National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials
Washington, DC 20594

RRD23FR002

COMBINED FACTUAL

Group Chair's Factual Report

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A. ACCIDENT

Location:	Beaumont, TX
Date:	October 28, 2022
Time:	12:02 a.m. local time 5:02 a.m. universal time
Train:	C3 Shift

B. COMBINED FACTUAL

IIC	Troy Lloyd Inspector-in-charge National Transportation Safety Board (NTSB)
Group Chair	Michael Bachmeier Operations Group Chairman NTSB
Group Chair	Michael Hoepf System Safety NTSB
Party Coordinator	Stacy Chavez IIC / Operations Federal Railroad Administration (FRA)
Party Coordinator	William (Grant) Gatlin Area Safety Lead ExxonMobil
Party Coordinator	Brian Camp VP Operations PSC Group
Party Member	Jason Crouch Operations Safety Inspector FRA

C. SUMMARY

On October 28, 2022, about 12:02 a.m. local time, PSC Group train 3832 struck and killed a train conductor while reversing southward at an ExxonMobil lubricant plant in Beaumont, Texas. Before the accident, the conductor, part of a four-person PSC Group train crew, was protecting the switching movement of train 3832, which consisted of one locomotive and 19 tank cars, to place the rearmost car near the end of Track 7 for product loading. Conditions were dark and clear, and the weather was 64°F.

In post-accident interviews with National Transportation Safety Board (NTSB) investigators, the engineer stated that the conductor, who was protecting the reverse movement from the ground near where the train cars were to be placed, radioed for the engineer to reverse the train back five cars and then three cars.[1] The train crew heard no further radio communication from the conductor after the three-car count, the brake pipe pressure started to decrease, and the engineer applied the train's emergency brakes. An ExxonMobil employee arriving to assume product loading duties found the deceased conductor.

[1] Railroad personnel commonly use railcar lengths to communicate distances during switching operations.

Figure 1: Satellite image of the accident location at the ExxonMobil lubricant plant. (Source: Google Earth Pro.)

D. DETAILS OF THE INVESTIGATION

1.0 Overview of PSC Group

The following description was taken from the PSC website:[2]

PSC Group (formerly known as Petroleum Service Corporation) is an operating company for the refining, petrochemical, terminal, and marine transportation industries. We work as a service provider within customers' facilities and with their equipment, using skilled employees trained to work in complex and hazardous manufacturing environments.

[2] http://www.pscgroup.com/

We offer the broadest suite of product handling, site logistics, marine operations, and ancillary services with the technical expertise, experience, and know-how to provide critical support through all levels of the petrochemical and fuel supply chains.

Since its founding in 1952 as the nation's first tankerman service, PSC has been committed to meeting industry needs for safe and efficient product handling and site logistics services. Our 4,000+ employees deliver quality service at more than 125 refineries, terminals, docks, and chemical plants across the U.S.

PSC Group offers everything you need for safe and efficient rail switching in the most challenging and complex sites. We manage more than 75 rail switching sites throughout the U.S. using our own fleet of advanced locomotives and mobile railcar movers, proven safety methods, and highly skilled personnel. We work closely with our customers to tailor our services to their unique needs utilizing over 70 locomotives, 40 mobile railcar movers (Trackmobiles and Shuttle Wagons), and more than 1,000 skilled employees to enhance safety, decrease cycle time, prevent derailments, and optimize railcar utilization.

2.0 Circumstances Prior to the Accident

On October 27, 2022, the crew for Train 3832 reported for duty at 6:00 p.m. local time, at the PSC Group office trailer inside the ExxonMobil lubricant plant in Beaumont, Texas. The crew consisted of a locomotive engineer, conductor,

brakeman, and new hire trainee. There is 24-hour coverage at this plant with one crew working the day shift and the other crew working the night shift.

According to the interviews, once the crew arrived and were on duty at the office trailer, they would have a job loss analysis (JLA) on safety issues they could come in contact while performing their job. After this JLA, they would go through a job briefing of the tasks and switching that they would do that shift. Once the two briefings are complete, they would head out to start their work. The conductor would get the switching instructions from the train schedulers from ExxonMobil. According to the engineer's interview, there was maintenance working on the BP track, so they took the cars to an ExxonMobil refinery yard. Once they put away those cars, they picked up cars for ExxonMobil chemical plant and went to switch out ExxonMobil chemical plant according to the instructions from the train scheduler.

