Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-25

Union Pacific (UP)
Elm Creek, Nebraska
April 27, 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-2006-25

1.Name of Railroad Operating Train #1: Union Pacific RR Co. [UP]	1a. Alphabetic Code: UP	1b. Railroad Accident/Incident No.: 0406NP017
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident: N/A
3.Name of Railroad Responsible for Track Maintenance: Union Pacific RR Co. [UP]	3a. Alphabetic Code: UP	3b. Railroad Accident/Incident No.: 0406NP017
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident: Month 04 / Day 27 / Year 2006	6. Time of Accident/Incident: 04:45: ☑ 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): 01

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

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
Elm Creek	208.2	N/A	NE	DAWSON

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
43 F		4		1		1

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
Main Track No 3		5	101		3

OPERATING TRAIN #1

25. 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	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
	1	1. Yes	1	3CNAN W25

28. Speed (recorded speed, if available) R - Recorded E - Estimated			Code	30. Method(s) of Operation (enter code(s) that apply)	30a. Remotely Controlled Locomotive?
E - Estimated	37	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) Code(s): d, e, N/A, N/A, N/A	0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 2. South 4. West; 3 = Remote control transmitter - more than one remote control transmitter: 0

29. Trailing Tons (gross tonnage, excluding power units): 18975

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

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

Alcohol	Drugs
0	0

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

34. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote	35. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	2	0	0	1	0	(1) Total in Equipment Consist	134	0	0	0	0
(2) Total Derailed	2	0	0	0	0	(2) Total Derailed	29	0	0	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
1709198	1266711	T399	N/A

Number of Crew Members				Length of Time on Duty	
40. Engineer/ Operators	41. Firemen	42. Conductors	43. Brakemen	44. Engineer/Operator	45. Conductor
N/A	N/A	1	N/A	Hrs 4 Mi 44	Hrs 4 Mi 44

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) 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	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
	N/A	1. Yes 2. No	N/A	N/A

55. Speed (recorded speed, if available) R - Recorded E - Estimated			Code	57. Method(s) of Operation (enter code(s) that apply)	57a. Remotely Controlled Locomotive?
E - Estimated	0	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

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56. 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

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

59. 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

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
(1) Total in Train	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

62. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	0	0	0	0
(2) Total Derailed	0	0	0	0	0

63. Equipment Damage This Consist: 0

64. Track, Signal, Way, & Structure Damage: 0

65. Primary Cause Code: N/A

66. Contributing Cause Code: N/A

Number of Crew Members

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

Length of Time on Duty

71. Engineer/Operator: Hrs 0 Mi 0

72. Conductor: Hrs 0 Mi 0

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: N/A

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

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

Highway User Involved

79. Type: 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) — Code: N/A

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

81. Direction geographical) 1.North 2.South 3.East 4.West — Code: N/A

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

84. Position of Car Unit in Train: N/A

85. Circumstance: 1. Rail Equipment Struck Highway User; 2. Rail Equipment Struck by Highway User — Code: 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	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: 0

