Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2007-32

CSX Transportation (CSX)
Castleberry, Alabama
May 31, 2007

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2007-32

1.Name of Railroad Operating Train #1: CSX Transportation [CSX]	1a. Alphabetic Code: CSX	1b. Railroad Accident/Incident No.: 000031840
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident No.: N/A
3.Name of Railroad Operating Train #3: N/A	3a. Alphabetic Code: N/A	3b. Railroad Accident/Incident No.: N/A
4.Name of Railroad Responsible for Track Maintenance: CSX Transportation [CSX]	4a. Alphabetic Code: CSX	4b. Railroad Accident/Incident No.: 000031840
5. U.S. DOT_AAR Grade Crossing Identification Number:	6. Date of Accident/Incident: Month 05 | Day 29 | Year 2007	7. Time of Accident/Incident: 12:43: ☐ AM ☑ PM

8. Type of Accident/Indicent (single entry in code box): 1. Derailment; 2. Head on collision; 3. Rear end collision; 4. Side collision; 5. Raking collision; 6. Broken Train collision; 7. Hwy-rail crossing; 8. RR grade crossing; 9. Obstruction; 10. Explosion-detonation; 11. Fire/violent rupture; 12. Other impacts; 13. Other (describe in narrative) — Code: 01

9. Cars Carrying HAZMAT	10. HAZMAT Cars Damaged/Derailed	11. Cars Releasing HAZMAT	12. People Evacuated	13. Division
17	8	3	455	Atlanta

14. Nearest City/Town	15. Milepost (to nearest tenth)	16. State Abbr	16. State Code	17. County
Castleberry	579.3	N/A	AL	CONECUH

18. Temperature (F) (specify if minus)	19. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark — Code	20. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow — Code	21. Type of Track 1. Main 2. Yard 3. Siding 4. Industry — Code
80 F	2	1	1

22. Track Name/Number	23. FRA Track Class (1-9, X) — Code	24. Annual Track Density (gross tons in millions)	25. Time Table Direction 1. North 2. South 3. East 4. — Code
main	4	50.7	1

OPERATING TRAIN #1

26. Type of Equipment Consist (single entry) 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car	A. Spec. MoW Equip. — Code	27. Was Equipment Attended? 1. Yes 2. No — Code	28. Train Number/Symbol
	1	1	Q57229

29. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	31. Method(s) of Operation (enter code(s) that apply)	31a. Remotely Controlled Locomotive?
49 MPH	R	a. ATCS; b. Auto train control; c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; g. Automatic block; h. Current of traffic; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; m.Special instructions; n. Other than main track; o. Positive train control; p. Other (Specify in narrative)	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter

30. Trailing Tons (gross tonnage, excluding power units): 5182

Code(s): e | N/A | N/A | N/A | N/A

31a. Remotely Controlled Locomotive?: 0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	NYC587901	9	no
(2) Causing (if mechanical cause reported)	NYC587901	9	no

33. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
0	0

34. Was this consist transporting passengers? (Y/N): N

35. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	3	0	0	0	0
(2) Total Derailed	0	0	0	0	0

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	32	0	34	0	0
(2) Total Derailed	10	0	16	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
803699	65000	E24C	E25C

Number of Crew Members				Length of Time on Duty	
41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen	45. Engineer/Operator	46. Conductor
1	0	1	0	Hrs 3 Mi 28	Hrs 3 Mi 28

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	0	0	0
Nonfatal	0	0	0

50. EOT Device? 1. Yes 2. No: 1

51. Was EOT Device Properly Armed? 1. Yes 2. No: 1

52. Caboose Occupied by Crew? 1. Yes 2. No: N/A

OPERATING TRAIN #2

53. Type of Equipment Consist (single entry) 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car	A. Spec. MoW Equip. — Code	54. Was Equipment Attended? 1. Yes 2. No — Code	55. Train Number/Symbol
	N/A	N/A	N/A

56. Speed (recorded speed, if available) R - Recorded E - Estimated	Code	58. Method(s) of Operation (enter code(s) that apply)	58a. Remotely Controlled Locomotive?
N/A MPH	N/A	a. ATCS; b. Auto train control; g. Automatic block; h. Current of traffic; m.Special instructions; n. Other than main track	0 = Not a remotely controlled; 1 = Remote control portable

57. Trailing Tons (gross tonnage, excluding power units) N/A

c. Auto train stop
d. Cab
e. Traffic
f. Interlocking
i. Time table/train orders
j.Track warrant control
k. Direct traffic control
l.Yard limits
o. Positive train control
p. Other (Specify in narrative)
Code(s) N/A N/A N/A N/A N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter N/A

59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

60. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

61. Was this consist transporting passengers? (Y/N) N/A

62. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

63. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

64. Equipment Damage This Consist N/A

65. Track, Signal, Way, & Structure Damage N/A

66. Primary Cause Code N/A

67. Contributing Cause Code N/A

Number of Crew Members

68. Engineer/ Operators	69. Firemen	70. Conductors	71. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

72. Engineer/Operator Hrs N/A Mi N/A

73. Conductor Hrs N/A Mi N/A

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

77. EOT Device? 1. Yes 2. No N/A

78. Was EOT Device Properly Armed? 1. Yes 2. No N/A

79. Caboose Occupied by Crew? 1. Yes 2. No N/A

OPERATING TRAIN #3

80. Type of Equipment Consist (single entry)
1. Freight train
2. Passenger train
3. Commuter train
4. Work train
5. Single car
6. Cut of cars
7. Yard/switching
8. Light loco(s).
9. Maint./inspect.car
A. Spec. MoW Equip. Code N/A

