panel slid to the ground then the train hit it, shoved it, and it was chaos. The welder thought that the foreman jumped but was not sure.

At this point the welder tried to call 911. He wanted to run over and help but the panels were still falling. MO1 was very upset. The welder was watching for the paramedics which got there pretty quickly. The welder met the paramedics and took them to the scene. The welder tried to comfort MO2 because MO2 was pretty upset.

At this time the local Roadmaster came out and was the first BNSF official on the scene. The firemen talked with MO2 about moving panels but MO2 wasn't up to that.

The rest of the gang then left the scene and went to the General Office Building (GOB) where they were drug and alcohol tested. While at the GOB they also gave a statement. They then went off duty after that and went to the hotel.

The week prior to this accident welder was asking around about working the weekend because he wasn't planning on going home. The foreman said he would be working so he could work with him. The welder thinks it was Wednesday that it was determined that they would be working. He thinks he asked the Roadmaster about working or he "imagined he did", he wasn't sure. Although he was sure that after talking with the Roadmaster he did speak with the foreman and the foreman said they would be working the weekend.

During the briefing on the morning of the accident they discussed the work for the day and that adjacent track protection would not be needed but protection on the track being worked would be needed.

Before starting the panel unloading no one took exception to the protection being used to unload the panels. Welder and the foreman were the ones who were on top of the cars unhooking the chains. MO1's loader was on the east end (stack A). Welder thought the foreman was on top between panel stacks C and D. Welder still did not know why the foreman was up on the panels, although there was no doubt the foreman was up there.

When the incident started the welder was by the truck and he did not know why the panel slid off the car towards the main track, hit the ground, and hit by the train. Welder said it looked like he foreman jumped off the car and then was covered by the panels. All this happened in a matter of seconds.

The welder was surprised that MO1 was unloading the panels and that the panel slid off so quickly.

The welder believed that all five of them were under the impression that since they were over four feet away they did not need protection to unchain the panels. With the Adjacent Track Rule they did not think they needed protection to unload the panels. Looking back he wished he would have told the foreman to get down from the panel.

He said that these five employees had worked Saturday, Sunday and then on Monday, the day of the accident. The welder said he had hung out with the foreman in Alva earlier in the year and that was part of the reason he bid to this gang. The welder believed that this is a professional gang on top of their game. During their safety briefing there were no questions and the welder felt the briefing was adequate. The welder had been through some training such as welding, leadership and gang startup. He did not know when his last Book of Rules (BOR) testing occurred. He did not attend this gang start up because he was not on the gang at that time. He said Roadway Worker Protection (RWP) is not covered but you learn RWP in the field, and he did not recall RWP being discussed. If it was covered in training, it was very brief and not thorough.

Construction Gang Laborer (CGL)

The CGL assigned to CG-08 (construction gang) began working for BNSF on May 7, 2007, as a laborer. In 2008 he was awarded a truck driver seniority date. At the beginning of this year he was awarded a position as a laborer on CG-08.

On the morning of May 25, 2015 he met with the other four Maintenance of Way employees involved in the incident in the hotel lobby for their job safety briefing. He stated that it was a typical "foreman briefing" also known as "short and sweet". He stated that the work plan for the day consisted of building the tail end of a switch off-track, and then unload track panels off the flat cars. He said they determined that they would not get within four feet of the main track so no form of protection (On-Track Safety) would be required for their work.

The job working on the yard switch was off-track and no tracks were near, so they built the switch without needing to establish track protection. After the work the loaders left and the CGL drove the van to the location and waited for the foreman to arrive. Once the foreman arrived and placed derails on the industry track (on which the track panel flat cars were spotted), the entire group went to work removing the chains from the panels. Some of the crew climbed on top of the panels to unhook the top of the chains while others worked on undoing the chains on the bottom end. He stated that he and the foreman climbed up on top of the panels.

Once the chains were off, he saw MO1 and MO2 get into the front-end loaders. He said that he walked toward the van since his work was done, and that the foreman remained on top of the panels on the cars on the west car. He said he recalled hearing the foreman yell 'hot rail' and then heard a crash. He said one of the MO's ran over to the pile of panels on the ground. The CGL walked over to the pile, and could see that their foreman was gone.

He said that one of the MO's and the welder called 911. The CGL stated that he talked to the emergency medical service and told them that it was probably too late. He stated that the police showed up next and then they were kept away from the scene. After, he stated the remaining four employees went over to the BNSF General Office Building and submitted to a breathalyzer and a urinalysis drug test. After he said they all provided written statements to BNSF and they all left for the hotel.

Upon further questioning, the CGL clarified that he climbed on top of the cars to unhook the top end of the chains and that he was never on the ground in between the main track and the cars being unloaded.

He stated that all five in the group worked together on that Saturday, Sunday, and Monday. He said that almost every week the Roadmaster asks for volunteers to stay to work. He stated he works a lot of weekends for the overtime. The CGL said that the day of the incident that he felt good and was not fatigued. He said that the Saturday and Sunday preceding the incident were light days. Prior to bidding on CG-08, the CGL stated he had worked with the foreman and one of the MO's, but not the other two in the group.

He recalled in the job briefing that someone asked about on-track protection needed for the work and that the foreman said it was a yard track so derails would be all that was needed if they stay away from the main track.

He said they always have a briefing, though when they got to where the cars were, he had a conversation with one of the MO's about whether or not main track protection would be needed. He said that the Machine Operator told him that it was not needed because of the four foot rule. No further briefing took place prior to commencing the work of unchaining and unloading the track panels.