Once they finished up the ExxonMobil chemical plant switching, the engineer stated that they were told to pull the train up to the office and wait for clearance from their on-duty night supervisor. After they were released by their night supervisor, then began switching and switched out tracks 8 and 9. Once tracks 8 and 9 were all switched out, they got the cars lined up and blocked for track 7 (pig trap track). The trainee was at the switch, and he lined the switch and gave the engineer instructions to back up and then handed off the shove move via radio to the brakeman who was at the crossing. According to the interviews, the brakeman took over the shove to get

them over the crossing. Once the shove movement made it over the crossing, the brakeman handed off the movement via radio to the conductor.

According to the interviews and audio recording review, the conductor then communicated to the engineer 8 cars to the north breezeway (first breezeway that the train encountered) and the engineer responded 8 cars. The train movement communications continued between the conductor and engineer with 4 cars, 2 cars, and then 1 car to the north breezeway. As the train cleared the north breezeway, the conductor radioed for the engineer to reverse back five cars to the next breezeway. The next communication from the conductor to the engineer was 3 cars to the breezeway with the engineer acknowledging. Approximately 30 seconds after the conductors last 3 car count to the engineer, event recorder data, along with inner-cab video viewed by NTSB investigators shows a sudden decrease in brake pipe pressure, along with the sound of air being released in the locomotive cab, and the engineer placing the train in emergency. Immediately after placing the train into emergency, the engineer radioed "what happened", "what happened", then seconds later said he states, "radio check". Several seconds later, a constant long sound is heard from the locomotive radio speaker. The inner-cab video continued to record, and never lost power. [3] [4] [5]

[3] A breezeway is simply a small pedestrian crossing that crossing the tracks. Track 7, the accident track had two breezeways known as the north and south breezeways.
[4] PSC uses 60 feet car lengths: for example, 3 cars=180 feet (3 cars X 60 feet)
[5] See RE event recorder data factual report in the accident docket

The engineer stated that he never received any further communications with the conductor after his last 3 car count, and a review of the locomotives download shows that the brake pipe pressure started to decrease and within 0.6 seconds the engineer placed the train into emergency to bring the movement to a stop. According to the interviews, the engineer called out to the brakeman to go and check on the conductor. The brakeman went to the rear of the train and found the conductor fatally injured.

According to the PSC Group Rack Operations procedure in place at the time of the incident, employees will walk on the west side of the track between spots 7-1 through 7-11. They will then walk on the east side of the track between spots 7-12 through 7-20. This is to make sure the employees walk on the safest side of the track. The conductor was found on the east side of the track at spot 7-1.