81. Was Equipment Attended? 1. Yes 2. No Code N/A

82. Train Number/Symbol N/A

83. Speed (recorded speed, if available) Code
R - Recorded
E - Estimated N/A MPH N/A

84. Trailing Tons (gross tonnage, excluding power units) N/A

85. Method(s) of Operation (enter code(s) that apply)
a. ATCS
b. Auto train control
c. Auto train stop
d. Cab
e. Traffic
f. Interlocking
g. Automatic block
h. Current of traffic
i. Time table/train orders
j.Track warrant control
k. Direct traffic control
l.Yard limits
m.Special instructions
n. Other than main track
o. Positive train control
p. Other (Specify in narrative)
Code(s) N/A N/A N/A N/A N/A

85a. Remotely Controlled Locomotive?
0 = Not a remotely controlled
1 = Remote control portable
2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter N/A

86. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

87. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

88. Was this consist transporting passengers? (Y/N) N/A

89. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

90. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

91. Equipment Damage This Consist N/A

92. Track, Signal, Way, & Structure Damage N/A

93. Primary Cause Code N/A

94. Contributing Cause Code N/A

Number of Crew Members

95. Engineer/ Operators	96. Firemen	97. Conductors	98. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

99. Engineer/Operator Hrs N/A Mi N/A

100. Conductor Hrs N/A Mi N/A

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

104. EOT 1. Yes 2. No N/A

105. Was EOT Device Properly 1. Yes 2. No N/A

106. Caboose Occupied by Crew? 1. Yes 2. No N/A

Highway User Involved

107. Code N/A
A. Auto
B. Truck
C. Truck-Trailer.
D. Pick-Up Truck
E. Van
F. Bus
G. School Bus
H. Motorcycle
J. Other Motor Vehicle
K. Pedestrian
M. Other (spec. in narrative)

108. Vehicle Speed (est. MPH at impact) N/A

109. geographical) Code N/A
1.North 2.South 3.East 4.West

Rail Equipment Involved

111. Equipment Code N/A
1.Train(units pulling)
2.Train(units pushing)
3.Train (standing)
4.Car(s) (moving)
5.Car(s) (standing)
6.Light Loco(s) (moving)
7.Light(s) (standing)
8.Other (specify in narrative)

112. Position of Car Unit in N/A

DEPARTMENT OF TRANSPORTATION
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110. Position 1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	Code N/A	113. Circumstance 1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	Code N/A
114a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither	Code N/A	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	Code N/A
114c. State here the name and quantity of the hazardous materials released, if any. N/A			

115. Type Crossing Warning 1.Gates 2.Cantilever FLS 3.Standard FLS 4.Wig Wags 5.Hwy. traffic signals 6.Audible 7.Crossbucks 8.Stop signs 9.Watchman 10.Flagged by crew 11.Other (spec. in narr.) 12.None								116. Signaled Crossing (See instructions for codes)	Code N/A	117. Whistle 1. Yes 2. No 3. Unknown	Code N/A
Code(s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

118. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	Code N/A	119. Crossing Warning with Highway Signals 1. Yes 2. No 3. Unknown	Code N/A	120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown	Code N/A

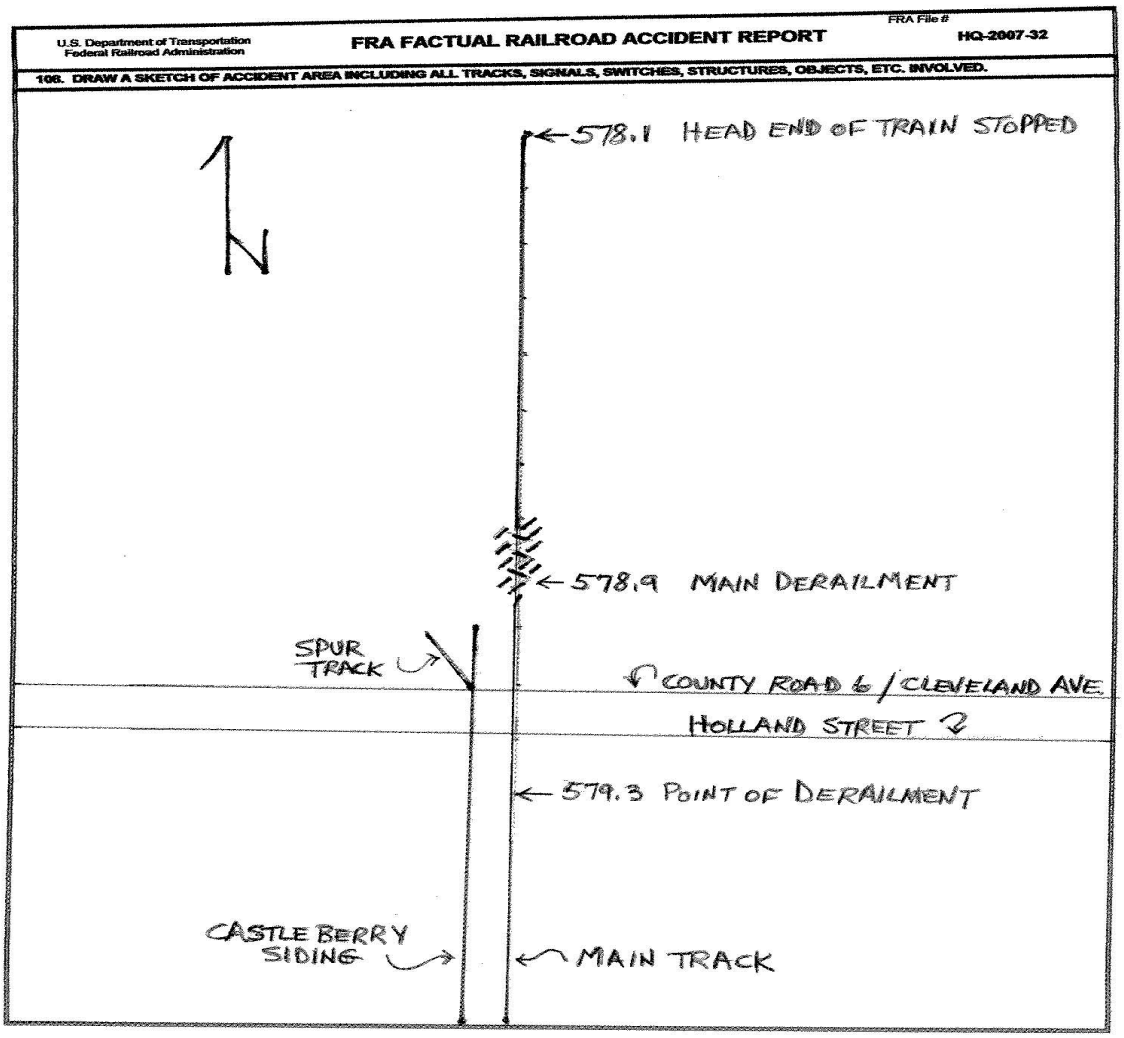
121. Age N/A	122. Driver's Gender 1. Male 2. Female	Code N/A	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code N/A	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other (specify in narrative)	Code N/A

