

# NATIONAL TRANSPORTATION SAFETY BOARD

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

## TRACK FACTUAL REPORT

**RRD19FR007**

### **Derailment of Denatured Ethanol Unit Train with Subsequent Fire**

**Fort Worth, Texas  
April 24, 2019**

**A. Accident Identification:**

|                       |  |
|-----------------------|--|
| NTSB Accident Number: | RRD19FR007                             |
| Date of Accident:     | April 24, 2019                         |
| Time of Accident:     | 12:33 a.m. (CST)                       |
| Railroad Owner:       | Union Pacific Railroad (UP)            |
| Train Operator:       | Union Pacific Railroad                 |
| Type of Train and No: | Denatured Ethanol Unit Train, UEBLTG20 |
| Crew Members:         | 1 Engineer, 1 Conductor                |
| Location of Accident: | Fort Worth, Texas                      |
| Subdivision:          | Midlothian Subdivision                 |

**B. Accident Summary:**

For a summary of this accident, refer to the *Accident Summary* report within the docket, RRD19FR007.



Figure 1- photo shows the destroyed track infrastructure and derailed/damaged tank cars with re-rail cranes working in the background. Picture is taken looking north in the area of the point of derailment at milepost 48.8.

**C. Midlothian Subdivision:**

The subdivision operates between Midlothian Junction, milepost 50.2 and ends at Garrett Junction, milepost 0.0. The main track authority for trains and other equipment operating on the Midlothian Subdivision between milepost 50.2 and milepost 0.0 is Track Warrant Control (TWC) and Automated Block System (ABS) rules listed under Special Instructions SI-01, Main Track Authority.

The mileposts on the Midlothian Subdivision decrease in a north to south direction. The UP operates about 11.5 trains daily or averages about 4,186 trains yearly over the subdivision. According to UP documentation, the 2018 total tonnage figure for the Midlothian Subdivision between milepost 50.2 and milepost 0.0 was about 37.2 million gross tons. Trains operate on the Midlothian Subdivision between milepost 50.2 and milepost 47.5 at a permanent speed restriction of 30 mph.

**D. Track Description:**

The Midlothian Subdivision track is constructed with 9-inch by 7-inch standard timber crossties measuring 8 foot 6 inches long and spaced on 24-inch centers (nominal). The running rail section consisted of 133 pound RE vacuum treated (VT) continuous welded rail (CWR) manufactured in September 2001. The running rails were fastened to the crossties through double shoulder tie plates with standard cut spikes to secure the track gauge. The cut spiking pattern consisted of one rail hold spike and one anchor holding spike on the field side of the rail and two rail holding spikes in the gauge of the rail. Every other crosstie was box anchored with rail anti-creepers that assist in restraining longitudinal movement of the continuous welded rail due to train dynamics and thermal forces.

A 20-foot inner guardrail was secured in the gauge of the track with double shoulder tie plates and cut spikes under the overhead Fort Worth and Western Railroad (FWWR) overhead bridge to protect the concrete bridge abutment walls from derauling equipment. The inner guardrail was gauged 12 inches away from the west rail. The track structure was supported with AREMA No.4 granite rock ballast. Investigators noted that UP maintenance forces completed an 80% tie renewal program that covered the entire Midlothian Subdivision in a 3-month period, ending March 2019.

**E. Subdivision Physical Characteristics:**

Traveling south on the Midlothian Subdivision and starting at milepost 50.23, the southbound train traversed a left-hand compound curve that measured 3,554 feet in-length on a descending track grade of -1.20%. The train exited the curve and traversed 468 feet of tangent (straight) track. At milepost 49.50, the train traversed a left-hand curve that measured 932.81 feet in-length, on a descending track grade ranging between -1.32% to -1.29%. The train exited the curve and traversed 104 feet of tangent track at the Shamblee Drive railroad street crossing. At milepost 49.32, the train traversed a left-hand curve that measured 1,775 feet in-length, on a descending track grade ranging between -1.25% to -1.20%. The train exited the curve and traversed 156 feet of tangent track. At milepost 48.94, the train traversed a right-hand curve that measured 984 feet in-length, on a descending track grade ranging between -1.20% to -1.23%. Investigators determined the point of derailment (POD) to be at milepost 48.8 where the train was traversing short tangent track and entering a 4° 13-minute right-hand curve with 1 ¾" super-elevation on a descending track grade between -1.20% and -1.23%.