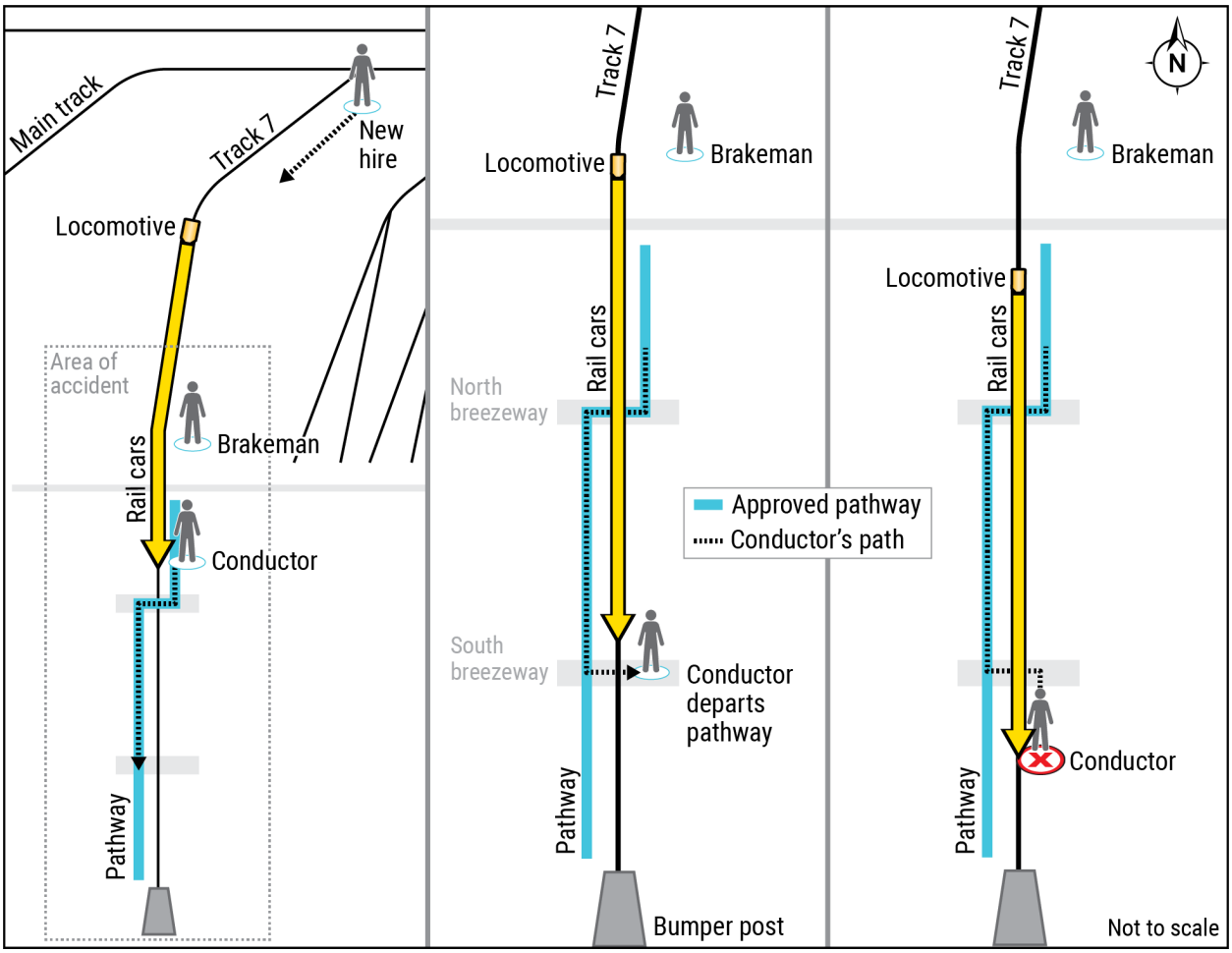

Figure 2: Diagram showing the walking path of the conductor and the PSC group approved pathway.

3.0 Two-Way Radio Communications

According to train crew interviews, there was some mention of the locomotive radio and portable radios not functioning properly. The portable radio used by the conductor was photographed in the track and taken into custody by the Beaumont Sheriff's Detective on the night of the incident. According to the detective, the radio was discovered between the walking platform and rail, and the microphone cord was laying over the rail with smashed wires, indicating that the train wheel ran over the

microphone cord. The antenna was still screwed into the radio, but the antenna had been broken completely through, and was severely bent.

An FRA Operations Inspector took possession of the conductor's radio from the detective on November 4th and took it to the PSC Group trailer to perform a test of the radio with a PSC Group operations manager. The damage to the radio consisted of a broken antenna, and train wheel contact to microphone cable, indicated by the smashed wires. The radio knob was in the off position, and the radio antenna base was still connected to the radio with the copper coil intact but bent to the side. As soon as the FRA inspector turned the radio on, the screen lit up and showed a low battery status. They replaced the battery and observed the radio to work as intended by receiving and transmitting communications. The two-way radio microphone cable wires were smashed together preventing communications via the microphone, but after installing another microphone, communications were received and transmitted via the microphone.

PSC also had the locomotive radio tested by a BearCom technician. BearCom, located in Beaumont, Texas, is a licensed two-way radio maintenance/dealer/installer, and performs work for PSC Group. The locomotive radio worked as intended by receiving and transmitting communications. NTSB also inquired to see if there were ever any safety issues/deficiencies or locomotive defects logged stating that they had ever had any radio issues with the locomotive or handhelds and PSC Group could not

find any logs of any radio issues. Even though the locomotive radio tested and worked as intended, PSC installed a new mobile radio in the accident locomotive.

Further postaccident investigative actions conducted by PSC revealed the following: Locomotive radio/inner-cab video recording systems – The mobile radio (locomotive radio) and the locomotive inner-cab video recording system both operate via a 12-volt power supply. Inside the locomotive, there is a single 12-volt inverter that supplies the power to operate both the locomotive radio, and the inner-cab video operating module. There is a single 64-volt breaker in the locomotive cab labeled as "Radio". This 64-volt breaker supplies the power to the inverter. If power is lost to the 12-volt inverter, it affects both systems as was demonstrated postaccident when the engineer flipped the 64 volt "radio" breaker, disabling both the locomotive and inner-cab video recording devices. This was indicated by the locomotive inner-cab video turning off, and then turning back on.

