Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-91

Union Pacific/Burlington Northern Santa Fe
Memphis, TN
November 22, 2006

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-2006-91

1.Name of Railroad Operating Train #1: Union Pacific RR Co. [UP]	1a. Alphabetic Code: UP	1b. Railroad Accident/Incident No.: 1106LK046
2.Name of Railroad Operating Train #2: BNSF Rwy Co. [BNSF]	2a. Alphabetic Code: BNSF	2b. Railroad Accident/Incident: SF11206117
3.Name of Railroad Responsible for Track Maintenance: Norfolk Southern Corp. [NS]	3a. Alphabetic Code: NS	3b. Railroad Accident/Incident No.: 027240
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident: Month 11 / Day 22 / Year 2006	6. Time of Accident/Incident: 02:19: ☑ AM ☐ PM

7. 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): 02

8. Cars Carrying HAZMAT	9. HAZMAT Cars Damaged/Derailed	10. Cars Releasing HAZMAT	11. People Evacuated	12. Division
0	0	0	0	N/A

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
N/A	547.0	N/A	N/A	N/A

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

21. Track Name/Number	22. FRA Track Class (1-9, X)	Code	23. Annual Track Density (gross tons in millions)	24. Time Table Direction 1. North 3. East	Code
N/A		N/A	0		N/A

OPERATING TRAIN #1

25. Type of Equipment Consist (single entry)	A. Spec. MoW Equip. Code	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
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	1	1	1	QNLSF21

28. Speed (recorded speed, if available) Code: R - Recorded; E - Estimated 16 MPH | R

29. Trailing Tons (gross tonnage, excluding power units): 6619

30. 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): 1 | N/A | N/A | N/A | N/A

30a. 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

31. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	6	yes
(2) Causing (if mechanical cause reported)	0	0	N/A

32. 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

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

34. 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	2	0	0	0	0
(2) Total Derailed	0	0	0	0	0

35. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	49	0	24	0	0
(2) Total Derailed	3	0	2	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
26984	12417	H605	H603

Number of Crew Members

40. Engineer/ Operators	41. Firemen	42. Conductors	43. Brakemen
N/A	0	1	0

Length of Time on Duty

44. Engineer/Operator	45. Conductor
Hrs 5 Mi 49	Hrs 5 Mi 49

Casualties to:	46. Railroad Employees	47. Train Passengers	48. Other
Fatal	0	0	0
Nonfatal	N/A	0	0

49. EOT Device? 1. Yes 2. No | 1

50. Was EOT Device Properly Armed? 1. Yes 2. No | 1

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

OPERATING TRAIN #2

52. Type of Equipment Consist (single entry)	A. Spec. MoW Equip. Code	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
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	1	1	1	EMHSNAM223

55. Speed (recorded speed, if available) Code: R - Recorded; E - Estimated 0 MPH | R

57. 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

57a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable

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56. Trailing Tons (gross tonnage, excluding power units)	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)	2 = Remote control tower 3 = Remote control transmitter - more than one remote control transmitter
3087			1 N/A N/A N/A N/A	0

58. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.	Alcohol	Drugs
(1) First involved (derailed, struck, etc)	BNSF 6062	1	N/A		N/A	N/A
(2) Causing (if mechanical cause reported)	0	0	N/A	60. Was this consist transporting passengers? (Y/N)	N/A	

61. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote	62. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	0	0	(1) Total in Equipment Consist	0	0	123	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	0	0	0	0	0

63. Equipment Damage This Consist	64. Track, Signal, Way, & Structure Damage	65. Primary Cause Code	66. Contributing Cause Code
15000	1500	H605	N/A

Number of Crew Members				Length of Time on Duty	
67. Engineer/ Operators	68. Firemen	69. Conductors	70. Brakemen	71. Engineer/Operator	72. Conductor
1	0	1	1	Hrs 8 Mi 19	Hrs 8 Mi 19

Casualties to:	73. Railroad Employees	74. Train Passengers	75. Other
Fatal	0	0	0
Nonfatal	0	0	0

76. EOT Device? (1. Yes 2. No)	77. Was EOT Device Properly Armed? (1. Yes 2. No)	78. Caboose Occupied by Crew? (1. Yes 2. No)
1	1	N/A

