DCA15FR014

Collision
Union Pacific Railroad
September,8 2015
Texarkana, TX

National Transportation Safety Board

Operations Groups – Factual Report

August 12, 2016

ACCIDENT

The collision of Union Pacific (UP) train AMNML-07 into the side of UP train ALDAS-06 at about 12:34 a.m. CDT[1] on September 8, 2015 in Texarkana, TX.

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Figure 1Tabel is List of names of Operating Group

[1] Unless otherwise indicated, all times are denoted in Central Daylight Time.

SYNOPSIS

On September 8, 2015 at 12:34 a.m. central daylight time, Union Pacific Railroad (UP) train AMNML-07 (train #1) traveling west on the Pine Bluff Subdivision, main track, collided into the side of UP train ALDAS-06 (train #2) traveling north on Little Rock Subdivision, main track one, at Texarkana, Texas. The collision occurred at a railroad crossing at grade located at the intersection of the Pine Bluff Subdivision, Control Point (CB) CB418, Mile Post (MP) 419.1 and the Little Rock Subdivision, CP R001, MP .5. As a result of the collision, two locomotives of the westbound train UP AMNML-07 along with the thirteenth through the nineteenth cars of the north bound train UP ALDAS-06 derailed. Both engineer and conductor of the westbound train sustained minor injuries. The lead locomotive of the westbound train AMNML-07 UP 2542 derailed on its side resulting in a release of approximately 4,000 gallons of diesel fuel. The fuel spill was contained, afterwards the soil and debris was removed for proper disposal. The Event Data Recorder indicated train #1 traveling at 19 mph before the train was placed into emergency brake application by the engineer at an impact speed of 6 MPH. The estimated damage is estimated at $4,664,073.00. The parties to the investigation include Union Pacific Railroad, the Federal Railroad Administration (FRA), the Brotherhood of Locomotive Engineers and Trainmen (BLET), the Sheet Metal, Air, Rail and Transportation (SMART) and the Brotherhood of Railroad Signalmen (BRS)

Accident Narrative

Struck Train ALDAS-06

The crew of northbound train ALDAS-6 included a locomotive engineer and a conductor. They went on duty at 8:45 p.m. CST, September 7, 2015, at the Union Pacific Little Rock yard in Little Rock, Arkansas. Upon going on duty the engineer and conductor had a job briefing which included reviewing their Track Warrants and speed restrictions that applied to the movement of their train. After departing Little Rock yard, the crew had an uneventful trip. The crew received an Advance Approach at mile post 4.8 then an Advance Diverging at mile post 2.5. At CPR002 train crew received a Diverging Clear signal indication followed by a Clear signal at CPR001. As the ALDAS-06 was traversing the Interlocking at grade at CB418, the train crew saw the headlight of the approaching westbound AMNML-07. According to the engineer and conductor as the headend of their train the ADLAS-06 was traversing the Interlocking at grade they discussed between themselves whether the AMNML-7 was traveling to fast to stop at the Interlocking. A few moments later the ADLAS-06 was struck, and the train made an emergency brake application.

Striking Train AMNML-07

The crew of westbound train AMNML-07 included a locomotive engineer and a conductor. They went on duty at 6:50 p.m. CST, September 7, 2015, at the Union Pacific Pine Bluff yard in Pine Bluff, Arkansas. This was the home terminal for both crew members. According to the engineer and conductor upon reporting to duty they had a job briefing that consisted of reviewing their track warrants, train profile, and speed restrictions that applied their train movement. Once

they completed their job briefing they were transported to their train, once on the train the engineer initialized Trip Optimizer on the lead locomotive[2]. Once Trip Optimizer was initialized train departed Pine Bluff, Arkansas. According to engineer they did not have any work enroute , and it was a light work load day with not many trains operating out in the territory. Trip Optimizer operated train from Pine Bluff to point of accident.

When the engineer was asked what kind of signal indications they had seen prior to the accident he said that he had a Clear (Green) signal at CB416, and that is all that he can recall, until the conductor called out red, red as they approached the signal at CB418 for the Interlocking. The Engineer and Conductor said that they do not recall seeing the intermediate signal indication at mile post 417.31. After the impact engineer and conductor remember crawling out of the locomotive and that the engineer and conductor of the struck train were there to assist them to get out of the locomotive.