The CGL stated that the foreman always liked to stand on top of panels whenever they build or worked with them. He guessed that the foreman likely wanted to stand on top to keep a better view of the unloading process and that there would have been no other reason for the foreman to be up there. He said the foreman always liked to walk on the ties and panels, even when out of track, instead of walking on the dirt. He stated that he had never unloaded track panels with this foreman but didn't see any harm in him staying up top during the unloading.
He said that all of the guys on CG-08 seemed to get along well and that all of them were good workers and no one was a slouch.

The typical briefing that the foreman gave was short and sweet according to the CGL; however, when they were in a large group the assistant foreman or the roadmaster would jump in to add to it. He stated no one has taken exception to the foreman's briefings.

The CGL stated that they did not hear the bell or whistle from the approaching train. He said that he knows exactly what it sounds like when combined with the sound of an engine and that if the locomotives involved had sounded either, he would have heard it. He said the only train sounds he heard was a train horn far off in the distance.

He stated that at gang start-ups, they have a solid week in a conference room to do the rules training; respirator fit test, hearing van, and other items. He said he's worked his entire career with BNSF on the production gangs and that it is usually just one day for the Book of Rules training.

The CGL stated that he believed the Adjacent Track Protection rule was very confusing. He said there were too many pieces and that it should be more explanatory. He believes that revisiting the rule could possibly have prevented the incident.

D**irector Engineering Safety (DES)**

The DES said he started with the BNSF as a maintenance-of-way trackman in January, 1981. In 1995, he said he was promoted to assistant road master. He worked in a number of middle management positions until 2012 when he was promoted to the system position of DES. He said his current responsibilities include oversight of the BNSF safety program incentives for the engineering team. He said he was also the facilitator for the BNSF SACP program and the facilitator for the BNSF Safety Advisory Committee.

The DES said spends about 70% of his time in the field and about 30% of his time in the office. He said he tries to spend his field time equally between all the BNSF divisions. He said he has 56 non-exempt safety assistants throughout the system. He said these people instruct other non-exempt employees on safety related subjects. He said rules instructors report to the Director of Rules, not to him. He said he meets with these safety assistants once a quarter for a week period. He said he tries to drop in on local job briefings whenever possible.

The DES said the rules covering Adjacent Track Protection have been distributed and taught to BNSF employees through On-Track Safety and Roadway Worker classes taught by the safety assistants in a course called Safety Certification. He said this was done over the last eight or nine years. He said now all the Roadway Worker Safety courses are instructed by BNSF Rules Department instructors. He said this course is now a one day course with a 30 question quiz at the end. He said records of these courses are maintained by the Director of Rules and can be made available for this investigation's purposes.

The DES said BNSF Engineering Department Supervisors conduct operation testing of BNSF employees. He said supervisors receive training with operations testing program. He said each engineering employee is tested at least once every 180 days. He said the results of these tests are entered into a data base for analysis and reference. We said BNSF will provide operation test results for the five individuals, involved in this accident, over the last 12 months. He said with this operation testing program the RR is trying to create an environment of coaching. He said with the first failure, an employee receives counseling from the testing manager. He said subsequent failures can lead to gain points, or 'marks', against the individual that could lead to future discipline and/or additional testing and counseling. He said in the year 2014, there were more than 1.3 million tests recorded over the BNSF system, with less than 2% of them recorded as failures.

The DES was asked what his understanding of the BNSF adjacent track protection was. He said BNSF Maintenance of Way Operating Rule 12.1.2 contained the following determining requirements; the location, if it is a controlled track, method of operation, track centers of 19 feet from main track, and what kind of work is to be performed. He said if Form 'B' protection is used, it must be 'called in' prior to 12 to 14 hours before its start time. He said Track and Time can be used for protection when one employee copies the track and time, another employee or employees verifies the track and time. He said if the track is less than 19 feet from a CTC track, adjacent track protection must be in place. He said an employee must be conversant with how the work is to be done to be sure if adjacent track protection is needed. He said the RR wants positive protection on the main track if material or equipment is going to foul the main track.

The DES said in May 2014, there was a change to the adjacent track protection requirements. He said before the change was implemented, trainers trained the managers then trained the employees in regards to the new requirements. He said this was accomplished by July 2014. He said he was not aware of any miss-understandings about the changes. He said he was aware there were questions about the rule changes, but these questions were handled by the rules examiners. He said there was some safety alerts and briefings issued in regards to these rule changes to help clear up any miss-understandings. He said he will provide copies of these safety advisories for the investigation.

The DES said employees receive a 30 day training period on new equipment. He said they are then evaluated by a roadmaster or an experienced machine operator before he becomes qualified for the machine operation. He said he wasn't sure how this training was documented. He said BNSF will provide this documentation for the investigation.

The DES was asked if he had any comments for the interviewers at the conclusion. He said he did. He said he was aware there are difficulties with the evolution of the changes with adjacent track protection. He said if a scenario such as the one involved in this accident were used as a training adjunct, it would save lives. He said he wished someone involved in the accident would have backed off and said something before it happened. He stated he had no more comments.

Division Roadmaster (DR)

On May 28, 2015, the BNSF Railway (BNSF) Northtown Roadmaster was interviewed in connection with an incident which resulted in a Maintenance of Way employee becoming fatally injured. The DR started his career with BNSF in May of 2007 in Springfield, MO, as a section man. In May 2011, he was promoted to Assistant Roadmaster and the following June was promoted to Roadmaster in Flagstaff, Arizona. In July 2013, he relocated to the North Town Roadmaster position in Minneapolis, Minnesota.