Highway User Involved

79. Type	Code
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)	N/A

80. Vehicle Speed (est. MPH at impact)	81. Direction geographical) 1.North 2.South 3.East 4.West	Code
0		N/A

82. Position	Code
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	N/A

86a. 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

Rail Equipment Involved

83. Equipment	Code
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)	N/A

84. Position of Car Unit in Train
0

85. Circumstance	Code
1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	N/A

86b. Was there a hazardous materials release by (1. Highway User 2. Rail Equipment 3. Both 4. Neither)	Code
	N/A

86c. State here the name and quantity of the hazardous materials released, if any.
N/A

87. Type of 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					

88. Signaled Crossing Warning (See instructions for codes)	Code
	N/A

89. Whistle Ban (1. Yes 2. No 3. Unknown)	Code
	N/A

90. Location of Warning (1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach)	Code
	N/A

91. Crossing Warning Interconnected with Highway Signals (1. Yes 2. No 3. Unknown)	Code
	N/A

92. Crossing Illuminated by Street Lights or Special Lights (1. Yes 2. No 3. Unknown)	Code
	N/A

93. Driver's Age	94. Driver's Gender (1. Male 2. Female)	Code
0		N/A

95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train (1. Yes 2. No 3. Unknown)	Code
	N/A

96. 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

97. Driver Passed Standing Highway Vehicle (1. Yes 2. No 3. Unknown)	Code
	N/A

98. 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

101. Casulties to Highway-Rail Crossing Users	Killed	Injured
	0	0

99. Driver Was (1. Killed 2.Injured 3. Uninjured)	Code
	N/A

102. Highway Vehicle Property Damage (est. dollar damage)
0

100. Was Driver in the Vehicle? (1. Yes 2. No)	Code
	N/A

103. Total Number of Highway-Rail Crossing Users (include driver)
0

104. Locomotive Auxiliary Lights? (1. Yes 2. No)	Code
	N/A

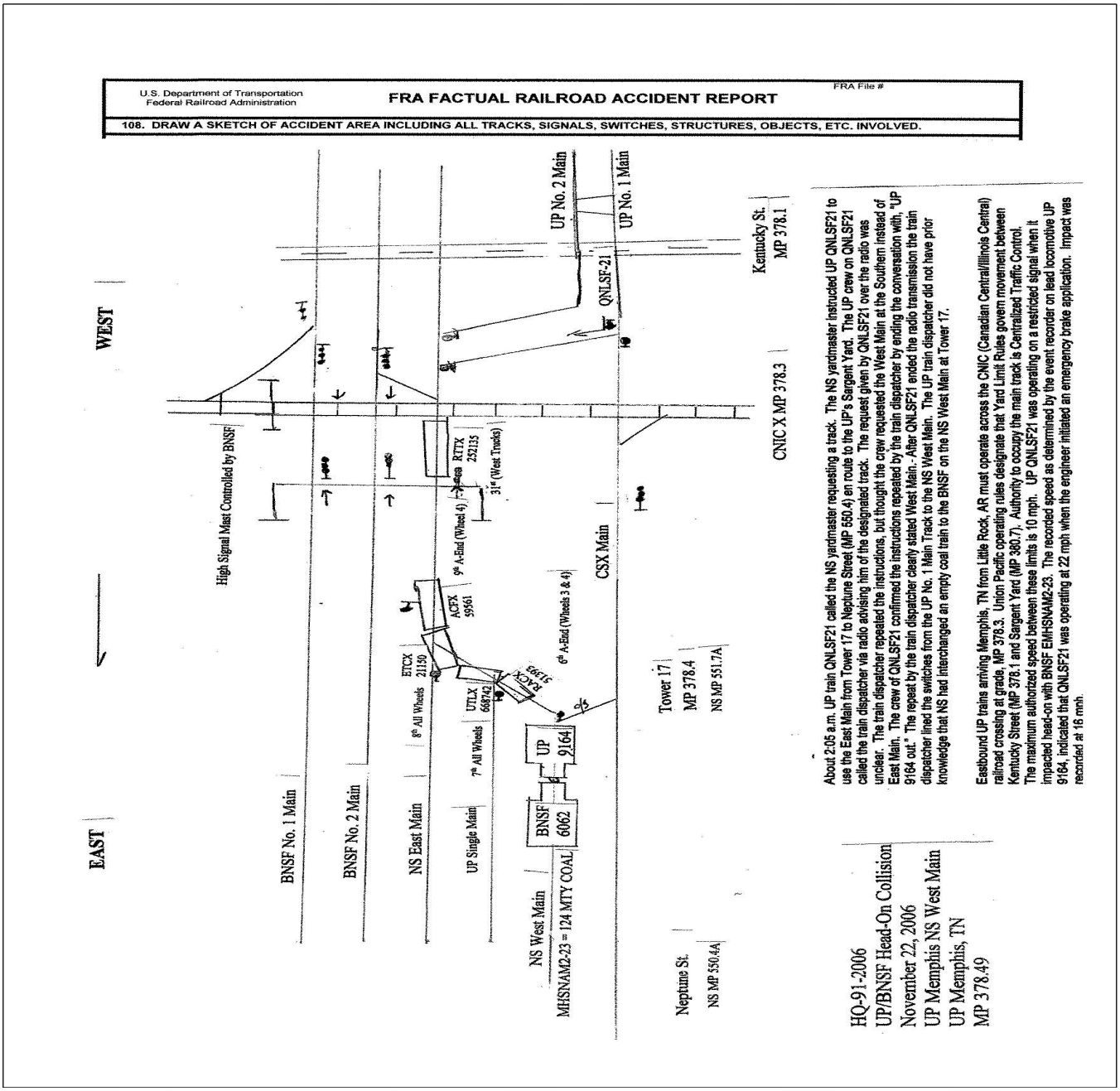
105. Locomotive Auxiliary Lights Operational? (1. Yes 2. No)	Code
	N/A