125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code N/A	126. View of Track Obscured by (primary obstruction) 1. Permanent Structure 2. Standing Railroad Equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicle 7. Other (specify in narrative) 8. Not obstructed	Code N/A

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code N/A	128. Was Driver in the Vehicle? 1. Yes 2. No	Code N/A
129. Highway-Rail Crossing Users	N/A	N/A	130. Highway Vehicle Property Damage (est. dollar damage)	N/A	131. Total Number of Highway-Rail Crossing Users (include driver)	N/A

132. Locomotive Auxiliary Lights? 1. Yes 2. No	Code N/A	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code N/A	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code N/A

136. DRAW A SKETCH OF ACCIDENT AREA INCLUDING ALL TRACKS, SIGNALS, SWITCHES, STRUCTURES, OBJECTS, ETC., INVOLVED.



137. SYNOPSIS OF THE ACCIDENT

Synopsis of the Accident

On May 29, 2007, at 12:43 p.m. Eastern Standard Time (EST) a CSX Transportation (CSX) northbound freight Train Q57229 derailed 26 cars. The main derailment occurred at milepost (MP) 578.9 on the M&M Subdivision of the Atlanta Division near Castleberry, Alabama (AL). Involved in the derailment were eight loaded tank cars with hazardous material of Phenol and Acetone. During the derailment, three of the tank cars were damaged resulting in a release of their product. The hazardous material release caused an evacuation of 75 residents from Castleberry and 380 persons in surrounding businesses.

The initial point of derailment occurred at MP 579.3 with wheel marks on the crossties. These wheel marks continued to MP 578.9 where the main derailment occurred. After the uninitiated emergency application of the train's air brakes, the first derailed car (NYC 587901) separated from the trailing derailed cars and remained coupled to the head eight cars and locomotives coming to rest at MP 578.1.

There were no casualties or injuries of railroad personnel as a result of the derailment. An unauthorized Alabama Highway Department employee who entered the restricted area was sprayed with Phenol and during the re-railing operations an environmental recovery employee was sprayed with Phenol. They were taken to a local hospital for chemical burns and released. The estimated damage for the track is $65,000 and the equipment is $803,699.

At the time of the derailment, it was daylight, clear, and 80 ̊F.

The probable cause of the derailment was the car body center plate disengaged from the truck bolster on the 9th car, NYC 587901. This resulted in the car being off-center with the car body riding on the truck bolster causing uneven weight distribution to the wheels which caused wheel lift.

A contributing factor may have been the possibility of the absence of the center pin, which would have helped in keeping the car body center plate in its proper position.

138. NARRATIVE

Circumstances Prior to the Accident

The crew of Train Q57229 included a locomotive engineer and a conductor. They first went on duty at 9:15 a.m., May 29, 2007, at the Sibert Yard in Mobile, AL. This was their away terminal and both crew members were off duty more than ten hours prior to reporting for duty.

Their assigned Train Q57229 originated in New Orleans, Louisiana (LA) where the required pre-departure car inspection and Class I air brake tests were performed. The train departed New Orleans at 2:25 a.m. on May 29, 2007, with three locomotives and 34 cars, 3,062 trailing tons, and a total length of 2,429 feet. It arrived in Mobile at 7:30 a.m. where a block of 32 cars were added to the train and a Class III air brake test was performed by the car inspectors. At 9:55 a.m. Train Q57229 departed Mobile with three locomotives and 66 cars (32 loads and 34 empties), 5,182 trailing tons, and a total length of 4,257 feet. The train's consist included 17 hazardous material cars, which included 16 loads and one residue car. The train traveled northward along the single main track of the M&M Subdivision on the Atlanta Division and enroute the trip was uneventful prior to the accident.

As the northbound train approached the accident area, the engineer was seated in the cab at the locomotive controls on the east side of the leading locomotive, CSXT 7862. The conductor was seated at the west side of the leading locomotive. Beginning at MP 582, the main line track is at a .35 percent average ascending grade. The track is tangent for a considerable distance before and beyond the accident area. Trains operate under a Traffic Control System with a maximum speed of 60 miles per hours (mph) as designated in the current CSX Atlanta Division Timetable No. 3 dated January 1, 2005.

The railroad timetable direction of the train was north and the geographic direction is the same. Timetable directions are used throughout this report.

The Accident

The engineer was operating Train Q57229 in throttle position three, traveling at 49 mph approaching the accident area, MP 579. As the train was passing through Castleberry, AL, the engineer felt the locomotive dip to the right. He glanced at the locomotive side mirror and could see a large dust cloud and informed the conductor that a gondola railcar was on the ground. Before he could initiate an emergency air brake application, an uninitiated emergency brake application occurred. The throttle position and speed were recorded by the event recorder on the lead locomotive, CSXT 7862.