On Monday May 25, 2015, the DR stated he was working in his office in Minneapolis when he received a service interruption email about an incident close to his location so he went over. As he departed his office, the Maintenance of Way call-out desk called and stated that a locomotive hit some ties that hit a pedestrian on the Midway subdivision.

He said he called the division engineer and was informed that the initial report was incorrect and that the locomotives struck track panels and had fatally injured an employee.

The DR stated that when he arrived on the scene those emergency responders, the fire department and several police were already present. He briefed with the four employees and asked about their condition. After the employees were done with questions from the emergency responders, the DR had them go to the vans to be away from the scene. He then obtained main track authority for the limits of the accident.

The DR worked with the medical examiner and the other emergency responders to come up with a plan to remove the body. The DR utilized one of the front-end loaders located at the site and removed two track panels and supported another to prevent it from falling while the group was working. He stated that after the panels were removed additional BNSF personnel started to arrive on scene.

He stated that when he showed up that there was a derail with a Maintenance of Way lock placed on the industry track to the east of the cars and to the west of the cars the switch was lined against movement toward the cars and locked with a Maintenance of Way lock.

The DR stated that he had tried to let as many people as possible have the weekend off, however, there was a derailment in the bowl tracks and he had called seven people in to make repairs.

When it comes to planned work on the weekends the Roadmaster said he always calls out for volunteers on his morning conference call and will accept volunteers based on seniority first. He said he will cover what the work entails and what positions are needed at a minimum to complete the work. When not enough volunteers raise their hands, he will ask for the others off of the adjacent Roadmasters' territories.

The DR said he is on the maintenance end of the engineering world. He said that there are also the construction and production crews that operate under a different management structure to complete specific tasks and travel around the system. The construction crew CG-08 working the Midway Subdivision is one of these gangs. He said that this construction crew has two Roadmasters for the project and one is a construction Roadmaster that directly oversees the project's forces and 20 plus people. One of them will oversee and coordinate the project on the division's behalf.

On the division maintenance end, the roadmaster has a set territory and will be on call for weekend and holiday duties. He said that all of the groups work hand in hand.

The DR stated that the five employees working on the 25th were all assigned to the construction crew. The DR said he is roughly familiar with where all of the construction work is taking place, even though it is on the adjacent Roadmaster's territory. He said that the major work was something discussed on the maintenance planning calls so he was aware of the major work blocks. He said that he will converse with people on the project but general doesn't get informed of all the details. He said he's sometimes notified of specific weekend work, but

usually it is only if they need help. He stated that the division forces assist the production crews, and then sometimes the production crews will assist the division, but it is not routine.

The DR stated that one of his main jobs is Safety. He said that he shares the morning conference call with the adjacent roadmaster. On the call, he said they cover exposure based briefings, looking at the risk exposures from little to big – e.g. pinch points, lockout/tag-out, ascending descending, climatic impacts, etc. He said they ask open ended questions to draw in the group in the discussion. He stated they discuss the day's work and some of the future plans as well as allowing all to air their concerns to help mitigate the risk.

The DR stated they have a no drive-by policy in which they stop and talk with the work groups and get involved.

The DR stated they do not do operations testing on the quality of job safety briefings. He said they can fail an employee for not conducting one, but they do not have a way to document that they have observed a good briefing. He said that there are specific test numbers for various operations tests they can conduct and none of them are specifically for job safety briefings. He said they previously used a job safety briefing book to document the briefings, but that became more of a check box rather than an open dialogue. He said the Approaching Others (AO) training seems to be a more effective. He said some divisions use a briefing book, but not everyone is required to fill it out and that each division may have their own.

The DR stated that when he arrived on the accident scene that there was no main track protection in place.

He said that when weekend work is assign a short discussion may be had with the employee in charge about safety, but primarily the employees on site are tasked with determining what is required.

The DR said that he was unaware that the construction crew was out working that day, but was not surprised to find out that the crew was working without him having been informed. He said that his crews have unloaded panels a number of times with a similar type loader in a similar fashion as were done by the crew on the 25th. If he assigns the task to a person to unload the panels, he already knows that individual and whether or not they are up to the task. If it is a new person, generally it will be up to the employee to verbalize what they are comfortable with or not. The DR said that he is less concerned with a new employee trying to do a new thing on a machine than he is making sure that whoever it is doing the task is doing it right. If doing something for the first time, it definitely falls under hazard recognition.

To prevent a recurrence of a similar issue, the DR suggested having better communication around all of the planned work for the weekend between those assigned the work and the Roadmaster on duty.

Construction Gang Roadmaster (CGR)

CG Roadmaster said he hired out with the BNSF on March of 2014 as Experienced Front Line Supervisor (EFLS). He said he has worked as Assistant Roadmaster on the Nebraska Division. He said he is currently assigned as BNSF Construction Gang (CG) #08 as a Roadmaster supervisor three months ago.

CGR said during a job briefing, on the morning of Wednesday, May 20th; he had asked the BNSF foreman and CG-08 work group for volunteers to work the up-coming weekend. He said that he had volunteers for weekend work. He said he understood it to be work on Saturday and Sunday, since Monday would be a holiday he expected them not to conduct work. He told the foreman they would be working on their own construction projects or also assisting division personnel in correcting Federal Railroad Administration (FRA) items.

