

# National Transportation Safety Board

RRD20LR005

Union Pacific Railroad Company  
Train Derailment with Bridge Strike and Fire  
Tempe, Arizona  
July 29, 2020

## Operations Group Chairman Factual Report

R. A. Hipskind, IIC & Operations Group Chairman

Date: November 4, 2020

## Synopsis

On July 29, 2020, at approximately 6:07 a.m. local time, a northbound Union Pacific (UP) freight train, MTUPX-29, with three locomotives and 97 cars, derailed 12 cars at the south end of the bridge over Tempe Town Lake UP's Phoenix Subdivision in Tempe, Arizona.<sup>1 2</sup> The train was operating on a single main track at 23 mph while crossing the bridge when the derailment occurred. The 12 derailed cars were located 49<sup>th</sup> to 60<sup>th</sup> from the head end of the train. Initial reports included information that the bridge collapsed and a fire ensued. Included in the 12 derailed cars were three hazardous materials tank cars loaded with UN1915 Cyclohexanone (Class 3, PGIII).<sup>3</sup> Two of the three of the hazardous materials cars rolled into a void created by the bridge collapse. UP reported about 500 gallons released from GATX 90208, a DOT-111A100W1 tank car. A third tank car partially derailed and was reportedly leaning near the south end of the void but did not release any material.

The railroad bridge collapsed over the Rio Salado Parkway temporarily shutting it down due to the obstruction of debris and for the containment and mitigation phase of the emergency response to the fire and reclamation of the hazardous materials spill. One person, an emergency responder, was reported treated and released for smoke inhalation at a local hospital. An evacuation of a small area near the accident was initiated. Air traffic from Phoenix Sky Harbor International Airport was diverted away from the derailment area due to heavy black smoke accumulation.

The Federal Bureau of Investigation (FBI) had the lead for the first two days while it investigated possible criminal activity. Their on-scene investigation was completed on July 30<sup>th</sup> without reported evidence of criminal activity prior to the derailment.

The weather at the time of the derailment was about 90 degrees Fahrenheit with winds from north to northwest at 5 to 8 mph. The skies were clear with visibility of 10 miles.

Damage estimated by the railroad for the equipment were near \$465,000; estimates for track and structures is \$435,000 and the bridge damages estimate is \$8.5 million.

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<sup>1</sup> UP Timetable for the Phoenix Subdivision lists train movement as either eastward or westward; however, for purposes of this report, NTSB will use geographic direction. Thus, as the train was traversing the Tempe Town Lake Bridge, it was moving in nearly a due north direction, so instead of defining the train movement as westward, the report defines the train's movement as northbound. Geographic direction will be used throughout the report.

<sup>2</sup> Forty-eight of the fifty States go on daylight savings time each spring ("Spring ahead"), Arizona and Hawaii do not. Because the UP spans a wide regional area with more States using daylight saving, they elect to use day light savings time for their official railroad time during this time of the year. In this report, we will only use "Tempe time" (meaning AZ standard time, which is Pacific Daylight Time (PDT)).

<sup>3</sup> Cyclohexanone is classified as a Class 3 flammable liquid, packing group III. The safety data sheet (SDS) listed cyclohexanone by its trademark name Nadone® and described the material as a clear, colorless liquid that has a "mint-like acetone-like" odor.

## Aerial View:



**Figure 1.** Aerial photo of the derailment site. Red arrow shows direction of train. Light rail operation to the east of UP's right-of-way.

## Circumstances Prior to the Accident:

### Train MTUPX-29:

On Tuesday July 28, 2020, a Union Pacific (UP) train crew, consisting of an engineer, a conductor and a brakeman reported for duty at Tucson, Arizona, at 09:05 p.m., local time. According to crew interviews, the crew reviewed their paperwork and assembled their train at the Tucson Yard and completed the required air brake test before departing the yard. The train was destined for Phoenix, AZ and departed Tucson with three locomotive and 102 cars. However, investigators learned after reviewing the train list and from interviews with the crew that the train crew completed a delivery of six cars at (lines 63 through and including 68) in Randolph, Arizona at Western Emulsion. During a second switching move, the crew picked up one car, VMSX 5313; and placed this car in the train, between ETTX 852014 and BNSF 301627. After making the delivery and pick-up moves, train had a total of 97 cars at the time of the incident.

