



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Railroad, Pipeline and Hazardous Materials Investigations

Washington, DC

Union Pacific Railway Derailment
Fort Worth, Texas
April 24, 2019

NTSB Accident No. RRD19FR007

Railroad Operations – System Safety Factual Report

Accident

NTSB Accident Number: RRD19FR007
Date of Accident: April 24, 2019
Time of Accident: 0033 (CST)
Type of Train and No: Ethanol Unit Train, UEBLTG20
Railroad Owner: UP
Train Operator: UP
Crew Members: 1 Engineer, 1 Conductor
Location of Accident: Fort Worth, Texas

Operations Group

Ryan Frigo
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UP

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Brotherhood of Locomotive Engineers and Trainmen

Kamron Saunders
Investigator
Sheet Metal, Air, Rail, and Transportation (SMART)

Operating Crews

Engineer:
On duty 4/23/19, at 2230 Ney Yard

Conductor:
On duty 4/23/19, at 2230 Ney Yard

Train Consist

- Key Train, High Hazard Flammable Train (HHFT)¹
- 98 cars (96 Loads, 2 Buffer Cars and 0 Empties)
- 13,230 Tons – 6,122 Feet
- 3 Locomotives (UP2677, UP 6875, UP5512)
- Traveling South on Midlothian Subdivision
- Derailed at MP 48.8 @ 00:33 on 4/24/2019
- 26 Cars Derailed (Lines 17 thru 42)²

Method of Operation and Location

The Midlothian Subdivision is 50.3 miles from Fort Worth, Texas to Ennis, Texas at MP 0. The method of operation is single track operations and track warrant control/ automatic block system (twc/abs). There is a permanent speed restriction of 30 MPH at the derailment location.³

At the time of the accident approximately 11 freight trains operated over the territory daily. These freight trains are primarily coal empty and loads; however, several freight trains are also scheduled to operate over this route as well.

Dispatching duties are controlled by the *UP Dispatcher* located in Omaha, Nebraska.

¹ A High Hazard Flammable Train (HHFT) means a single train transporting 20 or more loaded tank cars of a Class 3 flammable liquid in a continuous block, or a single train carrying 35 or more loaded tank cars of a Class 3 flammable liquid throughout the train consist. Additional requirements such as speed restrictions and enhanced braking systems also apply.

² UP consists documents number cars from the rear of the train forward, the UP provided train consist indicates the derailed cars in position 57-82. NTSB nomenclature uses a forward to rear numbering (not including locomotives), thus indicating car positions as 17-42. NTSB nomenclature and will be used throughout this report.

³ 30 MPH Speed Restriction is due to the characteristics of the track at the location, including descending grades and curvature.

The Accident

The accident train crew went on duty at 2230 on April 23 at Ney Yard. At the start of their shift, the crew conducted a safety job briefing, this included going over operating bulletins and any special instructions for the job that evening which included a cargo of flammable cars. The train crew mentioned that the paperwork did not contain any weather-related issues. The crew recalled that there was nothing unusual about the trip, they encountered the usual slow orders. Although there are two available routes for this job, the dispatching center had authorized train movement over the Midlothian Subdivision. At the start of the trip the train crew recalled heavy rain. There were no flash flood alerts issued to the crew prior to the accident. Prior to the accident, the crew reported that aside from the rain everything was normal. As they approached the accident location the train descended downhill and around a curve. The engineer and conductor recalled at first seeing that Echo Lake was full of water and then that there was water near the tracks and then over the ball of the rail. Soon after, the train went into an emergency brake application and came to a smooth stop. According to the Locomotive Data Recorder provided by UP, this occurred at approximately 0033. Immediately the engineer and conductor recalled discussing special considerations that needed to be taken because their train was a “key-train”⁴. They then soon discovered that several cars in the train were on fire. The engineer and conductor rapidly developed a plan to separate the three locomotives from the train consist and to move the locomotives away from the fire and to an area of safety and communicate the emergency to the train dispatcher. The train crew then awaited the arrival of emergency responders.

⁴ The Association of American Railroads (AAR) defines “Key Train” as any train with: One tank car load of Poison or Toxic Inhalation Hazard (PIH or TIH) (Hazard Zone A,B, C, or D), anhydrous ammonia (UN1005), or ammonia solutions (UN3318), or; 20 car loads or intermodal portable tank loads of any combination of hazardous material, or; one or more car loads of Spent Nuclear Fuel (SNF), High Level Radioactive Waste(HLRW). “Key Trains” are subject to speed restrictions and other special operating criteria.