CGR stated he has worked with the foreman (the deceased) for three months and just arrived in the Minneapolis area last week finishing planned work left behind at a previous job. He stated the foreman briefed with Division Construction Roadmasters to get started. He stated the foreman was a strong willed leader and required very little guidance. CGR also stated the foreman was soft spoken and didn't engage with employees keeping discussions short and to the point. CGR also stated he was working to assist the foreman with Job Safety Briefing (JSB) supplying print outs, visuals, and re-enforcing exposures, pinch points and re briefings to include protection.

CGR stated when arriving on Monday the 25th in the evening to the incident site, he believed the main track protection should have been in place and the potential to foul main track was evident. He also stated he believed the panels could have waited as there where many on site already and they must have wanted to empty and release the flat cars. He also stated they shouldn't have been attempting to remove two panels at a time and the Foreman should not have been on top of the cars during this process. He also stated the operators where more than qualified on the equipment and that he believed that was not a concern.

Director of Engineering Services (DRES)

The DRES stated that he was hired in 2003 as an intern and in 2004 he went to a Management Trainee position then worked his way to this position as Director of Engineering Services. The DRES's primary duties and responsibilities are the safety of those working in the construction side of the engineering department for BNSF. He manages and schedules all of the construction projects system wide on BNSF. Currently the biggest project is one of increased capacity for rail traffic or the building of additional main tracks to accommodate more trains.

He has 310 scheduled employees under his chain of command. In his organizational structure the DRES has two Division Engineers, five ADMP's, a Manager of Roadway Planning and 31 Supervisors that also work under his chain of command.

The DRES stated that some of the challenges he sees to safety are the following: new gangs, new equipment, new tools, challenges organizing everything, trying to keep consistency between all the gangs because there are 31 supervisors working different positions this year when there were only 16 last year. He said that the increase in the amount of supervisors is comforting knowing there will be multiple supervisors per project verses the supervisory ratio as it was lower last year. He is very confident they have the appropriate number of supervisors for the jobs.

He spends 80% of his time in the field and 20% of his time in the office. The DRES said the construction gangs operate similar to other production system gangs except that they shut down production one day a month for a mandatory safety briefing. They also do startup meetings similar to RSG's (Regional System Gangs).

The DRES stated that BNSF has introduced a safety technique known as Approaching Others (AO) and in that way is trying to break down barriers for employees to approach anybody else who works for BNSF to bring up a discussion about possible unsafe conditions or actions of another employee. He thought that job briefings on a construction system gang may look different than a division briefing due to the larger number of employees attending. He said that one additional training technique the construction side uses is that they bring up a picture of a job site and have the employees pick out hazards.

The DRES stated that he makes sure he attends job briefings and makes supervisors under him do the same so that they can assess that the gangs are getting quality job briefings. He did say that obviously there is not a manager every day at all of the briefings. BNSF relies on the construction roadmasters to insure the briefings are adequate.

Regarding monitoring safety, the DES stated that supervisors are required to do 25 OP's (Operations Tests) a month. Managers have no set number but they and the supervisors have the expectation to be on a group audit team at least once a month.

The windows[8] they typically get are 7-10 hours. The DRES recalled that the weekend before this one (the three day holiday weekend) some of the construction gangs had a 48 hour window in Joliet, Illinois. If there is a work window established, there has to be a supervisor on the scene. However when there is no window established, the supervisor is at least supposed to be in verbal contact for weekend work.

He said he has not had a direct conversation with the supervisors requiring them to talk about on track safety/protection for work when no supervisor will be present. When asked to comment about job briefings he stated the following:

8 The term "window(s)" in the railroad construction environment means the coordination between the engineering department and operational department of the railroad to secure both the outages for no train operations for a set time frame and distance to accommodate their work.

> "We have enough bandwidth in terms of supervisors to get the message across but it is something we're constantly working on, constantly improving. I would not at all sit here and say that we are 100 percent of the time doing perfect job briefings. I'd say we definitely have a lot of room to improve, but we are -- I see better briefings nearly every time I'm out there."

The DRES estimated that 80% percent of the construction gangs work is off track and some of that would require adjacent track protection such as Form B's which is most common to use for protection for adjacent track protection when the construction gangs actually install material (i.e. switch(s) into live track settings.

Regarding adjacent track protection requirements or compliance, the DRES thought that from discussions with his employees that the construction management and supervisors will be discussing adjacent track protection and its interpretations with the construction employees and that they are going to provide more training. According to the DRES, he and his subordinates feel there is more clarification needed adjacent track protection and when and how to use it and that they are going to address this. He agreed that the first step was the safety alert sent out earlier this week.

Subsequent to the on-scene interviews, investigators interviewed two BNSF officials on two separate occasions via telephone.

Interview of the BNSF Director of Engineering Training Services

On July 22, 2015, the BNSF Director of Engineering Training Services (DETS) was interviewed by representatives from the NTSB, FRA, BNSF and the Brotherhood of Maintenance of Way Employees (BMWE). The DETS said that he had been employed by BNSF for 24 years, beginning in the maintenance of way (MOW) department where he held various positions. In 1998 he began temporary assignments prior to becoming the MOW manager of field training. In 2002 he was promoted to manager field safety, and in 2005 to terminal train master. At that point he returned to engineering where he became a roadmaster until 2008 whereupon he was promoted to manager roadway planning. In 2010 he was promoted to assistant director of maintenance production, He has held the current position of DETS since 2013. In this position he stated he leads a team of about 40 managers and supervisors that deliver technical, safety and rules training for all engineering employees. These include employees who work in the track, structures, signal telecommunications and roadway equipment departments. He indicated that his primary responsibility is to ensure that his team meets BNSF's engineering technical training requirements.