### **Accident Sequence:**

The engineer stated in his interview that as the train “came around the corner” [the curve prior to the bridge] on the approach to the bridge and that he had already reduced the train’s speed from 40 mph down to around 22-23 mph in compliance with a 25 mph permanent speed restriction that began at milepost 915.8 [the start of the curve prior to the bridge]. He said that the trip was “uneventful” until the train went into emergency when the head end had crossed the bridge over Tempe Town Lake. He said he noticed the train went into emergency and that the train slowed “smoothly” from about 23 mph before coming to a stop. The crew discussed who would walk the train to determine the cause of the emergency braking. The brakeman walked south toward the bridge and observed smoke near the south end of the bridge and notified the engineer and conductor. A review of event recorder data indicated that the train went into emergency about 6:07 a.m. and confirmed the train was going 23 mph when it went into emergency. Several minutes after the train stopped, the UP dispatcher called the crew via radio and informed them that the Tempe Fire Department was aware that their train had derailed and there was a fire near the south end of the bridge.

The brakeman said that a UP officer assisted him in decoupling the non-derailed equipment (the 49<sup>th</sup> car from the head end) from the derailed equipment on the bridge and that it was their intention to “salvage” the head end cars by pulling them north off of the bridge. Eventually, the engineer pulled the train north to 48<sup>th</sup> Street crossing and tied the train down until a relief crew boarded the train. The crew said that they had been on duty close to their hours of service limit by the time they arrived at the crossing. The conductor said he job briefed with the relief crew and provided them the paperwork for the train.

The accident train crew traveled in a crew hauler and were taken to a facility to provide samples for toxicological testing. After toxicological samples were taken, the crew was driven to downtown Tempe where they were interviewed by agents for the FBI and local Tempe police.

All three crewmembers said that they did not see or feel anything when the head end of the train traversed the approach at the south end of the bridge.

### **Operating Documents**

The crews were governed by the General Code of Operating Rules, effective 4/1/2020. The territory is designated the Union Pacific Sunset Division, Phoenix Subdivision. At the time of the accident, the current timetable was Sunset Area Timetable No. 5, effective 05/10/2019. The applicable supplements to the operating rules were:

- System Special Instructions – Dated 05/10/2019
- Air Brake and Train Handling Rules – Dated 05/10/2019

## **Method of Operations**

Trains were governed and authorized by signal indication. The territory uses Track Warrant Control (TWC) and an Absolute Block System (ABS) with the train dispatcher stationed at the Harriman Dispatch Center (HDC), located in Omaha, Nebraska.

At the accident site, there was a single main track, signaled for train movements in both directions as part of an ABS.

## **Toxicology**

Quest Laboratory conducted FRA-mandated postaccident toxicology for the engineer, conductor, and brakeman in accordance with federal regulations.<sup>4</sup> The results of the toxicology tests for the engineer, conductor and brakeman were negative for tested-for drugs and alcohol.

## **Crew Interviews**

On July 31<sup>st</sup> investigators interviewed the engineer, conductor, and brakeman of MTUPX-29

### **Engineer's Interview:**

The engineer was asked to characterize his employment and to recount his activities and recollections from when he went on duty through the accident date.

