



***Federal Railroad Administration  
Office of Safety  
Headquarters Assigned  
Accident Investigation Report  
HQ-2006-69***

***Union Pacific  
Chiloquin, OR  
July 27, 2006***

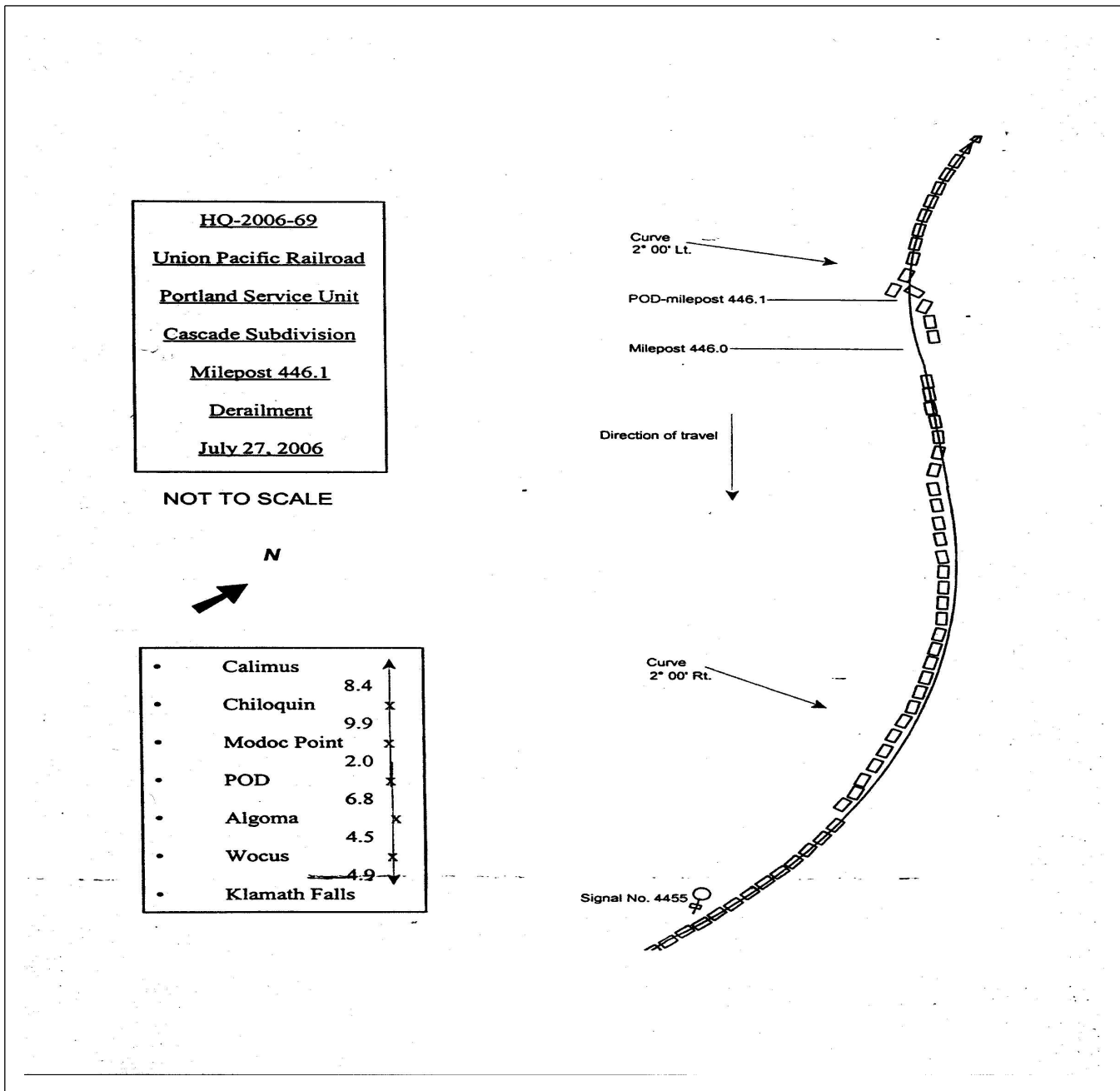
***Note that 49 U.S.C. §20903 provides that no part of an accident or incident report made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.***