Three locomotives, two buffer cars and 14 tank cars loaded with denatured ethanol

continued to traverse south over the point of derailment without derailing, with the head locomotive stopping around milepost 48.5. The accident resulted in the derailment of tank cars lines 17 through 42, totaling 26 derailed tank cars.<sup>1</sup>

#### **F. Post-Accident Track Geometry Measurements:**

Investigators documented track measurements and notes using thirty (30) track geometry stations at 15.5 foot intervals in the undisturbed portion of track to measure and document the actual track geometry measurements prior to the derailment location. Geometry stations were laid out from milepost 49.01, plus 468 feet north in a right-hand curve (left-hand curve for accident train directional travel). Track gauge and cross-level measurements were recorded at every 15.5-foot station.

Track gauge measurements ranged between 56 3/8 inches to 56 1/2 inches at the measured stations. Investigators noted no lateral track movement and took no exception to tie conditions or spike and anchor patterns. Cross-level measurements ranged between 3/16 inches to 1 1/8 inches at the measured stations. No longitudinal rail movement was noted at the rail base and rail anti-creeper area. Investigators noted that all track geometry measurements were within the engineering design range of UP's curve data and track profile charts. Investigators noted no wheel departure marks or indications of derailed trains wheels. UP inspects and maintains the Midlothian Subdivision to Federal Railroad Administration (FRA) track class 3 standards between milepost 50.2 and milepost 47.5, which allows for a maximum operating speed of 40 mph for freight trains. Trains are restricted to a permanent 30-MPH speed restriction between

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<sup>1</sup> Union Pacific train consists are numbered from the rear of the train, with the furthest railcar from the locomotives at position or line number 1. Therefore, the original train consist indicated the derailed tank cars were in position or lines 57 through 82.

MP 50.3 to MP 47.5.

**G. Post-Accident Track Inspection & Water Overflow Damage:**

Prior to the accident, the City of Fort Worth and surrounding jurisdictions received large amounts of rainfall over several days, which caused Echo Lake to overflow onto the railroad property on April 16, 2019 and April 24, 2019. The water level was still high with water still overflowing onto the railroad's property when investigators arrived on scene. Investigators noted that from milepost 49.03 (overhead railroad bridge) to about four hundred feet north, the west ballast shoulder was washed away exposing the west tie ends, with standing water in the gauge of the track. Investigators noted that large amounts of water was flowing down the west side of the track structure, where the lake's water was actively overflowing onto the railroad property. Investigators determined that about 670 feet of the tracks west shoulder (right side of track in direction of train travel) was washed out at this location. Investigators also noted large piles of ballast covering both rails sporadically throughout the inspected portion of track. (see figures 2 & 3)