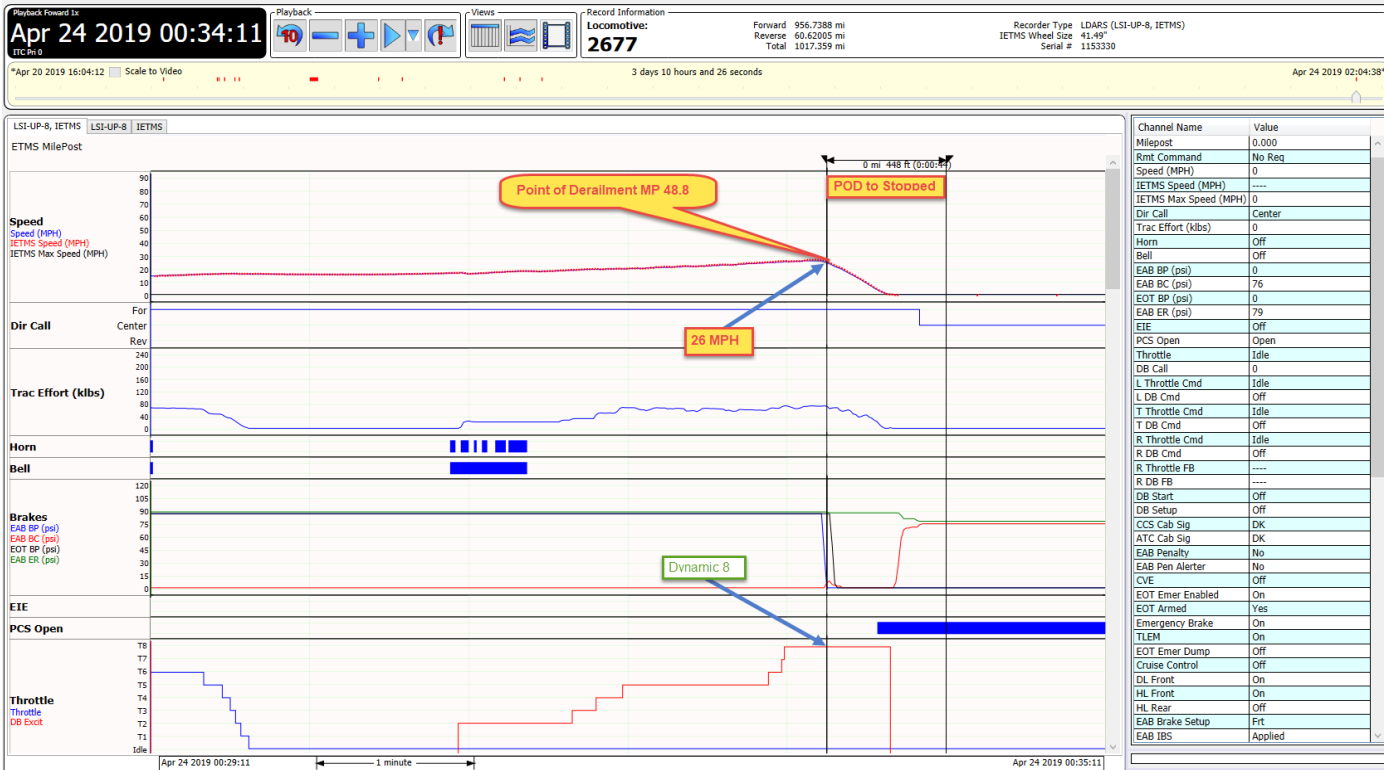


Figure 1: Locomotive Data Recorder provided by UP.

Echo Lake Park

Echo Lake Park is an approximately 42-acre recreational park and lake within the City of Fort Worth, Texas, this location also falls within the boundaries of Tarrant County, Texas. Investigators were unable to determine the original origins of the lake; local folklore dates the lake back to the turn of the century and serving the needs of two railroads at the location. As recently as 2017, Echo Lake Park remained under Tarrant County Ownership (Records of county maintenance date to 1970). A transfer of ownership occurred to the City of Fort Worth in October of 2017. As agreed, upon through the transfer of ownership a capital improvement and replacement project of Echo Lake’s drainage system was to be completed by Tarrant County. However, at the time of the accident this project was still undergoing review and approvals at Tarrant County and construction had not yet begun.