The DETS outlined the safety vision at BNSF, which is that every accident or injury was preventable and that they will operate free of accidents and injuries. He said that BNSF has three specific strategic initiatives that were focused when providing training: effectiveness, accountability and usability. He added that the right training was provided at the right time. The DETS continued that training procedures and programs were part of the risk reduction program, also known as layers of safety, which was introduced when the company launched Approaching Others (AO) training. Consideration was given to risk exposure that employees received on AO

when training was designed. He said that the goal of training was to identify rules and procedures that reinforced safety overlays so that employees could identify risk and mitigate exposure to safely accomplish tasks. However, investigators learned the BNSF's AO program and its training is voluntary.

The DETS said that the training audience at BNSF was about 12,500 employees. He added 10 managers of field training that provide rules instruction. Information is provided about MOW training, including the requalification process for MOW employees.

The DETS said that in 2014 and in response to FRA's implementation of the adjacent controlled track regulation, the BNSF created a document that addressed adjacent controlled tracks that was part of the training program. He added that AO is embedded in that training for 2015.

Regarding delivery of training, the DETS stated that as BNSF continues to improve the quality of training, there was a shift from a lecture oriented, rules on a screen approach to a more scenario based approach. The objective is to engage employees by a blend of training approaches.

The DETS provided additional information about AO. He said that it consisted of five components: line of fire, pinch points, walking/path of travel, ascending/descending and lifesaving processes. The DETS was asked whether there was a specific training module that addressed hazard identification and risk mitigation, to which he responded it [the training module], was embedded in AO. Specifically, he said detailed scenarios and videos were presented to employees whereby they were subjected to exposures and then made decisions about risk analysis and what processes to put in place to be able to perform their tasks. He also said that checklists are not used because specific items aren't exhaustive, and that the objective was to have employees be more global thinking and identify situations and apply the proper rules to accomplish the task.

The DETS said that while the BNSF had no data collected on how often AO was invoked in the field; it was evident that employees were embracing the concept. He added, "BNSF has had a phenomenal turnaround in safety culture and safety performance and I think that's evident in the training programs that we have, especially Approaching Others." When asked if contractors had received AO, the DETS said that contractors are not qualified by BNSF and do not receive AO training.

The DETS said that the training process is treated respectfully and that attention is paid to indicators, items are tracked and that relies on employee feedback.

With respect to the circumstances surrounding the accident, the DETS was questioned as to whether those employees had received peer-to-peer training. He responded, "Most likely." "It would have probably been Approaching Others." He added that those training records were maintained locally, and that they were not in his learning management system. He further stated that AO was managed by the safety department.

The DETS said that job briefings reinforce the need to recognize hazards and mitigate them. He provide an example of a situation where two operators were present whereby one was more experienced but not available, and thus a need to use the junior employee. In that case there may be a need to use additional safety overlays. He concluded by saying, "That's all part of the risk analysis that we talk to our employees about."

Interview of the BNSF Director of Rules and Field Support

On July 1, 2015, the BNSF Director of Rules and Field Support (DRFS) was telephonically interviewed by representatives from the NTSB, FRA, BNSF and the BMWE. The DRFS said that he had been in the railroad industry since 1979. He initially began his career as a brakeman/conductor/switchman, train dispatcher, and transportation trainmaster. He then moved into the operating rules department, and then was promoted to his current position of DRFS. In his current position he said he was responsible for the maintenance of rule books, timetables and special instruction, with primary responsibility for MOW rules.

When questioned about the accident, the DRFS stated that the focus should be about the quality of job briefings and a need for a thorough risk assessment. He proceeded to say that through training interactions, BNSF emphasizes that while the four foot imaginary line where authority or protection is needed, what is also needed is consideration of the level of experience (of employees), the type of activity that is occurring, the type of material being handled, and the activity of the equipment itself and how it may move into a position where it would encroach beyond [that] four foot line. The DRFS then discussed the term "proximity," and explained the BNSF borrowed the term from the regulation for fouling track. He said that the current definition of proximity might be construed by employees who "…may not be as mindful as we would like in the discussions about probablility….as we may wish." Therefore, he explained that the definition had been expanded to help instill that concept.

The DRFS stated that he could address training at a high level, but that he was not directly involved in the training itself. He was then asked two specific questions. The first question was if MOW employees at BNSF are taught or trained in the specific principles of hazard recognition and risk management, to which he responded yes. The second question was if AO essentially was peer-to-peer, to which he responded he was not prepared to answer the question. He was questioned as to what risk assessment and hazard recognition training consisted of, to which he responded that as part of AO, discussion occurred about auditing the work and determining the need for authority or protection. When discussing conditions pertaining to adjacent controlled track, the DRFS stated, "However, the issue at hand, again, is the potential or probability of fouling a track and the need for authority or protection to be in place to prevent that or protect against that condition." He added that BNSF attempted to instill in employees that each time the work changed, there should be a re-brief on conditions to ensure a clear understanding of the work to be performed.

The DRFS stated that the BNSF encourages different crafts to interact, but that each had different rules that ensured they had the knowledge necessary to perform their jobs. He added that some risk assessment must occur regardless of whether there was a single or multiple tracks.