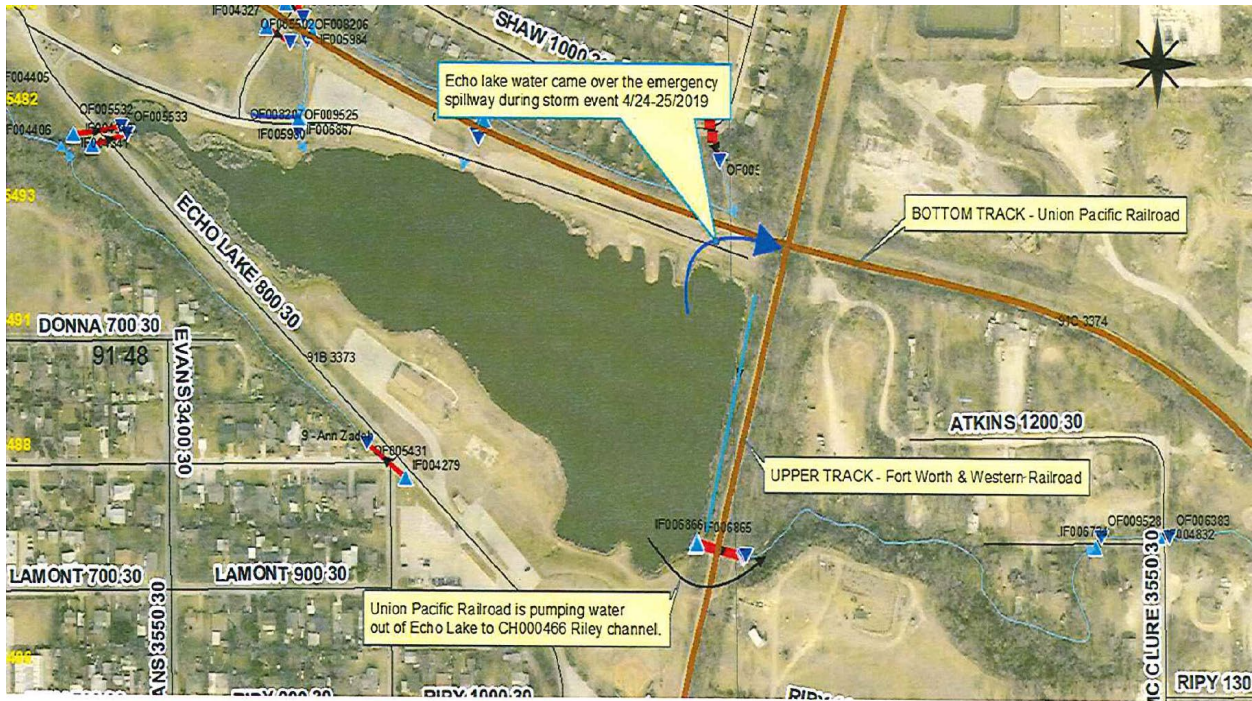


Figure 2- graphic of an overhead map showing Echo Lake and the Midlothian Subdivision track and surrounding properties. Blue arrow from Echo Lake indicates where water overcame the railroad property.

[Alt. text: Computer generated graphic of an overhead map showing Echo Lake and the Midlothian Subdivision track and surrounding properties. In the center of the graphic shows the location and shape of Echo Lake. The Midlothian Subdivision track is directly above Echo Lake and travels from left to right. A blue arrow extends from the upper right portion of Echo Lake indicating where water overcame and entered onto the railroad property.]