94. Driver's Gender 1. Male 2. Female — Code: 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

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

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

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

104. Locomotive Auxiliary Lights? 1. Yes 2. No — Code: N/A

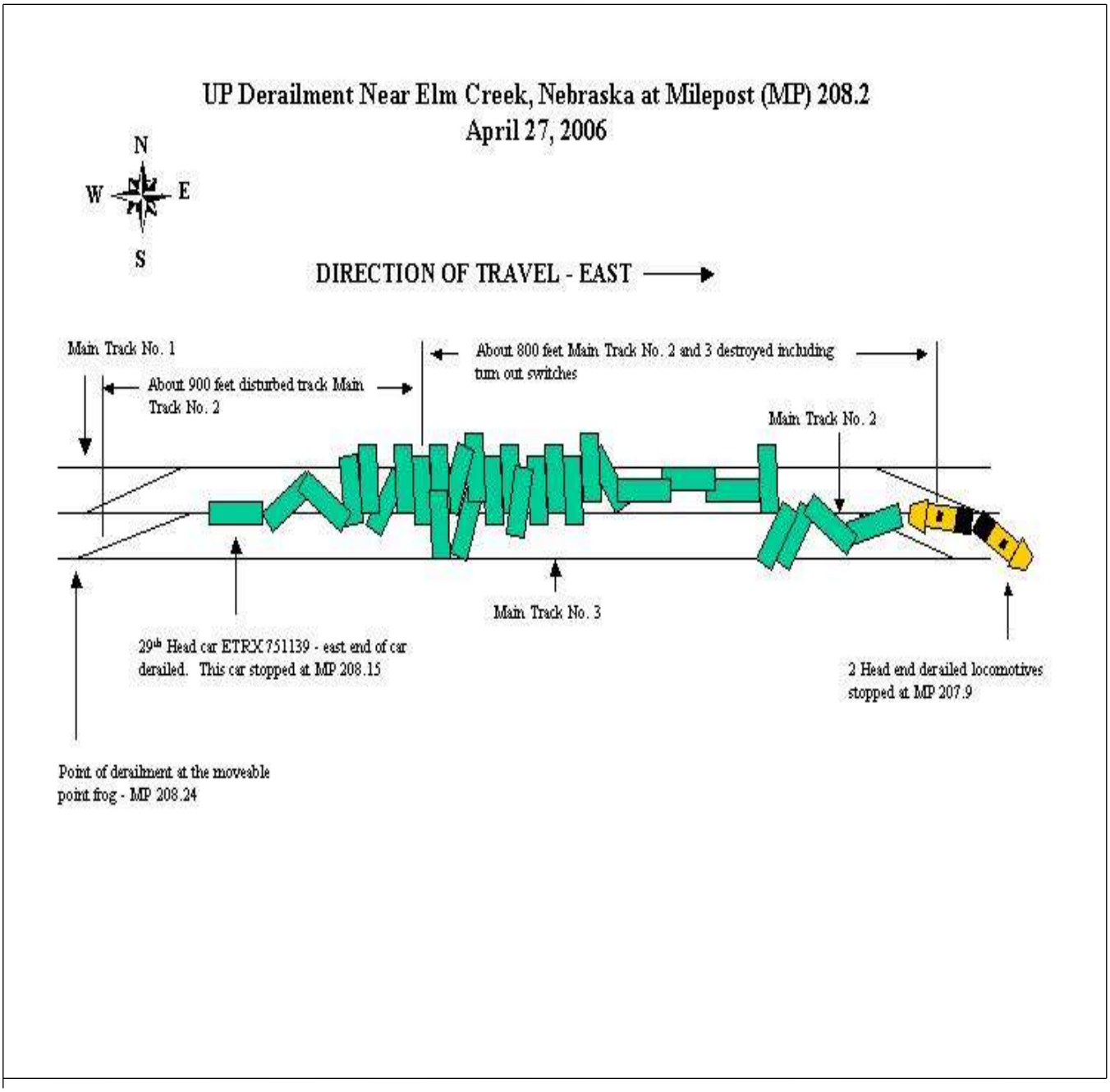
105. Locomotive Auxiliary Lights Operational? 1. Yes 2. No — Code: N/A

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-2006-25 sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

On April 27, 2006, at 4:45 a.m. central daylight time (CDT), eastward UP loaded unit coal Train Symbol 3 CNANW 25, consisting of two Head-end locomotives and one distributed power (DPU) locomotive on the rear of the train, 134 loaded coal cars, and operating at a recorded speed of 37 mph (maximum authorized timetable speed is 70 mph with a restriction for loaded coal trains of 50 mph) derailed the two Head-end locomotives and 29 cars beginning with the first head car through the 29th head car. The method of operation is by a traffic control system (TCS) supplemented by automatic cab signal (ACS) on triple main track. All three main tracks were blocked during clean-up.

The incident occurred at Simonds, Nebraska, a station location about 4 miles west of Elm Creek, Nebraska, in Dawson County at milepost 208.2 on the UP's Kearney Subdivision of the North Platte Service Unit . The train was traveling eastward on main Track No. 3 and negotiating through a No. 20 left hand turnout from main Track No. 3 crossing over to main Track No. 2 when the derailment occurred.

The weather conditions at the time of the derailment were clear, dark and the temperature was about 43 degrees F°. Damages are estimated at $2.8 million. The two member train crew under went toxicology testing under FRA post accident testing requirements. There were no injuries reported and no hazardous materials were released from the rail equipment; however, the derailment caused a gas leak in an underground line that provides natural gas to local switch heaters. The supply valve to the gas line was closed, stopping the gas flow and no injuries resulted from the leak.

In the area of the incident, the railroad is triple main track with a minus 0.13 percent grade at milepost 209.8 ascending to a plus 0.34 percent grade in a eastward direction at milepost 209.1. Through the area of the derailment and continuing eastward, the grade is relatively level gradually descending to a plus 0.28 percent grade at milepost 207.4. The track is tangent constructed with concrete crossties placed on 24-inch centers. The rail is 133-lbs continuous welded rail.