When the train passed the intermediate signal located at mile post 417.31 with a yellow aspect (approach indication) crew was required to be under Cab Red Zone as per Union Pacific operating rule 1.47.1[3]. The conductor's last entry on the conductor log book was when the train cleared the train scanner located at mile post 408.9. The Conductor's log book does not show an entry noting the approach signal indication at mile post 417.31, nor does it show that the crew was under Cab Red Zone as required.

Their assigned freight train consisted of two locomotives, 67 loaded cars, and 0 empty cars. It was 5167 feet long, and weighed 7094 tons.

As the westbound AMNML-07 train approached the accident area, the locomotive engineer was seated at the controls of the leading locomotive. The conductor was seated on the conductor station.

The railroad timetable direction of the train was west.

The train was being operated at 19 mph approaching the accident area. Lead locomotive event data recorder showed that train was operating under Trip Optimizer (cruise control). The engineer said he became aware of the impending collision when conductor called out red, red, he than initiated an emergency train air brake application. The train slowed to 6 mph when the collision occurred. Speeds were recorded by the event recorder of the controlling locomotive.

[2] Trip Optimizer is cruise control feature that does not respond to signal indications. When train the crew encounters a signal less favorable than a proceed the engineer has to take charge of train and operate the train manually and comply with signal indication requirements.

[3] Union Pacific Operating Rule 1.47.1 rule requirement is in the Appendix at end of the report.

Sequential Trackside Signal Indications Received by Struck Train ALDAS-06 [4]

Signal Aspect- Flashing Yellow , signal located at mile post 4.8. Train speed is 30 mph as recorded on the Conductor's Log book at 12:27 am.

Action required 9.2.4 –Advance Approach Proceed prepared to stop at second signal.Frieght trains exceeding 40 mph must immediatley reduce to 40 mph.Passenger trains may proceed, but must be prepared to pass the next signal not exceeding 40 mph.When signal governs the approach to a control point with 40 mph turnout speed be prepare to advnce on normal or diverging route.When the next signal is seen to display an aspect more favorable than Diverging Approach or Approach, the requirements to proceed prepared to stop short of the second signal si no longer required.

Figure 2.Advance Approach Signal Indication

Signal Aspect- Yellow over Yellow, signal located at mile post 2.5. Speed of trains is 29 mph as recorded on the Conductor's log book at 12:30 am.

Action required 9.2.5-Approach Diverging Proceed to advance on diverging route at next signal at prescribe speed through turnout.

Figure 3. Approach Diverging Signal Indication

Signal Aspect-Red over Green, located at CPR002. Speed of train is 30 mph at 12:31 as recorded on the Conductors Log book.

Action required 9.2.9-Diverging Clear Proceed on diverging route not exceeding prescribed speed through turnout.

Figure 4.Diverging Clear Signal Indication

Signal Aspect-Green,signal located at CPR001. Speed of train not recorded on Conductor's log book at 12:32 am.

Action required 9.2.1-Clear, Proceed

Figure 5.Clear Signal Indication

[4] Train ALDAS-06 was traversing on the Little Rock Subdivision when it entered the Interlocking at grade at CPR001.

Sequential Trackside Signal Indications Received by Striking train AMNML-07[5]

Signal Aspect –Green at Control Point Gertrude located at mile post 416.4;

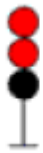
Action required 9.2.1- Proceed

Figure 6.Clear Signal Indication

Signal Aspect-Yellow at intermediate signal located at mile post 417.31, Train speed 31 mph as recorded by event recorder.

Action required 9.2.6- Proceed prepared to stop before any part of train or engine passes the next signal. Freight trains exceeding 30 MPH must immediately reduce to 30 MPH. Passenger trains exceeding 40 MPH must immediately reduce to 40 MPH. When next signal is seen to display a proceed indication, the requirement to proceed prepared to stop no longer applies. Speed may be resumed after leading wheels of train have passed signal.

Figure 7.Approach Signal Indication



Signal Aspect-Red at Interlocking signal CB 418 located at mile post 419.1.

Action required 9.2.15 -Stop

Figure 8.Stop Signal Indication

Method of Operation

The Pine Bluff Subdivision of the UP North Little Rock Area extended from MP 266.4 in Pine Bluff, Arkansas to MP 525.1 in Big Sandy, Texas in a timetable east-west direction. The maximum authorized timetable speed on the subdivision is 70 mph for freight trains with permanent speed restrictions between posted timetable mileposts. In the vicinity of the accident area, the UP operated trains over a single main track with passing sidings utilizing a Traffic Control System (TCS) controlled by a dispatcher located at the Harriman Dispatch Center in Omaha, Nebraska. Train movements on the Pine Bluff Subdivision were governed by operating rules, timetable instructions, and the signal indications of the traffic control system. The TCS used coded track circuits for train occupancy detection and signal communication.