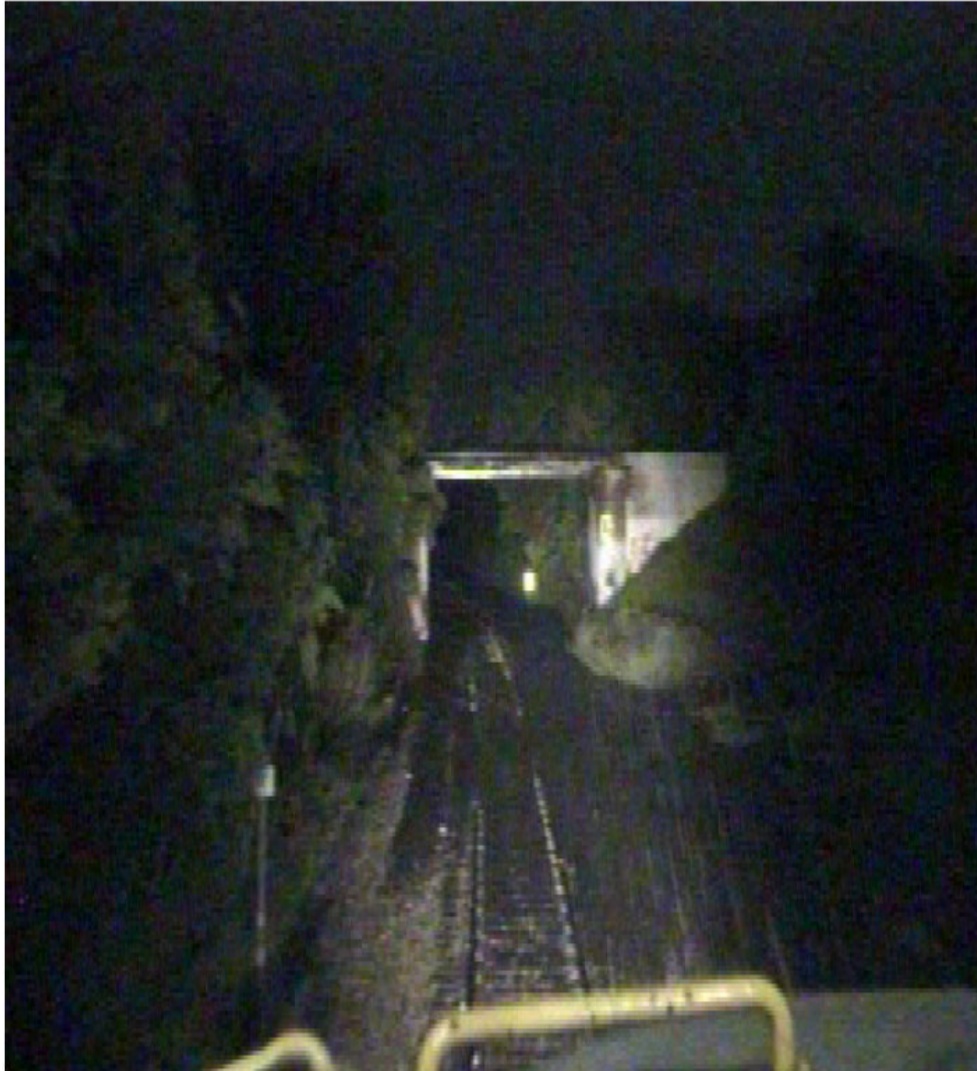
Figure 3- Post flooding and accident photo taken of the railroad track looking south towards the derailment location with active water flowing to the right (railroad west) and washed out shoulder and crib ballast. Note in the foreground where the ballast was washed up and over the railroad track.

[Alt. text: This photo is taken looking south towards the derailment site location. In the center of the photo shows a single intact railroad track with wooden crossties and a heavy stream of water running down the right side (railroad west) of the track in a downhill direction. Standing pools of water are located to the right of the railroad track. All the rock supporting the railroad track structure has been washed away from the flooding waters. Also, in the center of the picture is the Fort Worth and Western Railroad overhead bridge running over top of the bottom pictured track. At the top of the photo you can see the derailment site and cranes working to remove the derailed tank cars.]



DVR Video Snapshot

C:\Users\lloft\OneDrive - NTSB\Desktop\Accident Folder\UP Midlothian Texas\UP2677\_FIC\_2019-04-24\_00-33\_11733.lavi : Locomotive UP 2677 Source: UDP 4001  
Wed, Apr 24, 2019, 1:32:15 AM (Eastern Daylight Time)  
Event: No event selected



Video Capture Size: 704 x 480 pixels  
Video Frame Time: 4/24/2019 1:32:15 AM (Eastern Daylight Time)

Figure 4- Forward facing video from UP locomotive 2677

[Alt. text: Photo is from a screen shot taken from the forward-facing video. The photo shows a flooded track in front of the train.]

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Wed, Apr 24, 2019, 1:32:23 AM (Eastern Daylight Time)

Event: No event selected



Video Capture Size: 704 x 480 pixels

Video Frame Time: 4/24/2019 1:32:23 AM (Eastern Daylight Time)

Figure 5- Forward facing video from UP locomotive 2677

[Alt. text: Photo is from a screen shot taken from the forward-facing video. The photo shows a flooded track in front of the train.]