4.0 Inward facing video and audio timeline

The working group got together at 10:30 a.m. on Saturday, October 29th, to watch and listen to the audio recordings and build a timeline for the accident. Below is the timeline:

Time	Speed	Action
12:00:33 AM	3	Brakeman passes off to Conductor
12:00:44 AM	3	8 cars to the breezeway from conductor to engineer
12:01:24 AM	4	4 more cars to breezway
12:01:38 AM	4	2 more cars to breezeway
12:01:47 AM	3	1 car to breezeway
12:01:59 AM	3	Coming into breezeway, 5 cars to next breezeway
12:02:23 AM	3	3 cars to breezeway
12:02:53 AM	3	Angle cock on the rear end of shove movement places train into emergency
12:02:54 AM	3	Engineer places train into emergency
12:02:59 AM	0	Train stops

5.0 Locomotive event recorder timeline

The working group got together at PSC Group Office Trailer at 2805 Sycamore St. in Beaumont, TX at the ExxonMobil Lubricant Blending and Packaging Plant at approximately 7:00 p.m. local time on October 29, 2022, to review the CBFX 3832 event recorder. The team looked at the locomotive download and put together the timeline which is below. The throttle position was in idle, and it was determined that train handling was not a factor.

Locomotive CBFX 3832

Date	Time	Speed	Brake Pipe	Distance	Comments
10/28/2022	0:03:00.1	3.9	87	19554.9	Minimum Reduction
10/28/2022	0:03:00.3	3.9	79	19556.6	Angle cock opened
10/28/2022	0:03:00.4	3.9	53	19557.1	

10/28/2022	0:03:00.5	3.9	38	19557.7	
10/28/2022	0:03:00.9	3.9	13	19560	EIE
10/28/2022	0:03:01.4	3.9	1	19562.9	PCS Open
10/28/2022	0:03:07.0	0	0	19587.6	Movement Stops

6.0 Interviews

The investigative team conducted four interviews on Saturday, October 29th, 2022, at the Hilton Garden Inn in Beaumont, TX with the engineer, brakeman, brakeman trainee, and an ExxonMobil employee who worked the rack on track 7. Please refer to the docket for the full interview transcripts.[6]

7.0 Accident Site Inspection / Reenactment

On the night of October 29th at 8:00 p.m. local time, NTSB, and FRA, with the assistance of PSC Group and ExxonMobil leadership met on scene to create a reenactment of the train crews working scenario to see if we could better understand what caused the fatality. Due to differing conditions such as locomotive engine brake troubles and rain the reenactment did not take place.

We were, however, able to walk the entire facility and observed the following walking conditions (slick surfaces due to rain, hoses, couplings on ground, chocks left in walkway) of the area. The lighting in the area between the #1 spot where the

[6] The full interviews are located in the docket at this web address: NTSB Docket - Docket Management System

fatality occurred and the location the brakeman would have been standing was decent enough for the ground crew members to make each other out if they were looking in that general direction. The steam from the hoses in the facility did lessen visibility for each member of the crew on the ground. The team also was able to measure the distance from where the rail car stopped to the end of the track which was a distance of 35 feet.

Figure 3: Photo looking south from the end of the track showing the walking conditions from our on-site visit on October 28, 2022.

8.0 Mechanical

The FRA Motive Power and Equipment (MPE) Inspector conducted an onsite inspection of locomotive CBFX 3832, and the 19 tank cars involved and found no significant conditions which would have likely contributed to the accident. The following is the list of rail cars inspected: ECUX 405314, MBLX 28372, MBLX 28619, UTLX 664869, XOMX 310306, INFX 408122, UTLX 661295, GATX 3064, TILX 281265, XOMX 110271, XOMX 110335, SHQX 11284, TILX 281392, TEIX 112363, UTLX 640232, UTLX 224759, XOMX 100469, INFX 408124, and ECUX 410016.

He completed his inspection over the course of two days. He started his inspection on Friday, October 28th and finished on Saturday, October 29th.

9.0 Track

On Friday October 28, 2022, the FRA Track Inspector was notified of a conductor fatality that occurred in the Beaumont ExxonMobil Lubricant Blending & Packaging (B&P) facility. It was determined that a PSC Group male employee was struck and killed while performing a shoving move into track #7-(aka) pig trap track.