The probable cause of the derailment was determined to be, loose or missing bolts securing the short point of the moveable point frog. The preliminary findings identified the point of the derailment at a moveable point frog at milepost 208.2 at the west end turnout from main Track No. 3 crossing over to main Track No. 2. The short point of the moveable point frog on the south rail apparently opened due to broken or loose securement bolts allowing the lead locomotive to climb and split the switch.

110. NARRATIVE

Circumstances Prior to the Accident

The crew of UP Train Symbol 3 CNANW 25, an eastbound loaded coal train, included an engineer and a conductor. They first went on duty at 12:01 a.m., CDT , on April 27, 2006, at North Platte, Nebraska. This was the home terminal for both crew members and they had received more than the statutory off-duty period prior to reporting for duty.

Their assigned coal Train Symbol 3 CNANW 25, consisted of two head-end locomotives, one distributed power locomotive (DPU) located at the rear of the train, 134 loaded coal cars weighing 18,975 tons, and was 7,458 feet in length. The train was scheduled to travel to Newark, Arkansas, with no plans to add or remove cars en route. The train received an initial terminal, Class I brake test and departed North Platte at about 2 a.m. This train was required to operate at a restricted maximum speed of 50 mph due to the UP requirements regarding the movement of loaded coal trains. The locomotives had received the required inspections prior to departing North Platte with no defective conditions listed on the records.

As the eastbound train approached the accident area on Main Track No. 3, the engineer was seated at the controls on the south (right) side of lead Locomotive No. UP 5962 and the conductor was seated in the cab on the north (left) side of the lead locomotive. In this area of the railroad, there are three main tracks; Main Track No. 1 (north side), Main Track No. 2 (middle) and Main Track No. 3 (south side). All three tracks are tangent with 0 degree curvature. The elevation of the track preceding the derailment site is described as a descending 0.13 percent grade at milepost 209.8, changing to an ascending 0.34 percent grade at milepost 209.1. At the location of the derailment, the grade is relativity level, gradually descending to a plus 0.28 percent grade at milepost 207.4. The track is constructed with concrete crossties on 24-inch spacing and 133-lb continuous-welded rail (CWR). The railroad timetable direction of the train was east. The geographic direction was also east. Timetable directions are used throughout this report.

The Accident

As Train Symbol 3 CNANW 25 was approaching the area of the incident, traveling east on Main Track No. 3, train speed was gradually decreasing from 38 mph to 37 mph. The locomotive throttle position was being increased from throttle position No. 1 to throttle position No. 3 over a distance of approximately 1 mile. At the time the accident occurred, the train was negotiating through a No. 20 left-hand turnout from Main Track No. 3 crossing over to Main Track No. 2, at milepost 208.2 while being operated at 37 mph as indicated and recorded by the event recorder of controlling Locomotive No. UP 5962. The maximum authorized speed for loaded coal trains is 50 mph with a restricted speed of 40 mph through the dual control switch turnouts at this location, as designated in the current UP Timetable No. 2.

At approximately 4:45 a.m., as Train Symbol 3 CNANW 25 was traveling eastward through the west-end turnout switch from Main Track No. 3 to Main Track No. 2, the engineer noticed a rough spot at or near the moveable point frog at the west-end turnout, at milepost 208.2. The point of the derailment was identified at the location of the short point of the moveable point frog at the west control point turnout, controlling movement from Main Track No. 3 to Main Track No. 2, at milepost 208.2.

The event recorder data indicated the locomotive consist traveled approximately 1,792 feet in 45 seconds before coming to a stop at milepost 207.9. As a result of the derailment, both head-end locomotives derailed remaining upright. Most of the 29 derailed loaded coal cars piled up approximately 900 feet from the initial point of the derailment and blocked all three main tracks. The train crew shut down both head-end locomotives and contacted the dispatcher, providing information concerning the accident.

There were no injuries reported and no hazardous materials were released from the rail equipment; however, the derailment caused a natural gas leak in an underground line that services switch heaters. The supply valve to the gas line was closed, stopping the gas flow and no injuries resulted from the leak.

Equipment damages including both car and locomotive were estimated to at $1,709,198; track and signal damages were estimated at $1,266,711; totaling $2,975,909.