- He stated, “been with the Union Pacific for 17 years, and I’ve held an engineer’s license for about 12, and I’ve been working as an engineer for the last 5 years.”<sup>5</sup>
- He stated, “I think we went on duty around 2015, 8:15 p.m., out of Tucson; left Tucson within a few hours later. We had work at Randolph, stopped at Magma. It was, you know, no – an uneventful evening, and the sun was just coming up. It was probably around 6:00 in the morning as we – you come around the corner into Tempe, and the speed changes from 40 to 25. There was an approach signal right there before the bridge, so my conductor called that out.”<sup>6</sup>

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<sup>4</sup> Quest Laboratory tested specimens for alcohol, amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, opiates/opioids, phencyclidine, tramadol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine.

<sup>5</sup> Engineer’s interview’s, page 6, lines 17—19.

<sup>6</sup> Engineer’s interview’s, page 7, lines 6—13.

- He stated, “And about 20 or 30 cars passed the end of that bridge after the corner, and we went in emergency.”<sup>7</sup>
- He stated, “I looked at the screen, and the airflow went down to zero, and I bailed immediately and came to a pretty easy stop, you know. It maybe just barely jerked but no harder than normal. I mean, you know, you come apart with a knuckle here and there, and it felt just like normal. I looked at the conductor and said, I think we might have come apart; we just went in emergency. And he got his stuff together and started walking back, and he says over the radio look out your conductor’s – look out the conductor’s side window. And I look, and there’s this big smoke cloud.”<sup>8</sup>
- He stated, “the dispatcher called and said – NC – was it NCSS or NS – whoever the emergency calls that notify the dispatcher, and he said, yeah, they just called and they said your train is on fire. And both of those guys, the brakeman and the conductor, walk back.”<sup>9</sup>
- He stated, “Nobody ever came out to the unit, but a manager came over to the corner, which I guess was the easiest place for him to access. The brakeman met him there, and he cut us off where it seemed to be safe to do so, so we could pull the rest of the cars out of the way. And then we just pulled them up to 48<sup>th</sup> Street, a mile or so.”<sup>10</sup>

The engineer was asked, “how would you characterize when the head-end locomotives came across that south end of the bridge, did you see anything, did you feel anything?”

- He stated, “No. Yeah, those FBI guys said the same thing, and I do not remember feeling anything or seeing anything.”<sup>11</sup>

The engineer was also asked about how the bridge felt in the past.

- He stated, “I don’t remember if it was a dip, but I just remember – usually, you want to know where the problem is. Why is there a slow order? Oh, because of that. And so, I knew that there was a good reason, not just because I heard what happened, but because you could normally feel it. But this time, I don’t remember feeling it.”<sup>12</sup>

In addition to the statement above, the engineer said the post-accident he provided samples for toxicology testing and that he was interviewed by the FBI.

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<sup>7</sup> Engineer’s interview, page 7, lines 19—20.

<sup>8</sup> Engineer’s interview, page 7, lines 21—25; page 8, lines 1—5.

<sup>9</sup> Engineer’s interview, page 8, lines 8—13.

<sup>10</sup> Engineer’s interview, page 8, lines 20—25.

<sup>11</sup> Engineer’s interview, page 12, lines 2—3.

<sup>12</sup> Engineer’s interview, page 13, lines 1—6.

## Conductor's Interview:<sup>13</sup>

- He stated, in part, “I started with Union Pacific in 2015, as a train conductor. ....and I’ve been back for about a month now from the furlough here at Union Pacific.”<sup>14</sup>
- He stated, “I came on duty on July 28 at 9:05 p.m. railroad time. That’s, what, 2105 hours railroad time. I was called for the MTUPX, the 29. I came on duty, did my paperwork, regular stuff. We went over bulletins, all the train lists, everything; then we had to run our power around, hustle our power to the train. Then we have to – for a train running two different tracks, we put it from 29 to 28. We’ve got to ready – knock off the brakes. Went to the head-in and then took off, started going.”<sup>15</sup>
- He stated, “We had no issues at all going up the branch. We get into the Phoenix branch; I had to stop and do a car pick-up at Randolph, Old Randolph.”<sup>16</sup>
- He stated, “We went to New Randolph. There I had a, I believe it was a five- or six-car setup [setout].”<sup>17</sup>
- He stated, “We took off, waited at Jermand (ph.) [Germann] for one eastbound. As soon as the eastbound was here, we already had our track warrants to head to Phoenix. As soon as they catered [cleared] along the switch at Jermand [Germann], we took off. We started heading towards the Phoenix yard.”<sup>18</sup>
- He stated, “As we were getting close to the Phoenix yard, I get in contact with the yard master or the manager in charge. He gave us permission to enter yard limits, no track change [breach], no – nothing affecting our movement. As we’re going past the Tempe bridge, going around the little curve, felt a tug, noticed we went into emergency. Air wasn’t coming up on the rear. I got ready, started walking, and that’s when John told me to look over to the other side because I was walking on the left side of the train.”