| DEPARTMENT OF TRANSPORTATION<br>FEDERAL RAILROAD ADMINISTRATION                          |  | FRA FACTUAL RAILROAD ACCIDENT REPORT  |  |  |  | FRA File # <u>HQ-2006-69</u>  |  |
|--|--|---|--|--|--|---|--|
| 1. Name of Railroad Operating Train #1<br>Union Pacific RR Co. [UP ]                     |  |   |  | 1a. Alphabetic Code<br>UP  |  | 1b. Railroad Accident/Incident No.<br>0706PD028   |  |
| 2. Name of Railroad Operating Train #2<br>N/A  |  |   |  | 2a. Alphabetic Code<br>N/A   |  | 2b. Railroad Accident/Incident<br>N/A   |  |
| 3. Name of Railroad Responsible for Track Maintenance:<br>Union Pacific RR Co. [UP ]     |  |   |  | 3a. Alphabetic Code<br>UP  |  | 3b. Railroad Accident/Incident No.<br>0706PD028   |  |
| 4. U.S. DOT_AAR Grade Crossing Identification Number                                     |  |   |  | 5. Date of Accident/Incident<br>Month Day Year<br>07 27 2006                               |  | 6. Time of Accident/Incident<br>04:51: <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM   |  |
| 7. Type of Accident/Incident (single entry in code box)                                  |  | 1. Derailment<br>2. Head on collision<br>3. Rear end collision  |  | 4. Side collision<br>5. Raking collision<br>6. Broken Train collision                      |  | 7. Hwy-rail crossing<br>8. RR grade crossing<br>9. Obstruction  |  |
|  |  |   |  |  |  | 10. Explosion-detonation<br>11. Fire/violent rupture<br>12. Other impacts   |  |
|  |  |   |  |  |  | 13. Other (describe in narrative) 01  |  |
| 8. Cars Carrying HAZMAT 0  |  | 9. HAZMAT Cars Damaged/Derailed 0   |  | 10. Cars Releasing HAZMAT 0  |  | 11. People Evacuated 0  |  |
|  |  |   |  |  |  | 12. Division<br>Portland  |  |
| 13. Nearest City/Town<br>Chiloquin   |  |   |  | 14. Milepost (to nearest tenth)<br>446.1   |  | 15. State Abbr Code OR  |  |
| 17. Temperature (F) (specify if minus)<br>90 F   |  | 18. Visibility (single entry) Code<br>1. Dawn 3. Dusk<br>2. Day 4. Dark 2   |  | 19. Weather (single entry) Code<br>1. Clear 3. Rain 5. Sleet<br>2. Cloudy 4. Fog 6. Snow 1 |  | 20. Type of Track Code<br>1. Main 3. Siding<br>2. Yard 4. Industry 1  |  |
| 21. Track Name/Number<br>Main Track  |  |   |  | 22. FRA Track Code<br>Class (1-9, X) 3   |  | 23. Annual Track Density (gross tons in millions) 45.0  |  |
|  |  |   |  |  |  | 24. Time Table Direction Code<br>1. North 3. East 2   |  |
| OPERATING TRAIN #1   |  |   |  |  |  |   |  |
| 25. Type of Equipment Consist (single entry)   |  | 1. Freight train<br>2. Passenger train<br>3. Commuter train   |  | 4. Work train<br>5. Single car<br>6. Cut of cars   |  | 7. Yard/switching<br>8. Light loco(s).<br>9. Maint./inspect.car   |  |
|  |  |   |  |  |  | A. Spec. MoW Equip. Code<br>1   |  |
|  |  |   |  |  |  | 26. Was Equipment Attended? Code<br>1. Yes 2. No 1  |  |
|  |  |   |  |  |  | 27. Train Number/Symbol<br>QPWR V-23  |  |