On the east side of the track there is a street drainage culvert that is located about 100 feet north of the overhead bridge at Todd and East Shaw Street, where water runoff drains onto the railroad property and pools under the overhead bridge. Investigators noted active water flow from the street drainage culvert and vegetation that laid over in a south direction for about two hundred feet indicating that at one time large volumes of water was actively flowing in a southward direction from the street culvert onto the railroad property. (see figures 6, 7 & 8)



Figure 6- photo show a street drainage culvert located on the left side (railroad east) of the railroad with active water flowing onto the railroad property.

[Alt. text: This photo shows a round shaped street drainage culvert and deep drainage ditch that supports storm water run-off. Water is coming out of the drainage culvert and flowing towards the railroad property (rail east). To the left and right of the drainage ditch is grass and

trees. In the top portion of the photo show the drainage culvert coming out from under the street with a house in the far background.]



Figure 7- Photo taken from the left side (railroad east) of the track and looking south. Photo shows a standing pool of water from storm water run-off from the street drainage culvert, with tall vegetation laying over in a southward direction indication water flow direction. Note of east bridge abutment wall of the Fort Worth and Western Railroad overhead bridge.

[Alt. text: This photo was taken while standing on the left side (railroad east) of the railroad track and looking south. Photo shows a standing pool of water with tall green vegetation laying over in a southward direction, indicating the direction of storm water flow. At the top of the picture is the east bridge abutment wall of the Fort Worth and Western Railroad.]



Figure 8- photo was taken while standing on the left side (railroad east) of the track and looking south. Picture shows vegetation laying over in a southward direction with debris piled up from the flow of storm water.

[Alt. text: This photo was taken while standing on the left side (railroad east) of the railroad track and looking south. Photo shows tall green vegetation laying over in a southward direction with debris piled up indication the flow of storm water. To the left in the picture is the railroad track.]

At milepost 49.33, there is a railroad crossing at Shamblee Drive that has two street culvert drains located north and south of the road crossing that run parallel to the track structure on the east side and under Shamblee Drive. The street culvert drains are in place to direct the water flow into the single culvert drain that runs directly under that track structure, south of the road crossing. Water from these culvert drains empty storm water runoff into Echo Lake. Investigators noted that large amounts of trash, weeds, timber and debris was clogging all three street drains and stopping the flow of water, allowing the water to rise and flow onto the track structure. Investigators also noted that tall vegetation located about twenty feet away from the culvert drains was laid over in a south direction indicating that at one time a large volume of water was flowing in a north to south direction, adjacent to the east side of the railroad property. Investigators noted fouled ballast on the east and west shoulders with moist soil directly south of the road crossing. (see figures 9, 10 & 11)



Figure 9- photo show a street drainage culvert that runs under the track and directs storm water run-off towards Echo Lake. Photo shows the drainage swell clogged and littered with trash, vegetation and debris.

[Alt. text: Photo shows a concrete street drainage culvert that runs underneath of the railroad tracks. To the outside of the drainage pipe shows the area littered with trash, dirt, debris and tall green vegetation. At the top of the picture shows an investigators legs from the knees down standing between the culvert and the left side (railroad east) of the railroad track. Railroad rock, the ends of crossties, along with crosstie plates can be seen in the upper portion of the photo.]



Figure 10- photo shows the Shamblee Drive street drainage culvert with standing non-flowing water due to vegetation clogging the waterway.

[Alt text: Photo shows a street drainage culvert totally clogged up with standing non-flowing water. The drainage waterway is clogged with tall green wet vegetation. The vegetation is laying over in a southward direction indicating the travel flow of water.]





Figure 11- Photo is taken standing to the right side (railroad east) of the track and looking north. Photo shows a totally clogged drainage waterway with large amounts of trash, dirt and debris.