Analysis and Conclusions

Analysis
The railroad in the area of the derailment consisted of triple main tangent track (Main Tracks No. 1, No. 2, and No. 3) constructed with concrete crossties on 24-inch centers and 133-lb -continuous-welded rail (CWR). Main Track No. 3 was newly constructed in 1998. A series of turnouts are in place to allow movement from main track to main track. Approaching the area from west to east on Main Track No. 3 there is a remote controlled No. 20 left-hand turnout arrangement allowing movement from Main Track No. 3 through the turnout to Main Track No. 2. This turnout includes a moveable point frog assembly and is located at the west end of the turnout, at milepost 208.2. The moveable point frog construction includes a short point secured to a long point by three bolts. The initial post-derailment inspection of the frog identified the three securement bolts to be broken, allowing the point to open. At the time of the derailment, the crossover was lined for movement from Main Track No. 3 to Main Track No. 2.

The three, broken short point securement bolts were sent for lab analysis and further evaluation at Rail Sciences Inc in Omaha, Nebraska. The lab report concluded two of the three frog bolts which secure the short point had failed prior to the derailment due to fatigue cracking. For the purpose of this report, a numbering system relative to the lab report is used to identify the position of the three bolts securing the short point to the long point of the movable point frog. Bolt No. 1, which was the bolt closest to the tip, was not the standard size or grade bolt specified for use on these type frogs. Lab analysis results indicated Bolt No. 1 most likely failed first, based on 80 percent fatigue cracking and the presence of severe rust. Bolt No. 2 or the middle bolt, contained approximately 25 percent fatigue cracking before overload occurred. The third bolt (No. 3) failed due to simple overload during the derailment and had no signs of fatigue cracking. The short point tip position was at the end of the Sampson cut in the long point.

On December 16, 2005, a track geometry evaluation was made using evaluation Car No. EC4 checking for defects such as track gage, alignment, track geometry, and also the profile of the track. This testing revealed no significant defects at the location of the derailment. This portion of the railroad was again tested on February 23, 2006, using detector car DC16 for ultrasonic determination of internal defects in the rail. The test results revealed no defects at the location of the derailment. A hi-rail walk visual track inspection was made in the area of the incident on Monday, April 24, 2006, with additional inspections performed April 16, 18, 19, 20, and 23, reporting no defects in regards to the derailment location.

The equipment involved in the accident consisted of lead Locomotive No. UP 5962 built in 2002, Locomotive No. UP 6534 (the second unit) built in 2000, and 29 loaded coal cars of aluminum construction built in 1995. Both locomotives had received the required mechanical inspections prior to departure from North Platte, having no defective conditions noted on the inspection records. FRA post-accident inspections of these locomotives revealed no defective conditions to be attributed to the cause of the derailment. Prior to departing North Platte, the train received an initial terminal, Class I brake test by qualified mechanical inspectors. No defective conditions were recorded that would be relevant to the cause of the derailment based on the actual occurrence.

As a result of this derailment, both members of the crew underwent Post Accident Toxicological Testing and the results were negative.

Conclusions
The railroad was not in full compliance with their own and other applicable Federal standards. Title 49 Code of Federal Regulations (CFR) Section 213.133 (a) Turnouts and track crossings generally, states in part that "In turnouts and track crossings, the fastenings shall be intact and maintained so as to keep the components securely in place." Of the three bolts securing the short point to the long point of the movable point frog at the location of the derailment, the No. 1 bolt nearest to the point of the short point, was not the correct dimensional size or grade bolt required. The lab report indicated bolts No. 2 and No. 3 were not properly tightened and bolt No. 2 had fatigue cracked in the threads. All three securement bolts were discovered broken during the post-accident inspection. The lab report confirmed bolts No. 1 and No. 2 were broken prior to the derailment, with bolt No. 3 failing due to overload.

A reenactment involving an exemplar movable point frog was performed by Rail Sciences and railroad employees to determine the events leading to the derailment. Two bolts (Nos. 1 and 2) were removed from the short point of the movable point frog. Once the movable point frog was partially thrown, the tip of the short point pulled away approximately 1/2 inch. This scenario accurately recreates the conditions found during the post-accident analysis. The wheel marks on the short point and rail confirm the locomotive climbing or splitting the switch, resulting in the derailment. Inspections found no wheel or truck assembly marks west of the derailment site leading up to milepost 208.2 where the derailment occurred.

Probable Cause and Contributing Factors

The post-accident analysis confirmed the primary cause of the derailment was due to the broken bolts not securing the short point of the movable point frog to the long point. This allowed the short frog point to open, causing the locomotive wheels to climb or split the point of the frog, resulting in the derailment.

Therefore, the FRA finds the Primary Cause Code T-399 - Other frog, switch and track appliance defects, was the probable cause of HQ-2006-25.