The Little Rock Subdivision of the UP North Little Rock Area extended from MP 343.6 in North Little Rock, Arkansas to MP 89.6 in Longview, Texas in a timetable north-south direction. The maximum authorized timetable speed on the subdivision is 70 mph for freight trains and 75 mph for passenger trains with permanent speed restrictions between posted timetable mileposts. In the vicinity of the accident area, the UP operated trains over two main tracks utilizing a TCS

[5] Train AMNML-07 was traversing on Pine Bluff Subdivision when it entered the Interlocking at grade located at CB418.

controlled by a dispatcher located at the Harriman Dispatch Center in Omaha, Nebraska. Train movements on the Little Rock Subdivision were governed by operating rules, timetable instructions, and the signal indications of a TCS. The TCS used coded track circuits for train occupancy detection and signal communication.

Operating Documents

The crews were governed by the General Code of Operating Rules (GCOR) and a timetable specific to the Pine Bluff Subdivision they were operating over.

The operating rules and supplements were as follows and provided by Union Pacific:

The crews were governed by the following documents containing the operating rules and procedures:

- General Code of Operating Rules, Seventh Edition, Effective April 1, 2015,
- Union Pacific Special Instructions, Effective April 1, 2015,
- Union Pacific Railroad, Pine Bluff Timetable.
- Union Pacific Railroad, Safety Rules, Effective July 2, 2013.

Site Description

UP Texarkana Interlocking

The UP Pine Bluff Subdivision single main track and siding track crossed at grade with the Little Rock Subdivision two main tracks at Texarkana Interlocking located in Texarkana, Texas. Texarkana Interlocking was at MP 419.1 on the Pine Bluff Subdivision and at MP 0.5 on the Little Rock Subdivision.

Maximum authorized timetable speed through the Texarkana Interlocking for trains operating on the Pine Bluff Subdivision 20 was. Maximum authorized timetable speed through the Texarkana Interlocking for trains operating on the Little Rock Subdivision was 30 mph.

Crew Information

Union Pacific provided the following information for each crew member:

- Employee 30-day work history (on/off duty)
- Employment history
- Employee discipline record
- Operational Testing for each employee for one year
- Employee Training Records

AMNML-07 Engineer

Hire Date	03/15/2015
Engineer Certification Date	02/6/2007
Conductor Certification Date	07/12/2012
RCO Certification	04/06/2004

Certifications Expiration Date	10/08/2015
Vision Exam	09/4/2015 Failed, Right Eye 20/100
Hearing Exam	09/04/2015 Pass
Knowledge Exam	06/04/2015 Pass
Fatigue Training	06/04/2015
Discipline	None
Territory Exam	06/02/2015

Figure 9. AMNML-07 Engineer Training and Certifications History

AMNM-07 Conductor

Hire Date	07/07/2008
Conductor Certification	07/12/2012
RCO Certification	01/29/2017
Certifications Expiration Date	01/29/2017
Vision Exam	10/18/2013 Pass
Hearing Exam	10/18/2013 Pass
Knowledge Exam	06/11/2015 Pass
Cab Red Zone Training	03/11/2015
Territory Exams	06/09/2015
Discipline	None

Figure 10.AMNML-07 Conductor Training and Certification History

ALDAS-06 Engineer

Hire Date	10/27/2003
Engineer Certification Date	12/17/2011
Conductor Certification Date	12/23/2014
RCO Certification Date	01/19/2004
Certifications Expiration Date	12/17/2017
Knowledge Exam	02/11/2014
Territory Exam	02/11/2014
Cab Red Zone Training	07/31/2015
Discipline-maximum authorized speed	01/17/2015
Discipline-maximum authorized speed	02/15/2015

Figure 11.ALDAS-06 Engineer Training and Certifications History

ALDAS-06 Conductor

Hire Date	10/09/2006
Conductor Certification	11/30/2012
Conductor Certification Expiration	11/30/2015
Hearing Exam	03/21/2014
Knowledge Exam	08/20/2015
Fatigue Training	08/20/2015
Cab Red Zone training	03/16/2015
Discipline-Derailment	11/17/2010