“I go to the right side of the train, to the conductor’s side, and that’s when I see the smoke. And I started walking towards the rear of the train, then the dispatcher hits [says] on the radio that a concerned citizen called in a fire on a train. I kept on walking, and then dispatch had called again saying that, yeah, we were on the ground and we were on fire.

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<sup>13</sup> Note: The conductor provided the investigation with an errata sheet to make corrections to his interview; corrections appear in brackets for text identified for footnotes 16, 17 and 18 only.

<sup>14</sup> Conductor’s interview, page 6, lines 10—16.

<sup>15</sup> Conductor’s interview, page 6, lines 22—25; page 7, lines 1—4.

<sup>16</sup> Conductor’s interview, page 7, lines 10—13.

<sup>17</sup> Conductor’s interview, page 7, lines 19—20.

<sup>18</sup> Conductor’s interview, page 8, lines 5—9.

At that point, me and John, we talked about it. He was going to keep going towards the rear of the train to check out what was going on, and I went to the head-end to grab the paperwork with all the hazmat, all the train lists, and we were going to be in contact over the radio, communicating with each other about the hazmat and our train list.”<sup>19</sup>

Regarding the train traversing the south end of the bridge, the conductor was asked do you recall feeling anything, hearing anything, seeing anything that you thought was unusual at the south end – south portion of that bridge area?

- He answered, “No, I don’t. I didn’t see anything out of the usual. I did not feel anything out of the usual. When you go onto the bridge, you feel just like any other time that I’ve been through it.”<sup>20</sup>

Investigators asked the conductor about the accuracy of the paperwork and how they were relieved after taking the head portion of the train up to 48<sup>th</sup> Street.

- He answered, “Yes. I mean, I had everything up to date. I mean, every time I make a stop, I update everything right away.”<sup>21</sup> “Yes, sir. There was a crew there onsite relieving us. We did not get off the train until someone showed up to relieve us.”<sup>22</sup> “...we did job brief [with the relief crew]. We talked about what happened and I told them what had happened, and I told them that the list and all the required paperwork and everything was up there on the conductor’s side.”<sup>23</sup>

The conductor indicated that after the crew was relieved that he provided samples for toxicological tests and was interviewed by the FBI.

### **Brakeman’s Interview:**

- He stated, “On the 28<sup>th</sup> of July, we were called 2105 to work the MTUPX on the 29. I was called as the brakeman.”<sup>24</sup>
- He stated, “They brought the power after checking it out,...took it to Track Number 29, pulled the other cars out on Track Number 29, and joined with some cars that were on Track Number 28. Those cars were on air, had already been air-inspected, tested by the car department. We had our air slip handy....went back and got our EOT working and tested, and then we got in the vehicle and headed up to the head-end where we got on. We then received our permission to depart.”<sup>25</sup>

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<sup>19</sup> Conductor’s interview, page 8, lines 10—25; page 9, lines 1—4.

<sup>20</sup> Conductor’s interview, page 11, line 25; page 12, lines 1—2.

<sup>21</sup> Conductor’s interview, page 15, lines 10—15.

<sup>22</sup> Conductor’s interview, page 13, lines 21—22.