Returning to AO, the DRFS stated that it encouraged employees to openly interact with one another in a respectful fashion about safety concerns, risks and exposures. When asked about moving ahead after the accident, he said that the BNSF would like to see employees taking the quality of job briefings seriously and giving consideration to the probability and proximity that could result in fouling track. He added that he hoped that risk assessment will occur in job briefings. When asked if BNSF considered risk assessment to be a formalized procedure that could be trained and measured and that an FRA inspector could observe, the BNSF Director of Safety responded that that could be attacked in two ways, those being a formal job safety briefing and AO.

Post Accident Testing and Research

Postaccident toxicological testing

Pursuant to 49 Code of Federal Regulations (CFR) 219, Subpart C, Post-Accident Toxicological Testing, toxicological specimens were obtained under FRA authority from the crew (hostler and utility person) of the train passing on the track adjacent to the maintenance-of-way crew at the time of the accident as well as the deceased foreman. Substances screened for included cannabinoids, cocaine, opiates, amphetamines, MDMA/MDA, methadone, phencyclidine, barbiturates, benzodiazepines, brompheniramine, chlorphenirmine, diphenhydramine, doxylamine, pheniramine, tramadol and ethyl alcohol. The results were negative for the crewmembers and the foreman for the presence of alcohol and the aforementioned drugs.

Additionally the BNSF elected to conduct reasonable suspicion/cause testing of the other employees present at the time of the accident. These included machine operators one and two, the welder and the laborer. Substances screened for included amphetamines, barbiturates, benzodiazepines, cocaine and marijuana metabolites, methadone, methaqualone, MDA-analogues, opiates, 6-acetylmorphine, oxycodones, opiates, phencyclidine and propoxyphene. The results were negative for all of the employees tested for the presence of the aforementioned drugs.

Finally, at the request of the NTSB, specimens from the deceased foreman underwent independent toxicological testing at the Civil Aerospace Medical Institute (CAMI). Substances screened for included amphetamines, opiates, marijuana, cocaine, phencyclidine, benzodiazepines, barbiturates, antidepressants and antihistamines. No drugs were detected in the liver, and no ethanol was detected in the brain or muscle.

Personal Electronic Device and Mobile Phone Records:

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the personal electronic device of the deceased employee. Additionally, in response to a subpoena, the mobile phone service provider forwarded mobile phone records. Mobile phone records typically provide date, time, duration, direction, and source/destination information for calls, text messages, multimedia messaging, and data usage.[9]

Upon arrival at the NTSB Vehicle Recorder Division, an exterior examination revealed the Motorola Droid had not sustained any damage. The device started normally and it was observed the cellular and data communications capabilities were enabled.[10] The device was placed into Airplane Mode as part of the investigative process, but since the device was password protected, the efforts to access the data were not successful. When the device was taken out of airplane mode, approximately 20 audible and lock screen notifications were observed, however, the password was not successfully bypassed. Other than the startup status and notifications, no data was retrieved from the device.

Mobile phone activities on May 25, 2015, were examined. All call activity on May 25, 2015, were inbound calls and started at 1:41 pm CDT. All calls prior to 4:07 p.m. CDT went directly to voicemail; however, one 30-second call at 4:07 p.m. was answered.

There was one incoming text message at 2:35 a.m. CDT. All other text message activity was incoming. Incoming text messages between 10:56 a.m. and 12:42 p.m. CDT were deferred delivery until 12:53 p.m. CDT. Incoming text messages between 1:10 p.m. and7:21 p.m. CDT were immediately delivered. There was no multimedia message history on May 25, 2015.

Data usage on May 25, 2015, is shown in the table below. Activity around the time of the accident is highlighted with an asterisk; all data time stamps are CDT and occurred on May 25th, except the last data entry.

9 Mobile phone call and text message records were provided in CDT by the mobile phone operator. Data usage activity was provided in Greenwich Meant Time (GMT) and converted to CDT for this report.

10 Cellular and data communications capabilities may be disabled by putting a mobile phone in "Airplane Mode."

Data Start Time	Data End Time
0:30 a.m.	1:07 a.m.
0:30 a.m.	1:35 a.m.
0:30 a.m.	1:37 a.m.
0:30 a.m.	1:05 a.m.
0:34 a.m.	1:05 a.m.
0:34 a.m.	1:06 a.m.
0:34 a.m.	1:35 a.m.
*10:35 a.m.	12:56 p.m.
*10:35 a.m.	11:45 a.m.
*10:36 a.m.	11:47 a.m.
*10:36 a.m.	11:47 a.m.
*10:36 a.m.	11:25 a.m.
*10:42 a.m.	11:13 a.m.
*10:42 a.m.	11:16 a.m.
*10:43 a.m.	11:50 a.m.
*10:43 a.m.	11:47 a.m.
2:01 p.m.	3:27 p.m.
2:02 p.m.	2:32 p.m.
2:02 p.m.	2:02 p.m.
2:04 p.m.	2:10 p.m.
2:05 p.m.	2:05 p.m.
2:05 p.m.	2:10 p.m.
2:10 p.m.	6:23 a.m. 5/26/15

*Denotes incoming text activity, those texts were deferred delivery until 12:53 p.m.