| 28. Speed (recorded speed, if available) Code<br>R - Recorded<br>E - Estimated 29 MPH R  |  | 30. Method(s) of Operation (enter code(s) that apply)<br>a. ATCS g. Automatic block m. Special instructions<br>b. Auto train control h. Current of traffic n. Other than main track<br>c. Auto train stop i. Time table/train orders o. Positive train control<br>d. Cab j. Track warrant control p. Other (Specify in narrative) Code(s)<br>e. Traffic k. Direct traffic control<br>f. Interlocking l. Yard limits |  |  |  | 30a. Remotely Controlled Locomotive?<br>0 = Not a remotely controlled<br>1 = Remote control portable<br>2 = Remote control tower<br>3 = Remote control transmitter - more than one remote control transmitter 0 |  |
| 29. Trailing Tons (gross tonnage, excluding power units)<br>9087                         |  |   |  |  |  |   |  |
| 31. Principal Car/Unit   |  | a. Initial and Number   |  | b. Position in Train   |  | c. Loaded (yes/no)  |  |
| (1) First involved (derailed, struck, etc)   |  | N/A   |  | 70   |  | no  |  |
| (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.<br>Alcohol 0 Drugs 0   |  |
|  |  |   |  |  |  | 33. Was this consist transporting passengers? (Y/N) N   |  |
| 34. Locomotive Units   |  | a. Head End   |  | Mid Train  |  | Rear End  |  |
|  |  |   |  | b. Manual c. Remote  |  | d. Manual c. Remote   |  |
| (1) Total in Train   |  | 3   |  | 0 0  |  | 0 2   |  |
| (2) Total Derailed   |  | 0   |  | 0 0  |  | 0 0   |  |
|  |  |   |  |  |  | 35. Cars  |  |
|  |  |   |  |  |  | a. Freight b. Pass. c. Freight d. Pass. e. Caboose  |  |
|  |  |   |  |  |  | (1) Total in Equipment Consist 68 0 37 0 0  |  |
|  |  |   |  |  |  | (2) Total Derailed 13 0 24 0 0  |  |
| 36. Equipment Damage   |  | This Consist 728108   |  | 37. Track, Signal, Way, & Structure Damage 365325  |  | 38. Primary Cause Code T109   |  |
|  |  |   |  |  |  | 39. Contributing Cause Code N/A   |  |
| Number of Crew Members   |  |   |  | Length of Time on Duty   |  |   |  |
| 40. Engineer/Operators N/A   |  | 41. Firemen 0   |  | 42. Conductors 1   |  | 43. Brakemen 0  |  |
|  |  |   |  |  |  | 44. Engineer/Operator Hrs 5 Mi 06   |  |
|  |  |   |  |  |  | 45. Conductor Hrs 5 Mi 06   |  |
| 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 2  |  |
| OPERATING TRAIN #2   |  |   |  |  |  |   |  |
| 52. Type of Equipment Consist (single entry)   |  | 1. Freight train<br>2. Passenger train<br>3. Commuter train   |  | 4. Work train<br>5. Single car<br>6. Cut of cars   |  | 7. Yard/switching<br>8. Light loco(s).<br>9. Maint./inspect.car   |  |
|  |  |   |  |  |  | A. Spec. MoW Equip. Code N/A  |  |
|  |  |   |  |  |  | 53. Was Equipment Attended? Code 1. Yes 2. No N/A   |  |
|  |  |   |  |  |  | 54. Train Number/Symbol N/A   |  |
| 55. Speed (recorded speed, if available) Code<br>R - Recorded<br>E - Estimated 0 MPH N/A |  | 57. Method(s) of Operation (enter code(s) that apply)<br>a. ATCS g. Automatic block m. Special instructions<br>b. Auto train control h. Current of traffic n. Other than main track   |  |  |  | 57a. Remotely Controlled Locomotive?<br>0 = Not a remotely controlled<br>1 = Remote control portable  |  |