[Alt. text: In the center of the photo shows a large amount of trash, dirt and debris, including rubber car tires, coolers, a green shopping cart, tree limbs and plastic bottles clogging a storm water draining waterway. The railroad track is to the left in the picture. A chain link residential property fence is to the right of the picture. Tall green and wet looking vegetation surrounds the debris pile.]

#### **H. UP Geometry Car Testing:**

UP provided geometry car inspection reports for the Midlothian Subdivision for the last twelve months. The most recent geometry car inspection was conducted on April 9, 2019 with UP's EC 603 test car. The report was reviewed by the track group and revealed no track geometry defects near the POD. The closest track geometry defect was discovered at MP 31.559, placing the defect over 17 mile south of the POD.

#### **I. UP Internal Rail Testing Data:**

UP provided geometry detector car / ultrasonic rail test reports for the Midlothian Subdivision for the last twelve months. The most recent test was conducted on December 06, 2018 with UP's DC 62 test car. The report provided to the track working group revealed that no internal rail defects were identified on that particular inspection run. The track group also reviewed ultrasonic rail testing reports from the previous twelve months, which included six internal rail tests. The reports revealed that nine internal rail defects were identified on the subdivision. The closest internal rail defect discovered near the POD in a previous inspection run was a 288" Vertical Split Head (VSH) identified at MP 48.49, placing the defect 1,636 feet south of the POD.

#### **J. UP Track Inspection Records:**

FRA regulations found in 49 CFR 213 require that a rail carrier's track inspection records be prepared and signed on the day of the inspection for frequency of compliance with the FRA Track Safety Standards (TSS). FRA track inspection records are required to reflect actual field conditions and deviations from the FRA/TSS. UP has elected to operate at FRA Class 3 speeds

in the accident area requiring UP personnel to inspect the main track at least twice per calendar week. As part of the investigation, UP track inspection records were reviewed by the track group and revealed that UP was in compliance with FRA inspection frequencies. The most recent inspection of the Midlothian Subdivision was conducted on April 23, 2019 between MP 12.89 and MP 50.26 and revealed no defective track conditions. The most recent defective track condition identified was a broken rail on April 12, 2019 at MP 44.3, placing the defect over 4 miles south of the POD.

**K. FRA Regulatory Track Inspection History:**

FRA conducted three track inspections on the Midlothian Subdivision in the twelve months prior to the accident. One of the inspections was completed by an FRA Track inspector and the two additional inspections were completed by FRA certified inspectors from the Texas Department of Transportation (TXDOT). The most recent inspection was conducted on January 30, 2019, between MP 33.06 and MP 50.30, where three track defects were noted at MP 40.10 by regulatory inspectors.

**L. FRA Automated Track Inspection Program (ATIP):**

FRA's ATIP geometry cars conduct operational surveys of the United States rail transportation network determining railroad compliance with Federal Track Safety Standards (TSS). Priorities for these ATIP surveys include passenger routes, major Hazardous Material (HAZMAT) and Strategic Rail Corridor (STRACNET) routes, and other track, which present a safety concern to the FRA. UP's Midlothian subdivision was last surveyed by DOTX 219 on April 10, 2012. After reviewing the data included in the report of this survey, it was concluded

that no pertinent information related to the accident investigation could be found in the records due to the amount of time that has elapsed since the survey was conducted.

**M. Echo Lake Ownership & History:**

The train derailment with subsequent fire occurred on a single main track portion of the Midlothian subdivision that is owned, operated and maintained by the Union Pacific Railroad. A portion of this single main track runs adjacent to Echo Lake and a recreational park that surrounds the lake. The Lake sets to the west side of the track structure and is utilized to support rain runoff from street and culvert drains and is also considered for recreational usage. At the time of the accident Echo Lake was owned by the City of Fort Worth, but storm water management and lake drainage maintenance and repairs were the responsibility of Tarrant County, per the city's agreement with the county. Investigators reviewed records that indicated that Tarrant County requested and received extensions to their maintenance and repairs responsibilities, dated back as far as 2017.