FRA Regulatory Language:

FRA Part 214 Subpart B, subsection 214.336, states, in part, the following regulatory language pertaining to on-track protection and the requirements for adjacent track protection:

> **§214.336 On-track safety procedures for certain roadway work groups and adjacent tracks.**
>
> (a) *Procedures; general.* (1) *General rule.* Except as provided in paragraph (e) of this section, on-track safety is required for each adjacent controlled track when a roadway work group with at least one of the roadway workers on the ground is engaged in a common task with on-track, self-propelled equipment or coupled equipment on an occupied track. The required on-track safety shall be established through §214.319 (Working limits, generally) or §214.329 (Train approach warning provided by watchmen/lookouts) and as more specifically described in this section.

(3) *Definitions.* As used in this section—

Adjacent controlled track means a controlled track whose track center is spaced 19 feet or less from the track center of the occupied track.

Adjacent track means a controlled or non-controlled track whose track center is spaced less than 25 feet from the track center of the occupied track.

Inter-track barrier means a continuous barrier of a permanent or semi-permanent nature that spans the entire work area, that is at least four feet in height, and that is of sufficient strength to prevent a roadway worker from fouling the adjacent track.

Minor correction means one or more repairs of a minor nature, including, but not limited to, welding, spiking, anchoring, hand tamping, and joint bolt replacement, that are accomplished with hand tools or handheld, hand-supported, or hand-guided power tools. The term does not include machine spiking, machine tamping, or any similarly distracting repair.

Occupied track means a track on which on-track, self-propelled equipment or coupled equipment is authorized or permitted to be located while engaged in a common task with a roadway work group with at least one of the roadway workers on the ground.

(b) *Procedures for adjacent-controlled-track movements over 25 mph (or over 40 mph if passenger movements).* If a train or other on-track equipment is authorized to move on an adjacent controlled track at a speed greater than 25 mph, or at a speed greater than 40 mph for a passenger train or other passenger on-track equipment movement, each roadway worker in the roadway work group that is affected by such movement must comply with the following procedures:

(1) *Ceasing work and occupying a predetermined place of safety.* Except for the work activities as described in paragraph (e) of this section, each affected roadway worker shall, as described in Table 1 of this section, cease all on-ground work and equipment movement that is being performed on or between the rails of the occupied track or on one or both sides of the occupied track, and occupy a predetermined place of safety upon receiving either a watchman/lookout warning or, alternatively, a notification that the roadway worker in charge intends to permit one or more train or other on-track equipment movements through the working limits on the adjacent controlled track.

(a) If on-track safety through train approach warning (§214.329) has been established on the adjacent controlled track; or

(b) After the roadway worker in charge has communicated with a member of the train crew or the on-track equipment operator and established that further movements of such train or other on-track equipment shall be made only as permitted by the roadway worker in charge.

(c) *Procedures for adjacent-controlled-track movements 25 mph or less (or 40 mph or less if passenger movements).* If a train or other on-track equipment is authorized or permitted to move on an adjacent controlled track at a speed of 25 mph or less, or at a speed of 40 mph or less for a passenger train or other passenger on-track equipment movement, each roadway worker in the roadway work group that is affected by such movement must comply with the procedures listed in paragraph (b) of this section, except that equipment movement on the rails of the occupied track and on-ground work performed exclusively between the rails (*i.e.*, not breaking the plane of the rails) of the occupied track may continue, provided that no on-ground work is performed within the areas 25 feet in front of and 25 feet behind any on-track, self-propelled equipment or coupled equipment permitted to move on the occupied track.

(d) *Discretion of roadway worker in charge.* Nothing in this subpart prohibits the roadway worker in charge from establishing on-track safety on one or more adjacent tracks as he or she deems necessary consistent with both the purpose and requirements of this subpart.

(e) *Exceptions to certain requirements for adjacent-controlled-track on-track safety.* No on-track safety (other than that required by paragraph (f) of this section or provided under paragraph (d) of this section) is required by paragraphs (a) through (c) of this section for an adjacent controlled track during the times that the roadway work group is exclusively performing one or more of the following work activities:

(1) *On-ground work performed on a side of the occupied track meeting specified condition(s).* A roadway work group with all of its on-ground roadway workers (other than those performing work in accordance with another exception in paragraph (e) of this section) performing work while exclusively positioned on a side of the occupied track as follows and as further specified in Table 1 of this section:

(i) The side with no adjacent track;

(ii) The side with one or more adjacent tracks, the closest of which has working limits on it and no movements permitted within such working limits by the roadway worker in charge; or

(iii) The side with one or more adjacent tracks, provided that that it has an inter-track barrier between the occupied track and the closest adjacent track on that side.

(2) *Maintenance or repairs performed either alongside, or within the perimeter of, a roadway maintenance machine or coupled equipment on the occupied track.*

(i) One or more roadway workers performing maintenance or repairs alongside a roadway maintenance machine or coupled equipment, provided that such machine or equipment would effectively prevent the worker from fouling the adjacent controlled track on the other side of such equipment, and that such maintenance or repairs are performed while positioned on a side of the occupied track as described in paragraph (e)(1)(i), (ii), or (iii) and Table 1 of this section.

(ii) One or more roadway workers on or under a roadway maintenance machine or coupled equipment performing maintenance or repairs within the perimeter of the machine or equipment, provided that no part of their person breaks the plane of the rail of the occupied track except when toward one of the sides of the occupied track as described in paragraph (e)(1)(i), (ii), or (iii) and Table 1 of this section. A boom or other equipment extending beyond the body of a roadway maintenance machine or coupled equipment toward an adjacent controlled track is not considered to be within the perimeter of the machine or coupled equipment.