106. Locomotive Headlight Illuminated? (1. Yes 2. No)	Code
	N/A

107. Locomotive Audible Warning Sounded? (1. Yes 2. No)	Code
	N/A

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

HQ-2006-91.jpg



109. SYNOPSIS OF THE ACCIDENT

On November 22, 2006, about 2:19 a.m. Central Standard Time (CST), an eastbound Union Pacific Railroad (UP) freight Train QNLSF21 collided head-on with a westbound Burlington Northern/Santa Fe (BNSF) Train EMHSNAM2-23 that was stopped on the Norfolk Southern (NS) Westbound Main Track at milepost (MP) 547.0 in Memphis, Tennessee (TN). UP trains operating over NS at this location must receive permission from the NS yardmaster located at Forrest Yard to enter the Westbound or Eastbound main track. However, the switches at this location are remotely controlled by the UP train dispatcher located in Omaha, Nebraska (NE).

The NS yardmaster instructed Train QNLSF21 to operate eastward on the Eastbound Main Track. The crew operating Train QNLSF21 repeated these instructions to the UP train dispatcher. The train dispatcher repeated the instructions back to the train crew, but incorrectly said Westbound Main instead of Eastbound Main. Radio recordings indicate the UP train crew confirmed the dispatcher's repeat of Westbound Main. The train dispatcher lined Train QNLSF21 into the NS Westbound Main Track, where BNSF Train EMHSNAM2-23 was stopped, causing the head-on collision. The collision resulted in the derailment of five cars on Train QNLSF21.

UP reported equipment damage to Train QNLSF21 to be $26,984 ($10,001 to the locomotive and $16,983 to the cars) and track damage at $12,417. BNSF reported equipment damage to be $15,000 to locomotive BNSF 6062. NS estimates track damage at $1,500. The engineer on Train QNLSF21 reported injuries to his right hand and neck and was given a prescription after receiving medical treatment. The conductor of Train QNLSF21 reported injuries to his neck, shoulder, right knee, and left thumb.

At the time of the accident, the sky was dark, but clear and the temperature was reported to be 35°F.

The probable cause of the accident was the failure of Train QNLSF21 to comply with restricted speed. NS Time Table Division Special Instructions require all trains to operate at this location at a maximum authorized speed of 10 miles per hour (mph).

Contributing to the accident was a Federal Railroad Administration (FRA) speed violation. UP Train QNLSF21 was operating at a recorded speed of 21 mph prior to the collision.