Upon arrival at the scene, he received a safety briefing, signed in, and determined that the ECUX-411016 was the subject tank car involved in the incident. The deceased individual (DI) was underneath the southeast corner of the car, located

between the first and second wheel, and partially wedged underneath the truck set. The crew, including the DI was spotting the #7 track with empty cars to be loaded while holding onto 19 cars total. The track they were shoving into at the time the incident occurred was completely tangent with no curves or grade. Both rails were secured into the concrete using permanent concrete style fasteners, with bolts and locking nuts applied at the base of the rail, along with intermittent, 1 inch thick all thread, which was bolted on both sides through the web of the rail. Using his FRA calibrated level board, he measured a loaded gauge measurement at the incident scene on both ends of the rail car, that measured 56-5/8" on the B end (north), and 56-3/4" on the A end (south)incident end). The gauge measurement underneath of the rail car also measured 56-1/4" static with 1/4" base of rail movement for a total gauge measurement of 56-1/2".

Figure 4: Gage Measurement showing 56-1/2”

All of the gauge measurements taken were well within the allowable amount for FRA Class 1 track. The rail on #7 track was made in 1953 in the month of June manufactured by the Tennessee Coal & Iron company, (TCI) a subsidiary of US Steel Corp) and is 115-pound RE. The loaded measurable cross level on the B end of the car was almost at zero and showed a .32” on my FRA calibrated level board. The loaded measurable cross level on the A end of the car (subject end) measured 3/16”. All track measurements taken clearly indicated that track was not a contributing factor in the incident, the track measurements taken were well within the allowable amount for FRA class 1 track or greater. The track speed at the incident location was less than 10 mph. If this portion of track were to be regulated, it would be considered FRA class 1.

The DI was struck approximately 59 feet away from the bumper block at the end of the track, after being ran over the DI was shoved, approximately 24 feet until the car’s resting point. The incident end (A) of the car was 35 feet away from the bumper block. The rail car had not yet reached its intended spotting location (spot 1). The FRA Track Inspector was able to determine the point of impact (POI), due to marks on the top of the rail, and the fact that the rail head had been swept clean of grease and other debris by the DI being drug underneath the car.

Figure 5: Distance from rear car to bumping post was measured at 35 feet.

10.0 Applicable Rules (PSC Group General Safe Switching Procedure)

10.1 Communications / Commands:

6.10. Switching personnel MUST provide car counts at a frequency that allows the Engineer to clearly understand proper speed and also be able to track travel distance.

6.10.1. 2 Car Count down process (Engineer does NOT repeat commands after the 2-car count to the stopping point). Command frequency during this final movement to a stopping point should be "Two cars, one and a half cars, one car, half a car, set of trucks or 10 feet, that will do". The crew member in charge of the move should keep radio mic keyed up during the final half-car until stopped movement. The Engineer does not repeat commands during this final movement to prevent the radio from being used by both parties.

6.10.1.1. Engineer should mark 30 feet (half a car length) throughout the 2-car countdown process (up to the half-car count and then half the distance of the next command) and stop anytime an updated command is not given and this distance has been traveled.

6.10.1.2. After the half-car count, an unkeyed radio is the equivalent to an "all stop" command.

6.10.1.3. The 30 feet distance (or half distance) represents the point where the Engineer should rely on their eyes rather than just listening to the radio. If the radio were to fail in this critical two-car distance, the Engineer MUST know where and when to stop.

6.10.2. Car count commands for 10 car lengths or less requires an updated car count every 2 cars.

6.10.2.1. For example: "…10 cars to a couple, 8 cars, 6 cars, 4 cars, 2 cars".

6.10.2.2. This constant update provides the Engineer with an ability to recognize communication loss anytime 2 car lengths are traveled without an updated distance.

6.10.3. Car count commands for distances greater than 10 car lengths, require an updated car count at least every 10 car lengths, and should never be delayed until half the distance of the prior command.

6.10.3.1. For example, "Unit 1504, shove 40 cars to a bumper, 30 cars, 20 cars, 15 cars, 10 cars, 8 more, 6 cars, 4 cars, 2 cars", and so on

6.10.4. Engineers should always adjust train speed, so that in the event of radio loss, or in recognition of the next command in the sequence was not given, be able to stop the train in half the distance of the last command given.