(f) *Procedures for components of roadway maintenance machines fouling an adjacent controlled track.* Except as provided for in §214.341(c), a component of a roadway maintenance machine shall not foul an adjacent controlled track unless working limits have been established on the adjacent-controlled-track and there are no movements permitted within the working limits by the roadway worker in charge that would affect any of the roadway workers engaged in a common task with such machine.

Roadway Worker Protection (RWP) Special Investigation Report (SIR)

On September 24, 2014, NTSB held a sunshine meeting11 for the Board Members to deliberate on a draft report detailing 14 roadway worker employee fatality accidents, resulting in 15 fatalities. The report was prepared as a Special Investigation Report. Two of the safety issues addressed in that report concerned the quality, content and importance of a thorough job briefing and the positive effects of a "peer-to-peer" safety culture.

11 A "sunshine meeting" is term used to describe a scheduled NTSB Board meeting that is published in the Federal Register beforehand and wherein during the meeting, the Board Members deliberate on the topic or presentation of a draft report from staff for the meeting with full transparency for the public.

BNSF's Approaching Others (AO):

In response to a request to understand BNSF's AO program in greater detail, BNSF provided the following description of AO:

> **Safety**
>
> Our vision is that BNSF Railway will operate free of accidents and injuries. Because safety is business critical, many initiatives support it—training, operating processes/practices, rules compliance/ accountability and a genuine leadership commitment to safety. One of BNSF's innovative initiatives is our Approaching Others About Safety (AO) training, which encourages peers to provide positive feedback to those working safely and guidance feedback when someone is working at risk.
>
> ***Best Practice***
>
> Launched in 2013, Approaching Others About Safety (AO) is voluntary training for all BNSF employees and focuses on peer-to-peer interactions. It is the single largest training program BNSF has ever undertaken. Development was driven by our commitment to enhancing BNSF's safety culture and safety leadership development—embarked on eight years ago. It is our belief that BNSF can and will operate the railroad free of accidents and injuries and AO is the linchpin in providing feedback up, down and across the organization to help in achieving our safety vision. AO positions our employees to be confident and effective when speaking to each other about safety, and focus on exposures which are the key to staying safe.
>
> AO was created through the involvement of BNSF employees, including focus groups conducted with union employees within each Operations group – Transportation, Mechanical, Engineering, Intermodal and Telecom. Employees provided feedback on the program design, attended pilot sessions and assisted with the production of videos to ensure that training materials were specific to their craft. The second phase of this program launched in January 2014 and more than 35,000 employees participated in the training. This best practice has continued into 2015—to date approximately 32,000 have attended.
>
> - Craft Specific versions of both the train-the trainer and the craft-level program were developed to tailor training to the specific craft groups.
>
> - The program encourages attention to behaviors that, when done safely, reduce the level of risk.

        - Training focuses on the exposures that result in injuries, specifically key exposure areas, including: line of fire/release of energy, pinch points, ascending/descending, walking/path of travel, and life-saving processes.

- Employees learn the value of providing feedback in the moment:
    - Positively when they recognize someone is working safely, or
    - Corrective when they perceive someone is at risk, and
    - Pausing work for safety discussions.
    - Employees learn:
        - The most effective ways to approach co-workers and how to respond when approached,
        - How exposures are not only present at work, but at home and in our various hobbies,

  (Making this connection helps to reinforce our safety mindset and remind us that safety is a part of everything we do.)

- To identify exposure and sources of risk, and when to pause the work,
- To explore the real potential of a job safety briefing, and
- To understand the impact our interactions have on one another.

To build on the success achieved over the past three years, BNSF is continuing our Approaching Others About Safety training efforts in 2016. In this next phase, employees will be discovering how the core concepts learned in prior year's training can assist in overcoming the wide variety of external and internal influences experienced daily, both professionally and personally. The ultimate goal is for participants to leave with an understanding for how their decisions impact not only themselves, but those around them, and to gain a more full appreciation for how AO principles can help them be successful at work, in their homes, in their hobbies…and by themselves.

Post Accident Actions:

On May 26, 2015, BNSF conducted a "safety stand down" with all of their engineering personnel in the Minneapolis/Twin Cities area. The focus of the stand down was to discuss the recent events and emphasize safety and safe work practices.

On May 27, 2015, BNSF issued system-wide Safety Alert (SB-2015-05E) detailing general aspects of the accident and a question and answer section about adjacent track protection by reference to existing rules.

On November 2, 2015, NTSB received the following BNSF post-accident updates:

- Formalized BNSF Railway training process for heavy equipment operators on construction gangs

- Third party evaluating all operators and providing feedback to management team

- Training is specifically focused on the safe operation of the equipment to include machine limitations

- Created a formal briefing document that was shared with all engineering employees regarding track panel loading and unloading

  - Focus was on best practices on handling specific kinds of material in different situations

- Rule clarification have been made to our adjacent track rules to ensure better understanding

  - Adjacent track operations is now a required part of the construction crews daily job safety briefing

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Parties to the Investigation - Acknowledgment Signatures

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

_____

_____//s//_____ Date __11/15/15_____
Richard A. Hipskind, NTSB

_____//s//_____ Date __11/30/15_____
Dale D. Johnson, FRA

_____//s//_____ Date __11/20/15_____
Kevin Wilde, BNSF

_____//s//_____ Date __11/21/15_____
George Loveland, BMWED