After Train Q57229 stopped, the conductor walked back and discovered only nine cars were coupled to the last locomotive. The conductor radioed the dispatcher of the derailment and continued walking alongside the derailed cars. He observed the 10th through the 34th cars were derailed and of these the 27th through the 34th were tank cars loaded with hazardous materials. He could smell a strong odor and assumed one of the tank cars was leaking. The 26 derailed cars were stacked upon one another and badly damaged. He radioed the dispatcher again and informed him that one or more of the tank cars containing hazardous materials were leaking. The dispatcher instructed the conductor to leave the area and return to the

locomotives. After securing the head portion of the train, the conductor uncoupled the locomotives and moved to the next siding at Evergreen, MP 568.8.

The Castleberry Fire Department arrived at the derailment site about 1 p.m. where they issued an emergency evacuation order for a two mile radius of the accident area. Seventy five residents of Castleberry and another 380 persons from surrounding businesses were moved. Emergency responders constructed a plastic lined hole to collect the spilled hazardous liquids and lessen the contamination of the soil. Two persons received minor injuries from the leaking chemicals. An unauthorized Alabama Highway Department employee who entered the restricted area was sprayed with Phenol, and during the re-railing operations an environmental recovery employee was sprayed with Phenol. Both were taken to a local hospital for chemical burns and released.

Analysis and Conclusion

Analysis

Three of the tank cars had received heavy damage to their shell resulting in a release of the products that they were carrying. The 27th car, WCHX 30221, contained 188,500 pounds of Acetone and lost 33,840 pounds of product. The 31st car, GATX 72220, contained 188,500 pounds of Phenol, and the 32nd car, GATX 665841, contained 188,200 pounds of Phenol. Each car lost a combined total of 200,150 pounds of product.

Wheel action revealed that the point of derailment was at MP 579.3. An empty gondola car (NYC 587901), the ninth car in the train, was the first car to derail. The No. 3 wheel located on the "A" end of the car's trailing truck was lifted onto the east rail and traveled 78 inches on the ball of the rail before dropping to the field side of the main track. The car continued to run in a derailed position about 2,000 feet before the general pile-up occurred.

Inspection of the track at the point of derailment showed no defects that contributed to the derailment. The rail, crossties, and rail anchors were in good condition with the gage and cross level measurements, each within federal standards.

Inspection of Car NYC 587901 showed severe rub marks on the car body center plate. This indicated it had been disengaged from the bowl on the truck bolster and was riding on the lip of the bowl. There were signs that the center pin may have been missing, because there was little wear on the inside of the pin hole on the center plate. There were wheel rub marks underneath on the floor and on the end sill, but these were caused after the car derailed and traveled on the ground for a considerable distance.

Inspection of the truck bolster from the "A" end of Car NYC 587901 showed severe rub marks on the lip of the center bowl indicating the car body center plate had been riding on it. There was little wear on the inside of the pin hole of the truck bolster further indicating that the center pin may have been missing. The truck bolster center bowl had another defect of about 10 inches of the back portion of the rim. The bowl had been cracked and during the derailment this 10 inches of crack pulled away from the rim and was protruding out from the bowl. This was evident by a fresh break along the cracked section. This defective condition did not contribute to the derailment in anyway as the circumference of the bowl and the integrity of it would have kept the car body center plate in place.

Car NYC 587901 was placed in Train Q57229 at Mobile where it had been received in interchange from Norfolk Southern (NS). The car was used to haul scrap metal and was interchanged as a load. NS moved the car to a steel processing plant to be unloaded, then hauled the empty car back and interchanged it to CSX on May 28, 2007, at 11:45 p.m.

At Mobile, CSX carmen inspect the interchange trains on the inbound movements and any defective cars are switched out. Car NYC 587901, over the next 6 hours, was switched into two different tracks before departing. The inbound inspection is the pre-departure inspection and after the cars are classified and put into their outbound blocks, the car inspectors will perform a Class I air brake test and later a Class III air brake test to the departing train.

The railroad conducted a computer simulation of the train profile and conditions and the results were negative as to any train handling situations that caused any excess draft or buff conditions in the train that could have contributed to the accident.

Post-accident forensic toxicological testing of the train crew was performed in accordance with Federal regulations. Report of the testing indicates that the two employees had negative test results.

Conclusion

The evidence points to Car NYC 587901, an empty gondola, as being off center which led to the derailment as evidenced by the severe rub marks on the car body center plate and on the truck bolster bowl. The severity of these marks showed they were formed previous to the derailment and not during it. Where the car became off-center is unknown, since the car was inspected prior to being placed in the train at Mobile. This type of defect is very noticeable and should have been detected. Also, there is no evidence that train handling could have caused the defective condition.

Probable Cause & Contributing Factors

The probable cause of the derailment was the car body center plate disengaged from the truck bolster on the 9th car, NYC 587901. This resulted in the car being off-center with the car body riding on the truck bolster causing uneven weight distribution to the wheels which caused wheel lift.

A contributing factor may have been the possibility of the absence of the center pin, which would have helped in keeping the car body center plate in its proper position.

Fatigue Analysis
FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to a blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.

FRA obtained fatigue related information, including a 10-day work history, for the employee involved in this derailment.

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

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FRA File # HQ-2007-32

1. Engineer assigned to Train Q572-29
Sleep setting Excellent
Overall Effectiveness = 92%
Lapse Index = 1.1
Reaction Time = 108
Chronic Sleep Debt = 3.63
Hours of Continuous Wakefulness = 7.10
Time of Day (military) = 1241
BAC Equivalent = <0.05
Conclusion: Fatigue was not evident for this employee.

2. Conductor assigned to train Q572-29
Sleep setting Excellent
Overall Effectiveness = 92%
Lapse Index = 1.1
Reaction Time = 108
Chronic Sleep Debt = 3.63
Hours of Continuous Wakefulness = 3.63
Time of Day (military) = 1241
BAC Equivalent = <0.05
Conclusion: Fatigue was not evident for this employee.