Discipline- Failure to comply with instructions	05/26/2010
Discipline- Failed to keep a sufficient distance from equipment	09/08/08

Figure 12.ALDAS-06 Conductor Training and Certification History

Train Crews 10 Day Work History

AMNML-07 Engineer

Date	Previous Time Off	Time On Duty	Time Off Duty	Total Time on Duty
08/31/15	33:35	01:15 am	08/31/15-02:20 pm.	12:00
09/1/15	14:25	05:00 am	09/1/15-02:25 pm	09:25
09/3/15	19:45	03:15 am	09/4/15-03:35 am	12:00
09/5/15	22:19	01:54 am	09/5/15-11:40	09:46
09/5/15	11:50	11:30 pm	09/6/15-12:35	12:00
09/7/15	30:15	06:50 am	09/8/15-11:35	12:00

Figure 13.AMNML-07 Engineer 10 Day Work History

AMNML-07 Conductor

Date	Previous Time Off	Time On Duty	Time Off Duty	Total Time on Duty
08/28/15	16:45	07:30 am	08/28/15-10:27 pm	12:00
09/3/15	99:59	05:40 pm	09/4/15-06:21 am	11:55
09/3/15	12:55	05:40 pm	09/5/-07:25 am	11:09
09/7/15	30:15	06:50 pm	09/8/15-11:35am	12:00

Figure 14.AMNML-06 Conductor 10 Day Work history

ALDAS-06 Engineer

Date	Previous Time Off	Time On Duty	Time Off Duty	Total Time on Duty
08/30/15	99:59	09:15 pm	08/31/15-10:10 am	12:00
09/1/15	14:04	12:15 am	09/1/15-09:10 am	08:55
09/3/15	58:15	07:30 pm	09/4/15-05:30 am	10:05
09/4/15	17:30	11:00 pm	09/5/15-11:15 am	12:00
09/6/15	26:45	02:00 pm	09/7/15-12:03	10:03

09/7/15	20:42	08:45 pm	09/8/15-09:55 am	12:00

Figure 15.ALDAS-6 Engineer 10 Day Work History

ALDAS-06 Conductor

Date	Previous Time Off	Time On Duty	Time Off Duty	Total Time on Duty
08/22/15	50:22	08:11 pm	08/23/15-08:57 am	12:00
09/3/15	99:59	05:40 am	09/3/15-06:15 pm	12:00
09/4/15	14:15	08:30 am	09/4/15-07:33 pm	10:40
09/6/15	42:50	02:00 pm	09/7/15 12:01 am	10:00
09/7/15	20:45	08:45 pm	09/8/15-09:56	12:00

Figure 16.ALDAS-06 Conductor 10 Day Work History

Trains Consist

The westbound auto train AMNML 07 consisted of 3 locomotives and 67 auto carriers. The train was 6,520 feet in length and weighed 5167 tons. The locomotive consist had a total of 8,900 horse power and an equivalent tons per equivalent powered axle of 24.2 (EPA).
The northbound mixed manifest train ALDAS 06 consisted of 2 locomotives and 70 Freight cars. The train was 6,302 feet in length and weighed 5609 tons. The locomotive consist had a total of 8,000 horse power and an equivalent tons per equivalent powered axle of 20.8 (EPA).

Signal Sight Distance Observations

The Operations and Human Performance Group members conducted sight-distance observations of the wayside signals on the portion of the territory where the accident occurred. The environmental conditions were similar to the day of the accident. The purpose of the test was to determine the optimal distance where various signals (signals at CB 416, Intermediate signal at mile post 417.3, CB418) could be confidently identified by an operating crew. The exemplar locomotive was operated by an experienced Union Pacific engineer and conductor, who were both qualified to operate over the territory.

Signal Being Observed	Distance of initial view	Comments
CB416 at mile post 416.4	981 ft.-engineer 945.5 ft. conductor	Test train engineer identified signal aspect at 981 ft. from CB416. Conductor identified signal aspect 945.5 ft. from CB416

Intermediate signal at mile post 417.3	210 ft.-engineer 180 ft.-conductor	Test train engineer identified signal aspect 210 ft. from signal. Conductor identified signal aspect 180 ft. from signal.
CB418 at mile post 419.1	679.9 ft.-engineer 679.9 ft.-conductor	Test train engineer and conductor identified signal aspect 679.9 ft. from CB418.
Engineer Induced Emergency	340 ft.	Test train engineer and conductor view to point of engineer induced emergency is 340 ft.
Engineer Induced Emergency	339.9	Test train engineer and conductor view of CB418 from engineer induced emergency is 339.9
Engineer Induced Emergency	455.5	Test train engineer and conductor view from engineer induced emergency to impact is 455.5 ft.
Initial view of CB418 signal	1,251 ft.	Test train engineer and conductor initial view of signal aspect at CB418 and to point of impact is 1,251 ft.