| DEPARTMENT OF TRANSPORTATION<br>FEDERAL RAILROAD ADMINISTRATION   |       | FRA FACTUAL RAILROAD ACCIDENT REPORT   |  |  |  | FRA File # <u>HQ-2006-69</u>  |  |         |       |     |     |
|---|-------|--|--|--|--|---|--|---------|-------|-----|-----|
| 56. Trailing Tons (gross tonnage, excluding power units)<br><br>N/A   |       | c. Auto train stop<br>d. Cab<br>e. Traffic<br>f. Interlocking  |  | i. Time table/train orders<br>j. Track warrant control<br>k. Direct traffic control<br>l. Yard limits  |  | o. Positive train control<br>p. Other (Specify in narrative)<br>Code(s)<br>N/A N/A N/A N/A N/A  |  |         |       |     |     |
|   |       |  |  |  |  | 2 = Remote control tower<br>3 = Remote control transmitter - more than one remote control transmitter<br>N/A  |  |         |       |     |     |
| 58. Principal Car/Unit<br>(1) First involved (derailed, struck, etc)<br><br>0   |       | a. Initial and Number<br><br>N/A   |  | b. Position in Train<br><br>N/A  |  | c. Loaded(yes/no)<br><br>N/A  |  |         |       |     |     |
| (2) Causing (if mechanical cause reported)<br><br>0   |       | a. Initial and Number<br><br>N/A   |  | b. Position in Train<br><br>N/A  |  | 59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.<br><table border="1" style="width:100%; border-collapse: collapse;"><tr><td style="width:50%;">Alcohol</td><td style="width:50%;">Drugs</td></tr><tr><td>N/A</td><td>N/A</td></tr></table> |  | Alcohol | Drugs | N/A | N/A |
| Alcohol   | Drugs |  |  |  |  |   |  |         |       |     |     |
| N/A   | N/A   |  |  |  |  |   |  |         |       |     |     |
|   |       |  |  |  |  | 60. Was this consist transporting passengers? (Y/N)<br><br>N/A  |  |         |       |     |     |
| 61. Locomotive Units<br>(1) Total in Train<br><br>0<br>(2) Total Derailed<br><br>0  |       | a. Head End<br><br>0   |  | Mid Train<br>b. Manual c. Remote<br><br>0 0  |  | Rear End<br>d. Manual e. Remote<br><br>0 0  |  |         |       |     |     |
|   |       |  |  |  |  | 62. Cars<br>(1) Total in Equipment Consist<br><br>0<br>(2) Total Derailed<br><br>0  |  |         |       |     |     |
|   |       |  |  |  |  | Loade<br>a. Freight b. Pass. c. Freight d. Pass. e. Caboose<br><br>0 0 0 0 0  |  |         |       |     |     |
| 63. Equipment Damage<br>This Consist<br><br>0   |       | 64. Track, Signal, Way, & Structure Damage<br><br>0  |  | 65. Primary Cause<br>Code<br><br>N/A   |  | 66. Contributing Cause<br>Code<br><br>N/A   |  |         |       |     |     |
| Number of Crew Members  |       |  |  | Length of Time on Duty   |  |   |  |         |       |     |     |
| 67. Engineer/Operators<br>N/A   |       | 68. Firemen<br>N/A   |  | 69. Conductors<br>N/A  |  | 70. Brakemen<br>N/A   |  |         |       |     |     |
|   |       |  |  |  |  | 71. Engineer/Operator<br>Hrs 0 Mi 0   |  |         |       |     |     |
|   |       |  |  |  |  | 72. Conductor<br>Hrs 0 Mi 0   |  |         |       |     |     |
| Casualties to:<br><br>Fatal<br><br>Nonfatal   |       | 73. Railroad Employees<br><br>0  |  | 74. Train Passengers<br><br>0  |  | 75. Other<br><br>0  |  |         |       |     |     |
|   |       |  |  |  |  | 76. EOT Device?<br>1. Yes 2. No N/A   |  |         |       |     |     |
|   |       |  |  |  |  | 77. Was EOT Device Properly Armed?<br>1. Yes 2. No N/A  |  |         |       |     |     |
|   |       |  |  |  |  | 78. Caboose Occupied by Crew?<br>1. Yes 2. No N/A   |  |         |       |     |     |
| Highway User Involved   |       |  |  | Rail Equipment Involved  |  |   |  |         |       |     |     |
| 79. Type<br>C. Truck-Trailer. F. Bus J. Other Motor Vehicle<br>A. Auto D. Pick-Up Truck G. School Bus K. Pedestrian<br>B. Truck E. Van H. Motorcycle M. Other (spec. in narrative)<br>Code<br>N/A |       |  |  | 83. Equipment<br>3. Train (standing) 6. Light Loco(s) (moving)<br>1. Train(units pulling) 4. Car(s)(moving) 7. Light(s) (standing)<br>2. Train(units pushing) 5. Car(s)(standing) 8. Other (specify in narrative)<br>Code<br>N/A |  |   |  |         |       |     |     |