#

1.Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
CSX Transportation [CSX]	CSX	000031840
2.Name of Railroad Operating Train #2	2a. Alphabetic Code	2b. Railroad Accident/Incident No.
N/A	N/A	N/A
3.Name of Railroad Operating Train #3	3a. Alphabetic Code	3b. Railroad Accident/Incident No.
N/A	N/A	N/A
4.Name of Railroad Responsible for Track Maintenance:	4a. Alphabetic Code	4b. Railroad Accident/Incident No.
CSX Transportation [CSX]	CSX	000031840
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														01

9. Cars Carrying HAZMAT	10. HAZMAT Cars Damaged/Derailed	11. Cars Releasing HAZMAT	12. People Evacuated	13. Division
17	8	3	455	Atlanta

14. Nearest City/Town	15. Milepost (to nearest tenth)	16. State Abbr	16. State Code	17. County
Castleberry	579.3	N/A	AL	CONECUH

18. Temperature (F) (specify if minus)	19. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark	Code	20. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow	Code	21. Type of Track 1. Main 2. Yard 3. Siding 4. Industry	Code
80 F		2		1		1

22. Track Name/Number	23. FRA Track Class (1-9, X)	Code	24. Annual Track Density (gross tons in millions)	25. Time Table Direction 1. North 2. South 3. East 4.	Code
main		4	50.7		1

OPERATING TRAIN #1

26. Type of Equipment Consist (single entry) 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car A. Spec. MoW Equip.	Code	27. Was Equipment Attended? 1. Yes 2. No	Code	28. Train Number/Symbol
	1	1. Yes	1	Q57229

29. Speed (recorded speed, if available) R - Recorded E - Estimated		Code
49 MPH		R

30. Trailing Tons (gross tonnage, excluding power units)
5182

31. Method(s) of Operation (enter code(s) that apply)			
a. ATCS	g. Automatic block	m.Special instructions	
b. Auto train control	h. Current of traffic	n. Other than main track	
c. Auto train stop	i. Time table/train orders	o. Positive train control	
d. Cab	j.Track warrant control	p. Other (Specify in narrative)	
e. Traffic	k. Direct traffic control	Code(s)	
f. Interlocking	l.Yard limits	e N/A N/A N/A N/A	

31a. Remotely Controlled Locomotive?	
0 = Not a remotely controlled 1 = Remote control portable 2 = Remote control tower 3 = Remote control transmitter - more than one remote control transmitter	0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	NYC587901	9	no
(2) Causing (if mechanical cause reported)	NYC587901	9	no

33. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.	Alcohol	Drugs
	0	0

34. Was this consist transporting passengers? (Y/N)
N

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35. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	3	0	0	0	0
(2) Total Derailed	0	0	0	0	0

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	32	0	34	0	0
(2) Total Derailed	10	0	16	0	0

37. Equipment Damage This Consist: 803699

38. Track, Signal, Way, & Structure Damage: 65000

39. Primary Cause Code: E24C

40. Contributing Cause Code: E25C

Number of Crew Members

41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	1	0

Length of Time on Duty

45. Engineer/Operator: Hrs 3 Mi 28

46. Conductor: Hrs 3 Mi 28

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	0	0	0
Nonfatal	0	0	0

50. EOT Device? (1. Yes 2. No): 1

51. Was EOT Device Properly Armed? (1. Yes 2. No): 1

52. Caboose Occupied by Crew? (1. Yes 2. No): N/A

OPERATING TRAIN #2

53. Type of Equipment Consist (single entry): 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car

A. Spec. MoW Equip. Code: N/A

54. Was Equipment Attended? Code: 1. Yes 2. No: N/A

55. Train Number/Symbol: N/A

56. Speed (recorded speed, if available) Code: R - Recorded E - Estimated: N/A MPH N/A

58. Method(s) of Operation (enter code(s) that apply): a. ATCS b. Auto train control g. Automatic block h. Current of traffic m. Special instructions n. Other than main track

58a. Remotely Controlled Locomotive? 0 = Not a remotely controlled 1 = Remote control portable

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57. Trailing Tons (gross tonnage, excluding power units) N/A

c. Auto train stop
d. Cab
e. Traffic
f. Interlocking
i. Time table/train orders
j.Track warrant control
k. Direct traffic control
l.Yard limits
o. Positive train control
p. Other (Specify in narrative)
Code(s) N/A N/A N/A N/A N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter N/A

59. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

60. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

61. Was this consist transporting passengers? (Y/N) N/A

62. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

63. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

64. Equipment Damage This Consist N/A

65. Track, Signal, Way, & Structure Damage N/A

66. Primary Cause Code N/A

67. Contributing Cause Code N/A

Number of Crew Members

68. Engineer/ Operators	69. Firemen	70. Conductors	71. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

72. Engineer/Operator Hrs N/A Mi N/A

73. Conductor Hrs N/A Mi N/A

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

77. EOT Device? 1. Yes 2. No N/A

78. Was EOT Device Properly Armed? 1. Yes 2. No N/A

79. Caboose Occupied by Crew? 1. Yes 2. No N/A

OPERATING TRAIN #3

80. Type of Equipment Consist (single entry)
1. Freight train
2. Passenger train
3. Commuter train
4. Work train
5. Single car
6. Cut of cars
7. Yard/switching
8. Light loco(s).
9. Maint./inspect.car
A. Spec. MoW Equip. Code N/A

81. Was Equipment Attended? 1. Yes 2. No Code N/A

82. Train Number/Symbol N/A

83. Speed (recorded speed, if available) Code
R - Recorded
E - Estimated N/A MPH N/A

84. Trailing Tons (gross tonnage, excluding power units) N/A

85. Method(s) of Operation (enter code(s) that apply)
a. ATCS
b. Auto train control
c. Auto train stop
d. Cab
e. Traffic
f. Interlocking
g. Automatic block
h. Current of traffic
i. Time table/train orders
j.Track warrant control
k. Direct traffic control
l.Yard limits
m.Special instructions
n. Other than main track
o. Positive train control
p. Other (Specify in narrative)
Code(s) N/A N/A N/A N/A N/A