The below photographs detail the drainage system at Echo Lake. A spillway is routed to 3 drainage pipes. At the time of the accident, 1 of the three pipes was functional, 1 had been plugged, and the 3rd had been blocked by debris. As referenced in the photographs the emergency spillway location for the lake is located along the UPRR.



Figure 2: Echo Lake spillway, post-accident drainage pumps are present in the photograph.

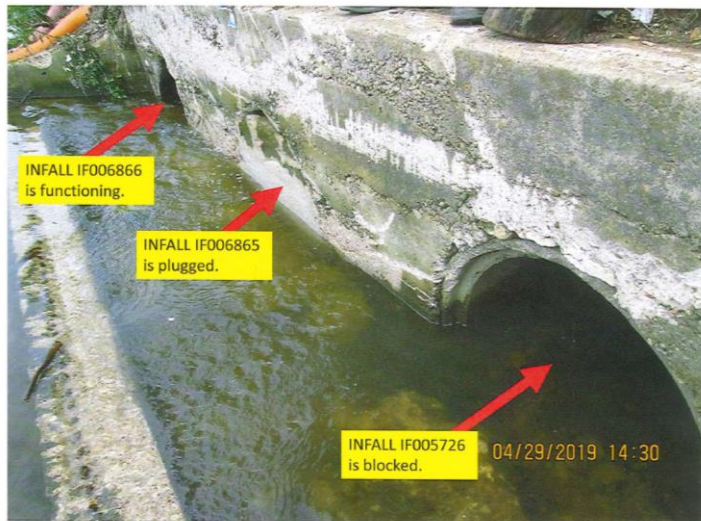


Figure 3: Close-up photograph on the spillway and drainage pipes

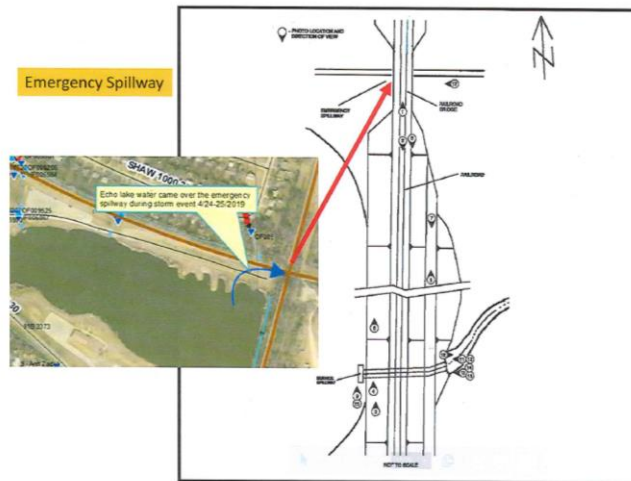


Figure 4: Diagram including image of emergency spillway location. The emergency spillway location is adjacent to the Midlothian Subdivision.

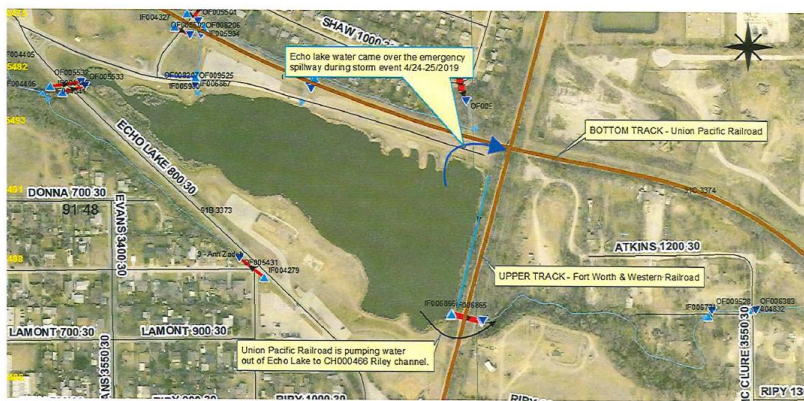


Figure 5: Image of emergency spillway location.

History of Overflow Events

ECHO LAKE PARK – TIMELINE

Early 2017 – County and City discussions regarding transferring ownership of Echo Lake Park to City of Fort Worth and County participating in Hemphill / Lamar street project.

Feb. 9, 2017 – Property Appraisal received from Appraisal Services, Inc.