| 80. Vehicle Speed<br>(est. MPH at impact) N/A   |       |  |  | 81. Direction geographical<br>1. North 2. South 3. East 4. West<br>Code<br>N/A   |  |   |  |         |       |     |     |
| 82. Position<br>1. Stalled on Crossing 2. Stopped on Crossing 3. Moving Over Crossing<br>4. Trapped<br>Code<br>N/A  |       |  |  | 84. Position of Car Unit in Train<br><br>N/A   |  |   |  |         |       |     |     |
| 85. Circumstance<br>1. Rail Equipment Struck Highway User<br>2. Rail Equipment Struck by Highway User<br>Code<br>N/A  |       |  |  | 86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?<br>1. Highway User 2. Rail Equipment 3. Both 4. Neither<br>Code<br>N/A  |  |   |  |         |       |     |     |
| 86b. Was there a hazardous materials release by<br>1. Highway User 2. Rail Equipment 3. Both 4. Neither<br>Code<br>N/A  |       |  |  | 86c. State here the name and quantity of the hazardous materials released, if any.<br><br>N/A  |  |   |  |         |       |     |     |
| 87. Type of Crossing<br>Warning<br>Code(s)<br>N/A   |       | 1. Gates<br>2. Cantilever FLS<br>3. Standard FLS<br>N/A  |  | 4. Wig Wags<br>5. Hwy. traffic signals<br>6. Audible<br>N/A  |  | 7. Crossbucks<br>8. Stop signs<br>9. Watchman<br>N/A  |  |         |       |     |     |
|   |       |  |  |  |  | 10. Flagged by crew<br>11. Other (spec. in narr.)<br>N/A  |  |         |       |     |     |
|   |       |  |  |  |  | 88. Signaled Crossing Warning<br>(See instructions for codes)<br>Code<br>N/A  |  |         |       |     |     |
|   |       |  |  |  |  | 89. Whistle Ban<br>1. Yes<br>2. No<br>3. Unknown<br>Code<br>N/A   |  |         |       |     |     |
| 90. Location of Warning<br>1. Both Sides<br>2. Side of Vehicle Approach<br>3. Opposite Side of Vehicle Approach<br>Code<br>N/A  |       | 91. Crossing Warning Interconnected with Highway Signals<br>1. Yes<br>2. No<br>3. Unknown<br>Code<br>N/A   |  | 92. Crossing Illuminated by Street Lights or Special Lights<br>1. Yes<br>2. No<br>3. Unknown<br>Code<br>N/A  |  | 93. Driver's Age<br>0   |  |         |       |     |     |
|   |       |  |  |  |  | 94. Driver's Gender<br>1. Male<br>2. Female<br>Code<br>N/A  |  |         |       |     |     |
|   |       |  |  |  |  | 95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train<br>1. Yes 2. No 3. Unknown<br>Code<br>N/A   |  |         |       |     |     |
|   |       |  |  |  |  | 96. Driver<br>1. Drove around or thru the Gate<br>2. Stopped and then Proceeded<br>3. Did not Stop<br>Code<br>N/A   |  |         |       |     |     |
| 97. Driver Passed Standing Highway Vehicle<br>1. Yes 2. No 3. Unknown<br>Code<br>N/A  |       | 98. View of Track Obscured by (primary obstruction)<br>1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify in narrative)<br>2. Standing Railroad Equipment 4. Topography 6. Highway Vehicle 8. Not obstructed<br>Code<br>N/A |  | 99. Driver Was<br>1. Killed 2. Injured 3. Uninjured<br>Code<br>N/A   |  | 100. Was Driver in the Vehicle?<br>1. Yes 2. No<br>Code<br>N/A  |  |         |       |     |     |
| 101. Casualties to Highway-Rail Crossing Users<br><br>Killed<br>0   |       | Injured<br>0   |  | 102. Highway Vehicle Property Damage<br>(est. dollar damage)<br>0  |  | 103. Total Number of Highway-Rail Crossing Users (include driver)<br>0  |  |         |       |     |     |
| 104. Locomotive Auxiliary Lights?<br>1. Yes 2. No<br>Code<br>N/A  |       | 105. Locomotive Auxiliary Lights Operational?<br>1. Yes 2. No<br>Code<br>N/A   |  | 106. Locomotive Headlight Illuminated?<br>1. Yes 2. No<br>Code<br>N/A  |  | 107. Locomotive Audible Warning Sounded?<br>1. Yes 2. No<br>Code<br>N/A   |  |         |       |     |     |