85a. Remotely Controlled Locomotive?
0 = Not a remotely controlled
1 = Remote control portable
2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter N/A

86. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

87. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

88. Was this consist transporting passengers? (Y/N) N/A

89. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

90. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

91. Equipment Damage This Consist N/A

92. Track, Signal, Way, & Structure Damage N/A

93. Primary Cause Code N/A

94. Contributing Cause Code N/A

Number of Crew Members

95. Engineer/ Operators	96. Firemen	97. Conductors	98. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

99. Engineer/Operator Hrs N/A Mi N/A

100. Conductor Hrs N/A Mi N/A

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

104. EOT 1. Yes 2. No N/A

105. Was EOT Device Properly 1. Yes 2. No N/A

106. Caboose Occupied by Crew? 1. Yes 2. No N/A

Highway User Involved

107. Code N/A
A. Auto
B. Truck
C. Truck-Trailer.
D. Pick-Up Truck
E. Van
F. Bus
G. School Bus
H. Motorcycle
J. Other Motor Vehicle
K. Pedestrian
M. Other (spec. in narrative)

108. Vehicle Speed (est. MPH at impact) N/A

109. geographical) Code N/A
1.North 2.South 3.East 4.West

Rail Equipment Involved

111. Equipment Code N/A
1.Train(units pulling)
2.Train(units pushing)
3.Train (standing)
4.Car(s) (moving)
5.Car(s) (standing)
6.Light Loco(s) (moving)
7.Light(s) (standing)
8.Other (specify in narrative)

112. Position of Car Unit in N/A

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110. Position	Code	113. Circumstance	Code
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	N/A	1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	N/A
114a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	N/A

114c. State here the name and quantity of the hazardous materials released, if any.
N/A

115. Type Crossing Warning	1.Gates	2.Cantilever FLS	3.Standard FLS	4.Wig Wags	5.Hwy. traffic signals	6.Audible	7.Crossbucks	8.Stop signs	9.Watchman	10.Flagged by crew	11.Other (spec. in narr.)	12.None
Code(s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A					

116. Signaled Crossing (See instructions for codes)	Code	117. Whistle 1. Yes 2. No 3. Unknown	Code
	N/A		N/A

118. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	Code	119. Crossing Warning with Highway Signals 1. Yes 2. No 3. Unknown	Code	120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown	Code
	N/A		N/A		N/A

121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other (specify in narrative)	Code
N/A		N/A		N/A		N/A

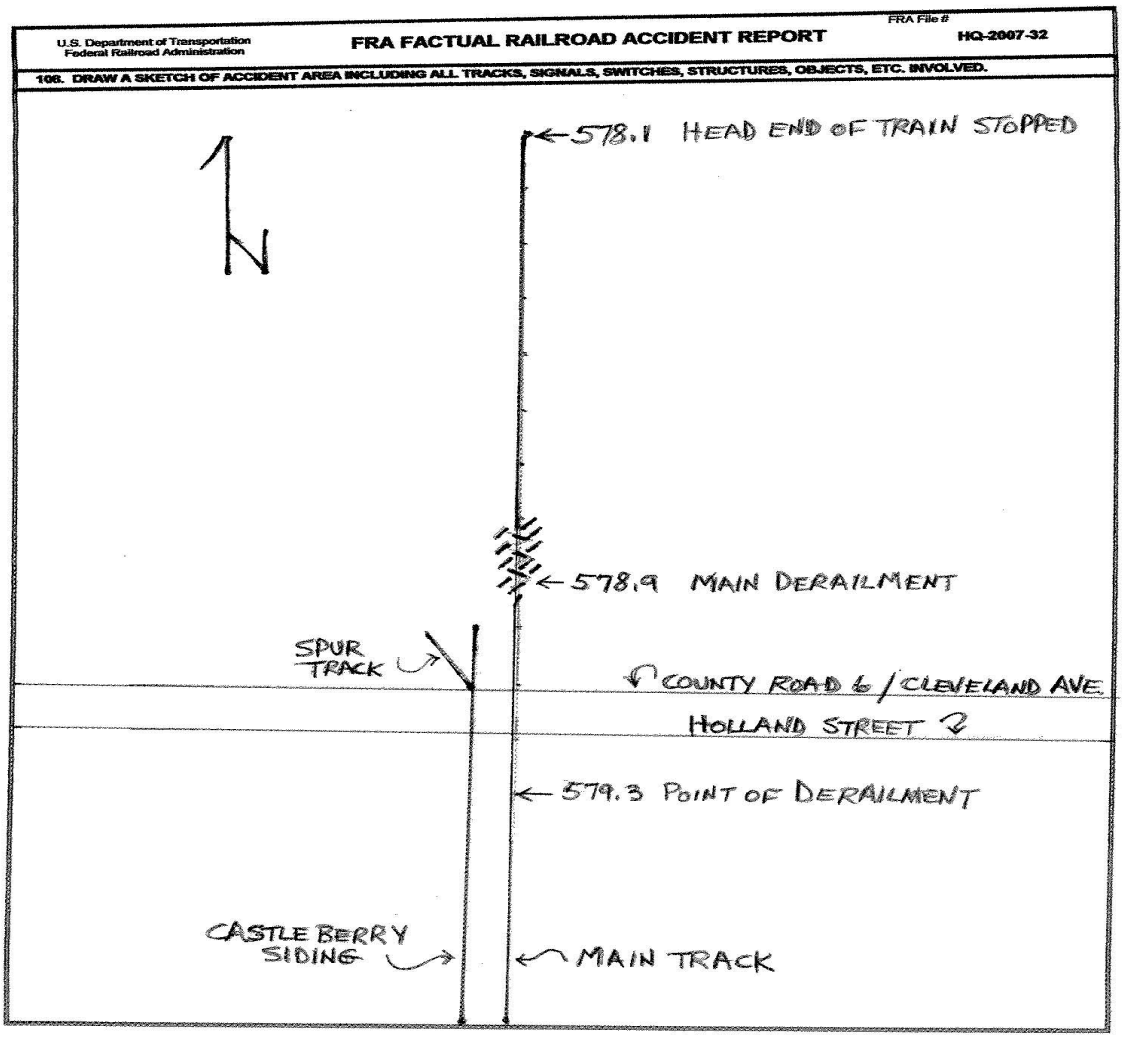
125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code	126. View of Track Obscured by (primary obstruction) 1. Permanent Structure 2. Standing Railroad Equipment 3. Passing Train 4. Topography 5. Vegetation 6. Highway Vehicle 7. Other (specify in narrative) 8. Not obstructed	Code
	N/A		N/A