Feb. 10, 2017 – Phase I Environmental Site Assessment Completed by Enercon Services, Inc.

Feb. 24, 2017 – Lake sediment and surface soil sampling completed by Enercon Services, Inc.

March 21, 2017 – City Council authorized (M&C L-16015) the execution of Interlocal Agreement with Tarrant County for acceptance of a donation of 41.326 acres of land identified as Echo Lake Park.

March 2017 – PARD Assessment Revised (from August 28, 2016); FINAL

April 3, 2017 – ILA executed/complete (CS #48940) - **County drainage improvements to be completed no later than September 30, 2017.**

April 4, 2017 – Deed without Warranty filed; executed.

September 21, 2017 – County email received requesting extension of contract commitment to March 31, 2018.

October 2, 2017 – 1st Extension letter to County adjusting County drainage improvement completion to March 31, 2018.

March 28, 2018 – County email received requesting extension of contract commitment (drainage improvements) to September 30, 2018.

April 9, 2018 – 2nd Extension letter to County further adjusting drainage improvement completion to September 30, 2018.

September 21, 2018 – County email received requesting extension of contract commitment to March 31, 2019.

October 29, 2018 – 3rd Extension letter to County further adjusting drainage improvement completion to March 31, 2019.

March 26, 2019 – County email received requesting extension of contract commitment to September 30, 2019.

April 12, 2019 – 4th Extension letter to County further adjusting drainage improvement completion to September 30, 2019.

Jan. 8, 2019 – South District and Trades cleared debris around mouth of drain at SE corner of Echo Lake

Jan. 9, 2019 – South District checked and cleared debris from mouth of drain

March 14, 2019 – South District and Trades cleared debris from mouth of drain

April 10, 2019 – South District and Trades cleared debris from mouth of drain

April 16, 2019 – South District, Trades and TPW-Storm Water met on site; Storm Water assessed drain and could not clear due to mouth of drain being under water – indicated that we could call them back out once drain was accessible (not under water) and they would clear drain.

April 26, 2019 – PARD District Superintendent informs investigators that the City took over ownership of the park, including park maintenance and programming, as of October 1, 2017; however, as a condition of the City’s agreement with the County (Section 4, Item (d)) “the County shall repair all storm water and drainage issues associated with the east side of the dam located on the Property, as set forth in Exhibit E” of agreement, “to the reasonable satisfaction of the City’s TPW – Storm Water Division and the UP Railway, and in accordance with the Texas Commission on Environmental Quality (TCEQ) requirements.” ILA and Exhibit E (site plan for County drainage improvements). County drainage improvements to be completed no later than September 30, 2017.



Figure 6: Photograph of high water in lake after the derailment.

Hazardous Material Transport Route Planning

In accordance with PHMSA final rule HM-251, carriers that operate HHFTs must perform a routing analysis that considers, at a minimum, 27 safety and security factors and select a route based on the findings.⁵ The rule found at 49 CFR 172.820 requires rail carriers to select a practicable route posing the least overall safety and security risk to transport HHFTs and certain hazardous materials.

Weather Notifications

The UP Harriman Dispatching Center develops weather data from a contracted service with Accuweather. Through this service, Accuweather also provides flash flood and other adverse weather notifications. UP officials stated that UP has no input on changing the flash flooding and/or weather threshold criteria. Weather warnings that are received from Accuweather are first seen at the dispatching center and then sent to crew via radio. These activities are logged and tracked within UP's dispatching software. According to UP officials, flash flood warnings are seen quite routinely (approximately 3,000 times per year). UP management discuss weather related issues and views weather picture graphics each morning, but this information is not required to be seen

⁵ 80 FR 26644, May 8, 2015.

by train crews. Most of the crew situational awareness for weather is weather information received through personal means prior to the start of a shift and then any warnings received from dispatch while working.