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

HQ-69  
Sketch.jpg



#### 109. SYNOPSIS OF THE ACCIDENT

On July 27, 2006, at 4:51 p.m.(PDT), a Union Pacific Railroad Company (UP) freight train (QPWRV-23) derailed on the Cascade Subdivision at milepost 446.1, approximately 16 miles north of Klamath Falls, Oregon. The train was operating southward at a recorded speed of 29 mph.

Prior to the derailment, on the same day, railroad workers replaced numerous ties in the area of the derailment. A temporary speed restriction was placed in effect restricting all trains to a maximum speed of 30 miles per hour. The normal freight train speed at this location is 60 miles per hour.

The train consisted of three locomotives on the head and two locomotives on the rear end. It had 105 cars (68 loads and 37 empties), weighed 9,087 tons and was 6,872 feet long. No hazardous materials were involved and no injuries or fatalities resulted. Reported damage is \$1,093,433 total (\$728,108 equipment and \$365,325 track/signal/structure).

At the time of the derailment, it was daylight, clear, and the temperature was about 90°F.

The probable cause was irregular track alignment.

#### 110. NARRATIVE

##### Circumstances Prior to the Accident

On July 27, 2006, after completing more than the statutory off duty time, a crew consisting of an engineer and a conductor reported for duty at Klamath Falls, Oregon, which is their home terminal. The crew was assigned to operate the southbound Union Pacific Railroad Company (UP) freight train (QPWRV-23) from the Calimus siding to Klamath Falls. The Calimus siding is located about 36.5 miles north of Klamath Falls. Their assigned freight train consisted of five locomotives and 105 cars (68 loads, 37 empties), weighed 9,087 tons and was 6,872 feet long. Three locomotives were positioned at the head of the train and two locomotives were positioned at the rear of the train. The southbound train was en route from Eugene, Oregon to Roseville, California and had been secured on the Calimus siding by a previous crew.

The crew was transported to the Calimus siding by taxi. Upon arrival, the crew prepared the train for departure by releasing hand brakes and performing a brake pipe continuity check. They waited approximately three hours before receiving a clear signal to depart at about 3:35 p.m..

Approaching the accident area from the north, there is in succession from the south switch at Modoc Point controlled siding, about 1,600 feet of tangent track followed by a 2-degree curve to the left that is about 3,700 feet long then about 530 feet of tangent track followed by a 2-degree curve to the right about 1,600 feet long. There is no grade in this area.

The railroad timetable direction of the train was south and the geographic direction was southeast. Timetable directions are used throughout this report and all curves will be identified as left or right as viewed by the derailed train's direction of travel. All times in this report will be Pacific Daylight Time (PDT) and all car positions will be given from the front to the rear of the train, with the leading locomotive in the first position.

As the train approached the accident area, the engineer was seated at the controls on the right (west) side of the locomotive cab. The conductor was seated on the opposite side of the cab.

##### The Accident

According to the event recorders on the leading locomotive and a locomotive at the rear of the train, the train was operating at 29 mph, in throttle position 4, when it derailed. The maximum authorized speed for freight trains is 60 mph as designated in the current UP Portland Area Timetable No. 3. However, at the time of the derailment, speed was restricted to a maximum of 30 mph by a temporary speed restriction outlined in Form A Track Bulletin No. 18958, line 4, on the Cascade Subdivision effective July 26, 2006, at 10:37 a.m.