110. NARRATIVE

Circumstances Prior To The Accident

Train QNLSF21

The crew of Train QNLSF21 reported for duty at 8:35 p.m. on November 21, 2006, in Little Rock, Arkansas (AR) MP 289. The crew consisted of an engineer and conductor. The train consisted of two locomotives, 49 loads, 24 empties, weighed 6,619 tons, and was 4,313 feet in length. Prior to reporting for duty each crew member received more than the statutory off duty period.

UP Train QNLSF21 was assigned locomotives UP 9164 and UP 9250 located in the locomotive shop at North Little Rock Terminal. The engineer and conductor operated the locomotives from the shop to their train, which was on Track No. 1 in the departure yard. They received a Class 1 terminal brake inspection, conducted a job briefing with the UP train dispatcher, and reviewed their train bulletins prior to departing Little Rock. The crew did not have any work (pickup/set offs) en route to Memphis. The method of operation on the Memphis subdivision is Centralized Train Control (CTC). The maximum authorized speed for freight trains is 60 mph. Train movement on this subdivision is controlled by desk 51 at the UP Harriman Dispatch Center located in Omaha, NE.

About 1:30 a.m. the UP train dispatcher called the NS yardmaster in Memphis that there were two eastbound UP trains en route. Train QNLSF21 would be the first inbound and was operating on Main Track No. 1. The yardmaster replied to let both eastbound trains come ahead. About 2:05 a.m. Train QNLSF21 called the NS yardmaster requesting a yard track. The NS yardmaster instructed them to use the East Main Track from Tower 17 to Neptune Street (MP 550.4) en route to the UP's Sargent Yard. The crew called the dispatcher via radio advising him of the designated track. According to the dispatcher, the request given by Train QNLSF21 over the radio was unclear. The dispatcher repeated the instructions, but thought the crew requested the West Main Track at the Southern instead of East Main Track. The crew confirmed the instructions by the dispatcher ending the conversation with, "UP 9164 out". The train dispatcher lined the switches from the UP Main Track No. 1 to the NS West Main Track. The engineer was operating from the south side of the locomotive cab and the conductor was seated on the north side in the conductor's seat.

At the Memphis Terminal, UP, BNSF, and NS conduct interchanges at Tower 17, MP 547.0. The UP dispatcher controls the switches at this location and NS owns two yard tracks on either side of the UP main track. The NS tracks are called the NS (Southern) East Main and the NS (Southern) West Main. All trains using the NS tracks at this location must get permission from the NS yardmaster located at Forrest Yard in Memphis. The NS yardmaster advises the UP train dispatcher or provides instructions directly to the train crew on which track they will be using. Once the UP train dispatcher is notified, he will align the switches for the specified track.

Train EMHSNAM2-23

At 12:15 a.m. on November 22, NS Train Q33 arrived on the NS Westbound Main Track with two locomotives and 124 empty coal hoppers, weighing 3,087 tons, and 4,313 ft in length. This train was interchanged to the BNSF as Train EMHSNAM2-23.

On November 21, the crew for BNSF Train EMHSNAM2-23 reported for duty at 6 p.m. in Marion, AR. The BNSF crew consisted of an engineer, conductor, and brakeman. The crew was taxied from Marion to Memphis to operate Train EMHSNAM2-23 and boarded the train about 2:10 a.m. The crew was advised by the NS yardmaster they would be allowed to operate in a westward direction after the UP Train QNLSF21 cleared the NS West Main switch. All three crew members were located on the lead locomotive.
The timetable direction for this movement is west to east and the geographical direction is the same.

The Accident

Train QNLSF21 was operating eastbound on a restricted signal from UP Main Track No. 1 to NS West Main Track when it impacted Train EMHSNAM2-23, which was stopped on the NS West Main Track. Train ONLSF21 was operating at 22 mph when the engineer initiated an emergency brake application prior to impact. The speed was determined by the event recorder on lead Locomotive UP 9164. They impacted Train EMHSNAM2-23 at a recorded speed of 16 mph. The three man crew of Train EMHSNAM2-23 that was situated on the locomotive did not have time to dismount and braced themselves for impact. The locomotive of their train was lifted into the air upon impact, but did not derail. The collision resulted in the derailment of five cars (6th, 7th, 8th, 9th and 31st) on Train QNLSF21.