For years, dating back to 1974, the lakes ownership and maintenance responsibilities has drifted back and forth between Tarrant County, the Department of Parks and Recreation and the City of Fort Worth, Texas. Records indicate that the City of Fort Worth took ownership of Echo Lake on October 1, 2017, but the county was still responsible for all storm water and drainage repairs.

### **Echo Lake Park – Ownership Timeline- April 30, 2019:**

- **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** – 1<sup>st</sup> 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** – 2<sup>nd</sup> 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** – 3<sup>rd</sup> 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** – 4<sup>th</sup> 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 receives voicemail from NTSB investigator. Superintendent speaks with investigator and informs him 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.” Superintendent emails investigator a copy of the ILA and Exhibit E (site plan for County drainage improvements). County drainage improvements to be completed no later than September 30, 2017.

**N. Lake Echo Past Flooding Events:**

The Manager- Track Maintenance described Lake Echo as being a problem to him and other past MTM’s due to its flooding history. Investigators reached out to UP officials to provide data on the history of Lake Echo and past flooding incidents. UP searched back 10 year into their “Highwater Events Report” and could only provide the following data:

- September 8, 2010- described as a washout event with a heavy flow of water from MP 49.00 – MP 49.010.
- September 8, 2010- described as a washout event with a heavy flow of water from MP 47.00 – MP 47.500.
- June 24, 2014- described as a washout event from MP 48.60 – MP 48.70. Five cars of ballast used per the event log report.
- September 22, 2018- major flooding and washout event due to large amounts of rainfall which caused 1,200 feet of track to be washed out. Track deemed unsafe for train traffic and placed out of service.
- April 16, 2019- train reported flooding and high levels of water in the lake overflowing onto railroad property. Inspected by track inspector and deem safe for train traffic due to

flood water being contained to the drainage ditches.

- April 24, 2019- major flooding and washout event due to large amounts of rainfall contributing to the derailment and resulting fire of a denatured ethanol unit train UEBLTG20.

**O. UP's Manager of Track Maintenance (MTM) Interview:**

The investigative team interviewed the Manager of Track Maintenance (MTM) that is responsible for track inspection and maintenance of the Midlothian Subdivision.

- Hired as trackman in 2005
- Worked his way up to truck driver and foreman
- Track Supervisor position in 2012 in system rail
- Track Supervisor position in 2015 in Fort Worth service unit
- Manager of Track Maintenance in 2017 on Midlothian Subdivision

The current MTM has over 18 years of railroading track maintenance and inspection experience. The MTM currently manages over 100 miles of mainline railroad and 3 switching yards. His territory consists of the Midlothian Subdivision from MP 0.0 to MP 50.3; the Ennis Subdivision from MP 230.94 to MP 260, a partial of the Dallas Subdivision going west from SP Junction to MP 212.7; and a partial of the Mineola Subdivision from SP Junction to MP 206.0.

His duties include maintaining the track to UP track standards, scheduling track and interlocking inspections, mentoring track inspectors, track maintenance scheduling, performing audit inspections and efficiency testing. He currently has two track inspectors, two track foremen, a welding gang and tamping gang that fall within his chain-of-command to assist in supporting his duties. The MTM stated that since taking over the subdivision he has had zero



mainline derailments, slow orders (speed restriction) are to a minimum, and zero FRA violations.

The MTM described the history of Lake Echo and how it effects his railroad. The MTM stated that on September 22, 2018, the lake overflowed onto the railroad property from large amounts of rain, causing over 1,200 feet of track to be side washed out. The MTM stated that the track was washed out from the Fort Worth and Western Railroad (FWWR) overhead railroad bridge to about 1200 feet south, causing the track to be removed from service. On April 16, 2019, a train reported high water level in the lake and water overflowing onto the railroad property, but it was determined that the overflow was being contained to the existing drainage ditches. This time the track was not removed from service and no speed restrictions/slow orders enforced. The MTM stated that speaking with previous MTM's, Lake Echo has been overflowing with water for quite some time.