The locomotives located at the rear of the train were being operated in synchronous mode, which means the controls of the rear locomotives matched those of the leading locomotive. According to the crew, as the train approached milepost 445, they felt a rapid deceleration immediately followed by a train induced emergency air brake application. The locomotive engineer notified the dispatcher via radio of the emergency stop, and that the conductor was in the process of inspecting the train. The conductor subsequently found 37 cars derailed and substantial damage to the track structure.

When UP officers were notified and arrived at the derailment site, the decision was made to perform FRA Post Accident Testing for Alcohol and Drugs on the train crew. Results were negative.

##### Analysis

According to the UP Manager of Tie Programs, a system tie gang had replaced wooden crossties at the location of the derailment earlier in the day, prior to the

QPWRV-23 traversing the area. The crew of the QPWRV-23 had received a mandatory written directive outlining protection of roadway workers between milepost 440.8 and 448.2 from 5:00 a.m. to 4:00 p.m. on the day of the accident. In addition, they received a mandatory directive temporarily restricting all trains to 30 mph between milepost 443.5 and milepost 448.35. This was due to the track structure being disturbed by the replacement of ties. The point of derailment (POD) was milepost 446.1 as evidenced by wheel markings on the ties. Ties had been replaced at this location that morning.

The first train to traverse this section of track, after crossties had been replaced, was northbound Amtrak Passenger Train No. 14 at about 1:30 p.m. According to UP's Director of Derailment Prevention, the track was inspected by a UP track inspector after the passenger train cleared the section of track. No unusual conditions were found.

The QPWRV-23 was the second train over this section of track at about 4:50 p.m. The first car to derail was the 70th car in the train, GPWX 1141, an empty gondola. Marks on the crossties indicate the leading wheels of the GPWX 1141 derailed to the inside of the curve at about milepost 446.1. According to UP Director of Tie Programs, all rules and procedures for tie replacement, as outlined in UP Engineering and Track Maintenance Field Handbook Rule 3.1.2 had, been followed. About 343 ties, of the 687 ties scheduled, had been replaced from milepost 446 to milepost 447 on July 27, 2006. A temporary speed restriction of 30 mph was placed in effect as outlined by UP Engineering and Track Maintenance Field Handbook Table 7-B.

Continuous welded rail (CWR) is located in the section of track where ties had been replaced and the derailment occurred. UP Engineering and Track Maintenance Handbook Rule 7.1- Causes of Track Buckling, identifies "High compressive forces in the rail resulting from thermal and mechanical loads." Rule 7.1.1- Conditions that contribute to track buckling, identifies a "high percentage of track buckles occur under the rear half of a train and more frequently on curves." And "maintenance activities such as tie renewals can reduce the lateral resistance by at least 50 percent."

Recorded weather data from the Klamath Falls airport showed a temperature of 66-degrees Fahrenheit at 7:53 a.m. and reported a temperature of about 90-degrees Fahrenheit at the time of the derailment. According to UP's Director of Derailment Prevention, the variance in temperature of over 20-degrees from the time ties were replaced to the time the QPWRV-23 traversed the area, makes CWR vulnerable to buckling. He also said the derailment of the leading set of trucks on the 70th car to the inside of the curve and the derailment of the trailing trucks on the 73rd car to the outside of the curve is indicative of a track misalignment derailment. Also, tie replacement on the curve to the left at the POD, and the derailment occurring after three locomotives and 66 cars traveled over this location are conditions that point to track alignment irregular as the cause of the accident.

Union Pacific officials who inspected the locomotives and cars reported that there were no mechanical defects found that would have caused or contributed to the cause of the derailment. The FRA and UP investigations found no train handling, operating rules or train make-up issues that could have contributed to the derailment.

#### Conclusion

Union Pacific Railroad Train Symbol QPWRV-23 derailed on the Cascade Subdivision on July 27, 2006. There was no evidence of mechanical or train handling issues that would have caused or contributed to the cause of the derailment. Prior to the derailment, a UP system tie gang had replaced numerous ties at, and in the area of the POD. Several conditions existed at the time of the derailment that are known to contribute to track buckling or are indicative of track buckling derailments. These conditions included thermal load on the rail, derailment in a curve, rear of the train derailling, the way the cars derailed, and disturbed track from tie replacement.

#### Probable Cause

An investigation by the Federal Railroad Administration found that the cause of the derailment was irregular track alignment.