Casualties to:	Killed	Injured
129. Highway-Rail Crossing Users	N/A	N/A

127. Driver 1. Killed 2.Injured 3. Uninjured	Code	128. Was Driver in the Vehicle? 1. Yes 2. No	Code
	N/A		N/A
130. Highway Vehicle Property Damage (est. dollar damage)	N/A	131. Total Number of Highway-Rail Crossing Users (include driver)	N/A

132. Locomotive Auxiliary Lights? 1. Yes 2. No	Code	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code
	N/A		N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code
	N/A		N/A

136. DRAW A SKETCH OF ACCIDENT AREA INCLUDING ALL TRACKS, SIGNALS, SWITCHES, STRUCTURES, OBJECTS, ETC., INVOLVED.



137. SYNOPSIS OF THE ACCIDENT

Synopsis of the Accident

On May 29, 2007, at 12:43 p.m. Eastern Standard Time (EST) a CSX Transportation (CSX) northbound freight Train Q57229 derailed 26 cars. The main derailment occurred at milepost (MP) 578.9 on the M&M Subdivision of the Atlanta Division near Castleberry, Alabama (AL). Involved in the derailment were eight loaded tank cars with hazardous material of Phenol and Acetone. During the derailment, three of the tank cars were damaged resulting in a release of their product. The hazardous material release caused an evacuation of 75 residents from Castleberry and 380 persons in surrounding businesses.

The initial point of derailment occurred at MP 579.3 with wheel marks on the crossties. These wheel marks continued to MP 578.9 where the main derailment occurred. After the uninitiated emergency application of the train's air brakes, the first derailed car (NYC 587901) separated from the trailing derailed cars and remained coupled to the head eight cars and locomotives coming to rest at MP 578.1.

There were no casualties or injuries of railroad personnel as a result of the derailment. An unauthorized Alabama Highway Department employee who entered the restricted area was sprayed with Phenol and during the re-railing operations an environmental recovery employee was sprayed with Phenol. They were taken to a local hospital for chemical burns and released. The estimated damage for the track is $65,000 and the equipment is $803,699.

At the time of the derailment, it was daylight, clear, and 80 ̊F.

The probable cause of the derailment was the car body center plate disengaged from the truck bolster on the 9th car, NYC 587901. This resulted in the car being off-center with the car body riding on the truck bolster causing uneven weight distribution to the wheels which caused wheel lift.

A contributing factor may have been the possibility of the absence of the center pin, which would have helped in keeping the car body center plate in its proper position.

138. NARRATIVE

Circumstances Prior to the Accident

The crew of Train Q57229 included a locomotive engineer and a conductor. They first went on duty at 9:15 a.m., May 29, 2007, at the Sibert Yard in Mobile, AL. This was their away terminal and both crew members were off duty more than ten hours prior to reporting for duty.

Their assigned Train Q57229 originated in New Orleans, Louisiana (LA) where the required pre-departure car inspection and Class I air brake tests were performed. The train departed New Orleans at 2:25 a.m. on May 29, 2007, with three locomotives and 34 cars, 3,062 trailing tons, and a total length of 2,429 feet. It arrived in Mobile at 7:30 a.m. where a block of 32 cars were added to the train and a Class III air brake test was performed by the car inspectors. At 9:55 a.m. Train Q57229 departed Mobile with three locomotives and 66 cars (32 loads and 34 empties), 5,182 trailing tons, and a total length of 4,257 feet. The train's consist included 17 hazardous material cars, which included 16 loads and one residue car. The train traveled northward along the single main track of the M&M Subdivision on the Atlanta Division and enroute the trip was uneventful prior to the accident.

As the northbound train approached the accident area, the engineer was seated in the cab at the locomotive controls on the east side of the leading locomotive, CSXT 7862. The conductor was seated at the west side of the leading locomotive. Beginning at MP 582, the main line track is at a .35 percent average ascending grade. The track is tangent for a considerable distance before and beyond the accident area. Trains operate under a Traffic Control System with a maximum speed of 60 miles per hours (mph) as designated in the current CSX Atlanta Division Timetable No. 3 dated January 1, 2005.

The railroad timetable direction of the train was north and the geographic direction is the same. Timetable directions are used throughout this report.

The Accident

The engineer was operating Train Q57229 in throttle position three, traveling at 49 mph approaching the accident area, MP 579. As the train was passing through Castleberry, AL, the engineer felt the locomotive dip to the right. He glanced at the locomotive side mirror and could see a large dust cloud and informed the conductor that a gondola railcar was on the ground. Before he could initiate an emergency air brake application, an uninitiated emergency brake application occurred. The throttle position and speed were recorded by the event recorder on the lead locomotive, CSXT 7862.