The MTM stated that anytime they get a flash flood warning tag from the dispatching center in that milepost range or on the northern end of the Midlothian territory, that is the first place they go and inspect. The inspections occur every two hours until the flash flood is expired, then a final inspection is performed to ensure everything is all good for train service. The MTM stated that his track inspectors are empowered to restrict track speed or remove the track from service.

The MTM stated that this current accident, he did not receive any severe weather alerts or no flash flood warnings. He stated that there were several flash flood tags issued around his territory but wasn't sure of the exact time frames. He did receive a flash flood tag around 3:30 a.m. from UP's dispatch center, but the lake had already overflowed, causing the track to be flooded out, derailling the train.

The MTM stated that the city maintains the street drainage culverts and since taking over the

MTM responsibilities, he has never seen the city clean or maintain any of the drainage culverts. He also stated that the city residences that run along the railroad property, they throw their trash and debris over onto the railroad property which ends up going into the drainage culverts and clogging the drains.

**P. UP Post Accident Actions:**

UP started post-accident mitigations four days after the accident to assist with storm water runoff from Lake Echo by; (1) constructing a 1,300' storm water drainage ditch along the west side of the track to control water run-off, (2) constructing a 1,600' storm water drainage ditch along the east side of the track, (3) installed seven- 450 gallon per minute (gpm) water pumps to assist with lower the water levels in Lake Echo, (4) cleaned out the drainage culverts that support Lake Echo water levels by removing trash, dirt and debris, and (5) cleaned out and removed standing trash, dirt and debris from and around the street drainage culverts at the Shamblee Drive railroad crossing, and (6) constructed a water run-off berm to block any water runoff from Lake Echo.



Figure 12- Large high-volume portable water pumps are being used to assist with lowering the water level in Lake Echo for lake culvert repairs. (Photo courtesy of UP)

[Alt. text: This photo shows 3- very large vehicle towed high volume water pumps. Each pump has an orange flexible suction tube measuring 6 inches in diameter hooked to the front of the water pumps. The other end of the tubes are submerged in the water of Lake Echo and actively pumping water from the lake and re-directing it to another location]



Figure 13- Overhead photo taken from the Fort Worth and Western Railroad overhead bridge showing the newly constructed track and new clean ballast looking south. The derailment occurred at the top portion of the photo where the track curves to the right. Note the track how digging the new west side drainage ditch and overflow berm. (Photo courtesy of UP)

[Alt. text: Overhead photo taken from the Fort Worth and Western Railroad overhead bridge showing the newly constructed track and new clean ballast looking south. In the center of the photo show the new constructed track with fresh new and clean railroad rock. At the top portion of the photo, a large track hoe is sitting in the middle of the track digging a new water drainage ditch along the left side (railroad west) of the railroad track. The upper top left of the photo show an old brick factory building with a brick smokestack to the right of the building.]



Figure 14- Photo shows a newly constructed water overflow berm constructed by Union Pacific to protect the railroad property from water overflowing from Lake Echo. (Photo courtesy of UP)

[Alt. text: Photo show a newly constructed dirt water overflow berm constructed by UP.

In the center left of the photo and in a left to right direction, shows the dirt berm extending from edge the railroad rock over to the bank of lake Echo. The top left portion of the photo shows the west bridge abutment and overhead railroad track of the Fort Worth and Western Railroad.]

**Q. Damages Estimates:**

UP officials estimates that track damages and rebuilding efforts are reported to be approximately \$832,482. This consists of the installation of sixteen 39-foot track panels totaling 624 feet of new track construction, over 3,000 feet of renewal ballast, fielding welding of 64 rail joints and track tamping and surfacing. This does not include the additional costs associated with remediation efforts.

**R. Attachments:**

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