The engineer on UP Train QNLSF21 reported injuries to his right hand and neck and was given a prescription after receiving medical treatment. The conductor of UP Train QNLSF21 reported injuries to his neck, shoulder, right knee, and left thumb. There were no injuries to the crew of Train EMHSNAM2-23.

Analysis and Conclusion
Analysis

Eastbound UP trains arriving to Memphis from Little Rock must operate across the Canadian Central/Illinois Central (CNIC) railroad crossing at grade, MP 378.3. UP operating rules designate that Yard Limit Rules govern movement between Kentucky Street (MP 378.1) and Sargent Yard (MP 380.7). Authority to occupy the main track is Centralized Traffic Control. The maximum authorized speed between these limits is 10 mph.

UP crew members operating Train QNLSF21 declined to be interviewed by the FRA. The NS yardmaster on duty did provide FRA with an interview and written documentation outlining the instructions given to Train QNLSF21. There was also a recorded conversation from the UP train dispatcher's office. The recording revealed that the train dispatcher lined the track for the NS West Main according to instructions received from the crew of Train QNLSF21.

The information repeated by the UP train dispatcher to occupy the West Main at the Southern was confirmed by the crew of Train QNLSF21, although the crew was advised by the NS yardmaster to operate via the East Main Track. The UP train dispatcher lined the switches from the UP No. 1 Main Track to the NS West Main. With this line-up, Train QNLSF21 was operating on a Restricted Signal.

BNSF Train EMHSNAM2-23 was occupying an NS yard track at the time of the collision. There are no signal circuits that would alert the UP dispatcher that there was a train occupying either NS East or West Main Tracks. The UP train dispatcher had not been advised that the NS West Main was occupied (this is currently not required by railroad operating rules). UP operating rules require that eastbound UP trains that operate via the NS East or West Main tracks must call the NS yardmaster at Forrest Yard when they arrive in the vicinity of the Mississippi River Bridge (MP 379.0).

Trains will obtain routing instructions from the NS yardmaster and the crew will relay this information to the UP train dispatcher. The UP train dispatcher on duty on November 22, 2006, said that when Train QNLSF21 requested the route given to them by the NS yardmaster the request was unclear. The dispatcher thought the crew requested the West Main Track at the Southern and repeated this to the crew. The train dispatcher said the crew responded, "Okay", when posed the question regarding the West Main at the Southern. When the crew confirmed West Main at the Southern, the UP train dispatcher proceeded to line the route.

The investigation of the track, signal, and equipment disclosed no defective conditions contributing to the cause of this accident.

Conclusion

The FRA investigation revealed that the maximum authorized speed at this location is 10 mph, as documented in UP timetable No. 3, effective 0001 hours Sunday, November 09, 2003. Information obtained from the event recorder located on UP lead Locomotive 9164 revealed that Train QNLSF21 was operating on a Restricted Signal and obtained a speed of 22 mph. The maximum authorized speed at this location was exceeded by more than 10 mph.

In an effort to increase safety awareness and prevent future accidents of this type, UP officials at Memphis and Little Rock developed a Critical Incident Alert (CIA). The CIA highlighted rules that are in place to prevent the type of accident that occurred involving Train QNLSF21. Officers reviewed General Code of Operating Rules 1.47 Duties of Crew Members, 2.3 Repetition, 6.1 Repeat Instructions, and 6.27 Movement at Restricted Speed. All train and engine service employees were contacted on the Memphis subdivision.

Fatigue Analysis

FRA obtained fatigue related information, including a 10-day work history, for all of the employees invloved in this incident. FRA reviewed the work history of the crew members involved and noted that the employees may have been working at a diminished level of effectiveness due to fatigue, which may have contributed to the cause of the accident.

FRA concluded fatigue was a probable cause for the following employees, the engineer and conductor and dispatcher of UP Train QNLSF21.

Probable Cause

The probable cause of the accident was the failure of Train QNLSF21 to comply with restricted speed. NS Time Table Division Special Instructions require all trains to operate at this location at a maximum authorized speed of 10 mph.

Contributing to the accident was an FRA speed violation. UP Train QNLSF21 was operating at a recorded speed of 21 mph prior to the collision.