6.11. It is imperative when switching a yard or storage track, that the crew member who is protecting the move is always the person providing the Engineer with car counts. If another switching employee is on the "top end" of the yard to verify clear of switch or clear of foul marker, this employee should key-up to notify crew of clear; but this person should NOT be the person giving the car counts while the other crew member protecting the move is passive and not communicating. Radio failure cannot be determined if the bottom-end employee that is protecting the move is not in command of the train.

10.2 Protecting the Move (Ensuring Direction of Travel is Clear)

10.5. A safety stop MUST be performed 1-car length prior to the clearance mark when shoving into a dead-end track. The train can then be shoved at walking speed (2-3 mph) to the desired clearance mark.

10.3 Definitions

Safety Stop – A stop required with a minimum distance of 1 car length or 60 feet when a train approaches a derail, blue flag, gate, cone, bumper, or critical areas (bumpers/close clearances).

11.0 Applicable Rules (PSC Group Rack Operations)

11.4 BP 7 Track – Pig Trap

WARNING: 7 Track (Pig Trap) is a dead-end track and very slippery. Proceed at slowest speed possible and use EXTERME CAUTION.

11.4.3 Spotting Railcars on 7 Track

- Block railcars as designated by switch list
- Spot railcars as designated by switch list
- Wait on Loader to give direction on where to spot railcars
    - o 7-1 Spot – spotted roughly 10 feet from bumper (Use Extreme Caution)
    - o 7-20 Spot – spotted closest to the derailer
- Employees will walk on the safest side of the track
    - o 7-1 through 7-11 – West side of the track
    - o 7-12 through 7-20 – East side of the track
- Set hand brake on each railcar or cut of railcars prior to uncoupling

12.0 Postaccident Actions

12.1 PSC Group

PSC has conducted the following postaccident actions as a result of the accident: (1) Conducted a safety stand-down of the accident and reviewed/discussed switching rules and radio communications; (2) Had a certified radio technician test and replace the locomotive radio (even though the radio tested OK); (3) Tested the conductors portable (no problems found); (4) Revised Rack Spotting Procedure:

i. Eliminate walking during train movements.

ii. Include the implementation and operating discipline around a portable sign to be posted in the breezeway(s) during active switching at the loading rack to alert/prevent pedestrian traffic

iii. Identification and placement of rail skids near the bumper of the Pig Trap track; (5) Implemented the use of Brake Sticks at the loading rack; (6) Safety Stand-downs across entire organization to discuss incident and stress the importance of Red Zone and more broadly Line of Fire; (7) Companywide initiative to perform additional operational testing of engineers on the actions they are to take in the event of a loss of communication; (8) PSC Senior Leadership has met with customers across the industry to share the incident and corrective action plan with hopes to improve rail worker safety across industrial switching industry; (9) Active participation with FRA Inspection visits; (10) Ordered Trainline hose extensions to trial in critical rack areas to provide a method for switchman protecting a shoving movement to activate

emergency braking without entering the Red Zone; (11) Internally developed a Remotely Activated Brake Device (RBAD) that provides a ground crew member the ability to stop a consist remotely from a distance. This device also has a secondary means of manual activation at the device location which keeps grounds men out of the line of fire. i. Currently have 10 working prototypes being trialed. Working with 2 engineering design firms to put the system into full production with a goal of having them in use on every train that we operate in 1Q 2024; and (12) Have purchased 30+ Rail Skates/skids that are in use at critical racks to provide an additional passive layer of protection near the end of tracks, including the Pig Trap track. Continuing to identify additional areas to implement these devices.

12.2 ExxonMobil

ExxonMobil conducted the following postaccident actions as a result of the accident: (1) conducted safety stand down with all crews working at Beaumont Lubricant Blending & Packaging Site and sent safety communication to all rail related employees across U.S.; (2) increased PSC interfaces and reinforced safety expectations; (3) developed a one-page summary of the incident for sharing internally and externally; (4) addressed housekeeping at identified walking areas at the site (e.g., installed brackets for hanging train wheel chocks, created more room for hose storage when hoses not in use by several different means such as shortening or removing piping and redirecting piping and hose reels, pressure-washed walking

area, removed unused scaffolding); (5) executed additional facility enhancements (e.g., installed rail crossing signs at 7 track breezeways, addressed lighting); and (6) working to develop additional materials to share learnings from the incident and evaluate additional potential actions the ExxonMobil investigation team requested be evaluated.

Submitted by:
Troy Lloyd
IIC