After Train Q57229 stopped, the conductor walked back and discovered only nine cars were coupled to the last locomotive. The conductor radioed the dispatcher of the derailment and continued walking alongside the derailed cars. He observed the 10th through the 34th cars were derailed and of these the 27th through the 34th were tank cars loaded with hazardous materials. He could smell a strong odor and assumed one of the tank cars was leaking. The 26 derailed cars were stacked upon one another and badly damaged. He radioed the dispatcher again and informed him that one or more of the tank cars containing hazardous materials were leaking. The dispatcher instructed the conductor to leave the area and return to the

locomotives. After securing the head portion of the train, the conductor uncoupled the locomotives and moved to the next siding at Evergreen, MP 568.8.

The Castleberry Fire Department arrived at the derailment site about 1 p.m. where they issued an emergency evacuation order for a two mile radius of the accident area. Seventy five residents of Castleberry and another 380 persons from surrounding businesses were moved. Emergency responders constructed a plastic lined hole to collect the spilled hazardous liquids and lessen the contamination of the soil. Two persons received minor injuries from the leaking chemicals. An unauthorized Alabama Highway Department employee who entered the restricted area was sprayed with Phenol, and during the re-railing operations an environmental recovery employee was sprayed with Phenol. Both were taken to a local hospital for chemical burns and released.

Analysis and Conclusion

Analysis

Three of the tank cars had received heavy damage to their shell resulting in a release of the products that they were carrying. The 27th car, WCHX 30221, contained 188,500 pounds of Acetone and lost 33,840 pounds of product. The 31st car, GATX 72220, contained 188,500 pounds of Phenol, and the 32nd car, GATX 665841, contained 188,200 pounds of Phenol. Each car lost a combined total of 200,150 pounds of product.

Wheel action revealed that the point of derailment was at MP 579.3. An empty gondola car (NYC 587901), the ninth car in the train, was the first car to derail. The No. 3 wheel located on the "A" end of the car's trailing truck was lifted onto the east rail and traveled 78 inches on the ball of the rail before dropping to the field side of the main track. The car continued to run in a derailed position about 2,000 feet before the general pile-up occurred.

Inspection of the track at the point of derailment showed no defects that contributed to the derailment. The rail, crossties, and rail anchors were in good condition with the gage and cross level measurements, each within federal standards.

Inspection of Car NYC 587901 showed severe rub marks on the car body center plate. This indicated it had been disengaged from the bowl on the truck bolster and was riding on the lip of the bowl. There were signs that the center pin may have been missing, because there was little wear on the inside of the pin hole on the center plate. There were wheel rub marks underneath on the floor and on the end sill, but these were caused after the car derailed and traveled on the ground for a considerable distance.

Inspection of the truck bolster from the "A" end of Car NYC 587901 showed severe rub marks on the lip of the center bowl indicating the car body center plate had been riding on it. There was little wear on the inside of the pin hole of the truck bolster further indicating that the center pin may have been missing. The truck bolster center bowl had another defect of about 10 inches of the back portion of the rim. The bowl had been cracked and during the derailment this 10 inches of crack pulled away from the rim and was protruding out from the bowl. This was evident by a fresh break along the cracked section. This defective condition did not contribute to the derailment in anyway as the circumference of the bowl and the integrity of it would have kept the car body center plate in place.

Car NYC 587901 was placed in Train Q57229 at Mobile where it had been received in interchange from Norfolk Southern (NS). The car was used to haul scrap metal and was interchanged as a load. NS moved the car to a steel processing plant to be unloaded, then hauled the empty car back and interchanged it to CSX on May 28, 2007, at 11:45 p.m.

At Mobile, CSX carmen inspect the interchange trains on the inbound movements and any defective cars are switched out. Car NYC 587901, over the next 6 hours, was switched into two different tracks before departing. The inbound inspection is the pre-departure inspection and after the cars are classified and put into their outbound blocks, the car inspectors will perform a Class I air brake test and later a Class III air brake test to the departing train.

The railroad conducted a computer simulation of the train profile and conditions and the results were negative as to any train handling situations that caused any excess draft or buff conditions in the train that could have contributed to the accident.

Post-accident forensic toxicological testing of the train crew was performed in accordance with Federal regulations. Report of the testing indicates that the two employees had negative test results.

Conclusion

The evidence points to Car NYC 587901, an empty gondola, as being off center which led to the derailment as evidenced by the severe rub marks on the car body center plate and on the truck bolster bowl. The severity of these marks showed they were formed previous to the derailment and not during it. Where the car became off-center is unknown, since the car was inspected prior to being placed in the train at Mobile. This type of defect is very noticeable and should have been detected. Also, there is no evidence that train handling could have caused the defective condition.

Probable Cause & Contributing Factors

The probable cause of the derailment was the car body center plate disengaged from the truck bolster on the 9th car, NYC 587901. This resulted in the car being off-center with the car body riding on the truck bolster causing uneven weight distribution to the wheels which caused wheel lift.

A contributing factor may have been the possibility of the absence of the center pin, which would have helped in keeping the car body center plate in its proper position.

Fatigue Analysis
FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to a blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.

FRA obtained fatigue related information, including a 10-day work history, for the employee involved in this derailment.

1. Engineer assigned to Train Q572-29
Sleep setting Excellent
Overall Effectiveness = 92%
Lapse Index = 1.1
Reaction Time = 108
Chronic Sleep Debt = 3.63
Hours of Continuous Wakefulness = 7.10
Time of Day (military) = 1241
BAC Equivalent = <0.05
Conclusion: Fatigue was not evident for this employee.

2. Conductor assigned to train Q572-29
Sleep setting Excellent
Overall Effectiveness = 92%
Lapse Index = 1.1
Reaction Time = 108
Chronic Sleep Debt = 3.63
Hours of Continuous Wakefulness = 3.63
Time of Day (military) = 1241
BAC Equivalent = <0.05
Conclusion: Fatigue was not evident for this employee.

#