Adverse Weather Operating Rules Post-Accident Changes

Operating Rule 6.21, Precautions Against Unusual Conditions

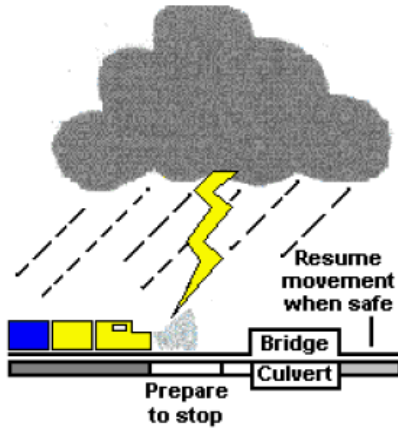
After the accident, UP made a minor change to operating rule 6.21 for operating under a flash flood warning, emphasizing to train crews that they should “proceed prepared to stop prior to washout or debris on track”. This differs from a previous version of the rule where speed would be governed through special instruction. The CSO further highlighted that the vagueness of rule 6.21 (prior to the change) led to crews not having a clear understanding of how to proceed once a warning was received. This was a determining factor for the rule change. This change to rule 6.21, and any rule change information, is sent out to all crews via the UP-portal network. This computer portal network is used for crew sign up and paperwork downloads before and after work shifts. The network then creates a record of which employees have received and acknowledged seeing the updated document. The change to rule 6.21 was completed in May 2019. The UP-Chief Safety Officer explained to investigators that UP receives approximately 3000 weather warnings a year, and that each warning is taken as a potential serious incident.

6.21: Precautions Against Unusual Conditions

Protect trains and engines against any known condition that may interfere with their safety.

When conditions restrict visibility, regulate speed to ensure that crew members can observe and comply with signal indications.

In unusually heavy rain, storm, or high water, trains and engines must approach bridges, culverts, and other potentially hazardous points prepared to stop. If they cannot proceed safely, they must stop until it is safe to resume movement.



[Diagram A]^

Advise the train dispatcher of such conditions by the first available means of communication.

Add the following application to rule:

Verbally Notified	Track Bulletin or Track Warrant	Procedure to follow
"FF" in effect between _____ and _____, or at location _____.	Flash Flood warning in effect between _____ and _____. Within these limits or specified location be governed by Rule 6.21 and Rule 6.21.2.	Proceed prepared to stop short of washout or debris on track and be governed by Rule 6.21 and Rule 6.21.2.

Rule Updated Date

May 21, 2019

6.21.2: Water Above Rail

Do not operate trains and engines over tracks submerged in water until the track has been inspected and verified as safe.

Operate engines at 5 MPH or less when water is above the top of the rail. If water is more than 3 inches above the top of the rail, a mechanical department supervisor must authorize the movement.

6.21.3: Track Obstruction/Unusual Conditions

When a train is instructed by the Train Dispatcher in the words, "BETWEEN (location) AND (location) BE GOVERNED BY RULE 6.21.3", within specified limits, train must proceed at a speed which will permit stopping short of slide, rock, washout or debris on track.

Rule Updated Date

April 1, 2015

System Special Instructions

Effective Date: April 1, 2015

Safety Management System

On August 29, 2019, NTSB Investigators received a briefing on the changes that are being made to UP safety under the new leadership of the Chief Safety Officer (hired April 2019). According to UP officials, UP is developing its safety program through the four pillars of a Safety Management System (SMS). There is a policy statement on safety that comes from the highest level of the organization and there are examples of existing and emerging risk mitigation procedures and programs. There are also risk analysis metrics, evaluation tools, and safety promotion activities. UP officials discussed changes that have been made to its efficiency check program. This program which is used by management to ensure the compliance by employees with UP rules has according to UP, shifted from a wide scope of "all" rule compliance to a targeted approach on the "most significant" 31 rules which when violated have the greatest potential to result in a significant or fatal injury. UP has also moved towards discussions and coaching sessions post rule violation whereas previously these violations could be met with immediate termination. It was explained to investigators that this presents a significant shift in how management will interact with employees. Additionally, UP officials discussed training initiatives for managers and interacting with employees. UP officials highlighted their coordination with labor unions on these initiatives and believe that the labor unions are extremely pleased with the new approach. This was highlighted as the cornerstone of the new approach to safety management and the CSO described UP's SMS as in the initial stages of development and maturity. Another initiative that was discussed is UP's push to evaluate decisions that have been made over the past several years and the impact that those decisions have had on the safety of train operations. This was explained as an ongoing initiative. Staffing levels of the safety office were discussed, and that the safety office is expected to grow in the coming year.

Interviews

The Operations Group conducted 3 interviews during the on-scene phase of the investigation. Interviews conducted included:

- Engineer
- Conductor
- Dispatcher on Duty

Additional Interviews were conducted after the on-scene phase of the investigation. Interviews conducted included:

- District Superintendent, Fort Worth Parks and Recreation Department
- Director of Transportation, Tarrant County
- Union Pacific Chief Safety Officer