<sup>23</sup> Conductor’s interview, page 14, lines 3—6.

<sup>24</sup> Brakeman’s interview, page 6, lines 15—18.

<sup>25</sup> Brakeman’s interview, page 6, lines 19—25; page 7, lines 1—2.



- He stated, in part, “Went on to New Randolph, where ...-- we dropped the conductor off at the car that we were supposed to pick up, He made the cut on the main track. We proceeded to set out six cars, six tagged cars at New Randolph, and then we swapped it over to the other track and picked our car up, did our air test.”<sup>26</sup>

I want to put in here, too, at that point we didn’t need a track warrant for ABS territory. We were still operating on CTC. Once we did that, we received our warrant to operate on ABS territory from the dispatcher. That warrant told us that we were going to proceed to a siding called Jermand (ph.)[Germann] safest siding and wait for the arrival of another train, a southbound train. We were northbound.”<sup>27</sup>

- He stated, “And we headed north. And after passing the Tempe Bridge, we came to a stop. And for me, it was a very smooth stop, so not really understanding what was happening for a second, then over the radio I hear that they’ve gone into emergency, and our conductor was getting off the head-end to walk the train.”<sup>28</sup>
- He stated, “And at that point, I looked over just off the right-hand side, and I saw a plume of smoke around the corner. I told him to come up on the engine and look at it, as well; he did. So we both stepped down on the south side of the tracks and started walking. As we were walking, we were job braking. At that time, I made a point to tell him that I would prefer if he went back to the head-end and called it in and got all the hazmat paperwork handy in case I had any questions as I continued to walk through, and he did.”<sup>29</sup>
- He stated, “I walked about, let’s say, 40 cars, 45 cars. As I came around the corner, underneath the overpass, I then actually was able to see the bridge, and I did verify at that point that we had a problem. Our train was on fire. I could see a number of lumber cars already burning. But from my angle on the west side of the bridge, I didn’t see any derailment because you can’t see it from there. So, I had no idea that we had actually derailed.”<sup>30</sup>
- He stated, “So the dispatcher, right around that point, came back and said that he didn’t want any of us near the incident. So, I gave Mario a car number, the car number I was standing by, the sugar car. I have the car number here if you’d like me to read it. Okay. It’s T5LX518747, a sugar hopper. I gave him that car number, and I told him that we were on fire probably another eight cars east of that location. At that time, I turned around and walked back up to the head-end to await further instructions.”

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<sup>26</sup> Brakeman’s interview, page 7, lines 12—20.

<sup>27</sup> Brakeman’s interview, page 7, lines 21—25; page 8, lines 1—2.

<sup>28</sup> Brakeman’s interview, page 8, lines 19—24.

<sup>29</sup> Brakeman’s interview, page 9, lines 4—12.

<sup>30</sup> Brakeman’s interview, page 9, lines 19—25.

“When I got back to the head-end, and after a few minutes, we received a call from a Union Pacific official, Kevin Moore [Murphy], asked that one of us would meet him back there so we could salvage whatever cars we could salvage. At that point, we were at less than an hour to work, so we took it as an urgent request. I got off the train and proceeded to walk back again to the bridge.”

“I met Kevin, we walked back to it, and then I asked Kevin where he wanted to make a cut. He informed me that indeed the sugar car is what we were leaving with. So, we secured what we were leaving with a brake and got a pin, made the cut. And he also instructed us to take it as far as 48<sup>th</sup> Street since we were running out of time, and at that point we would be relieved by another crew.”<sup>31</sup>

- He stated, in part, “So that’s basically what happened from the time I went on duty through our portion of the incident. As far as afterwards, we were asked to wait. We were going to proceed to make our statements. And we had to – based on the estimated loss, we had to go to a facility to have a tox screen done, both with blood and urine testing.”