Figure 17.Sight Distance Observations

Alerter Test

On June 23, 2016 NTSB and Union Pacific conducted Alerter Test observations with Trip Optimizer in effect on the lead locomotive on the portion of the territory where the accident occurred. The purpose of the test was to determine if Trip Optimizer hindered or nullified the functions of the Alerter. The exemplar locomotive was operated by an experienced Union Pacific engineer and conductor, who were both qualified to operate over the territory.

Test was started on mile post 402 on the Pine Bluff Subdivision.

1. First test involved moving the reverser to forward and releasing the independent and Automatic Brakes. While standing Alerter sounded waring an after timing out a penalty brake application occurred.
2. In the second test Trip Optimizer was initialized, put reverser in forward, released independent and automatic brakes. While standing Alerter sounded waring an after timing out a penalty brake application occurred.
3. The third test involved allowing Trip Optimizer to operate locomotive. While locomotive was in motion in in a throttle setting in power, Alerter sounded off and was allowed to continue to sound off for 15 seconds before being reset.

4. The fourth test involved allowing Trip Optimizer to operate locomotive. While locomotive was in motion in in a throttle setting in dynamic brake, Alerter sounded off and was allowed to continue to sound off for 15 seconds before being reset.
5. The fifth test involved allowing Trip Optimizer to operate locomotive. While locomotive was in motion in in a throttle the Alerter sounded off. Conductor sounded horn from his station, but Alerter did not reset.
6. The fourth test involved allowing Trip Optimizer to operate locomotive. While locomotive was in motion, Alerter sounded off and was allowed to continue to sound off for 15 seconds before being reset by the engineer by sounding the horn.
7. The remainder of tests were performed by the engineer involved allowing Trip Optimizer to operate locomotive. While locomotive was in motion, Alerter sounded off and was allowed to continue to sound off for 15 seconds before being reset by throttle manipulation, bailing off independent brake, applying the automatic brake, sounding the bell, touching a soft key on the computer screen on the engineer station.

Train Crews Interview

Interviews for both of the train crews were recorded and transcribed.

Appendix
TRIP OPTIMIZER:

GE's Trip Optimizer a product of Ecomagination, automatically controls a locomotive's throttle, helping keep trains on schedule while minimizing fuel use. This makes the process of delivering locomotive freight more fuel-efficient and less costly.

The Trip Optimizer creates an optimal trip profile that can minimize braking by automatically learning a train's characteristics. The system calculates the most efficient way of running by considering such factors as train length, weight, grade, track conditions, weather and locomotive performance.

During the trip, a sophisticated network of on-board computers and GPS systems update the profile continuously, adjusting for changes so the train can arrive on time-and with minimum fuel use.

Appendix

GCOR Rule : 1.47.1 Cab Red Zone
Add new rule:
During a Cab Red Zone (CRZ), an environment must be created in the locomotive control compartment that focuses exclusively on controlling the train, verbally communicating restrictions, and proper application of the rules. The conductor must be in the control compartment unless required to perform other duties (i.e. to operate switches, be at a road crossing, passenger train duties, etc.).
A Cab Red Zone exists during critical times such as:
The following restrictions or conditions are required during a Cab Red Zone:
Application: As contained within this rule, approaching is defined as two miles from the restriction or end of the train's authority.
Operating at Restricted Speed. (Does not apply when switching.)
Operating on a signal that requires the train to:
Copying mandatory directives.
Approaching a Form B restriction.
Approaching a temporary speed restriction that affects the train.
Approaching the end of the train's authority.
Be prepared to Stop at the next signal.
or
Pass the next signal at Restricted Speed
Cab communication is restricted to immediate responsibilities for safe train operation.
Radio communication with the dispatcher or other employees must be limited to the train's immediate movement or conditions that affect the safety of trains.
A crew member other than the employee operating the controls will be required to handle radio communications when that crew member is in the control compartment.
Exception: Rule 33.6.1 (Operating Responsibilities with Manned Helper.)
If proper action is not being taken, crew members must remind each other of the Cab Red Zone and/or take appropriate action to stop the train.