“A representative showed up and along with the team, Concentra and a representative, they took our blood sample and urine sample, and then we were released from there after we made all the necessary chain of command – or what do they call it? Custody, chain of custody. We went back to the Phoenix yard office at that point. We finished our statements, which I’d like to read my statement if that’s okay? You guys already have a copy of that? This is what I wrote.”

“At 0708, the train MTUPX of the 29, came to a stop on the main line. As I was exiting the second unit to join the conductor to walk the train, I noticed a plume of smoke east of our location. I send the conductor back to the head-end to call and retrieve hazmat info while I walked the train. As I came around the corner, I saw multiple cars on fire on the Tempe Bridge. The dispatcher advised us to stay clear, so I went back to the head-end. John D. Hartlep on July 29<sup>th</sup>, 2020.”

“We wrote our statements, and then we were briefed that we would meet with the command and control team at the incident site. The Union Pacific police officer took us to that site. We met with – I wish I could tell you the names. I didn’t write them down. But we met with a representative of the FBI and a detective from the Tempe Police Department. We met separately. I went first and I was interviewed, probably six or seven questions, for about 15 minutes; then I was relieved. Our engineer second, and then our conductor went in last. After the interview, we were taken back to the yard office, received accommodations at the Holiday Inn. We went, got our rest, and we deadheaded back to Tucson the next afternoon. Once we tied up, we were placed on critical incident, 3 days off (indiscernible). And that’s basically what happened.”<sup>32</sup>

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<sup>31</sup> Brakeman’s interview, page 10, lines 3—24.

<sup>32</sup> Brakeman’s interview, page 11, lines 3—25; page 12, lines 1—25.

The conductor was asked about any notification from any hot box detectors that the train may have encountered.

- He stated, “Your assumption is correct, and we didn’t get a peep back, either verbally or mechanically from any of the detectors that we passed. We have a talking detector right out the gate; nothing on that one. The other detector is on the CTC. When anything went wrong, we would receive notice from the dispatcher.”<sup>33</sup>

The brakeman was asked about his recollection as what he saw, felt, or heard when the train got to the bridge.

- He stated, “The short answer to your question is no. I didn’t feel anything. I didn’t see anything. Again, I was facing south, so my field of vision wasn’t out the front window as we were traveling. So, the answer to your question is no. I neither felt anything or saw anything that was abnormal for our trip.”<sup>34</sup>
- About his seniority, he stated, “I hired on January of ‘07, so I’m in my 13<sup>th</sup> year.”<sup>35</sup>

## **Records Requests and Received**

- Operating Rule book General Code of Operating Rules (GCOR)
- Timetable
- General Orders
- Train Bulletins
- Service Interruption Report
- Train Dispatcher Radio recordings
- Local Radio recordings
- Event Recorder printout
- System Special Instructions – Dated 05/10/2019
- Air Brake and Train Handling Rules – Dated 05/10/2019

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<sup>33</sup> Brakeman’s interview, page 13, lines 6—13.

<sup>34</sup> Brakeman’s interview, page 14, lines 3—7.

<sup>35</sup> Brakeman’s interview, page 18, lines 2—3.

Parties to the Investigation - Acknowledgment Signatures

The undersigned designated *Party to the Investigation* representatives attest that the information contained in this factual report for NTSB's accident investigation RRD20LR005 for the Union Pacific train derailment with a bridge strike and fire in Tempe, AZ is a factually accurate representation of the information collected during the investigation, to the extent of their best knowledge and contribution in this investigation.

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//s//

Date 11-17-2020

Richard A. Hipskind, NTSB

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//s//

Date 11-19-2020

Lewis Burris, FRA

\_\_\_\_\_  
//s//

Date 11-17-2020

Joseph Pinkerman, Arizona Corporation Commission

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//s//

Date 11-19-2020

John Allberry, UP

\_\_\_\_\_  
(unavailable)

Date \_\_\_\_\_

Scott Jones, SMART

\_\_\_\_\_  
//s//

Date 11-19-2020

Jim Maynard, BLET