



***Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-48***

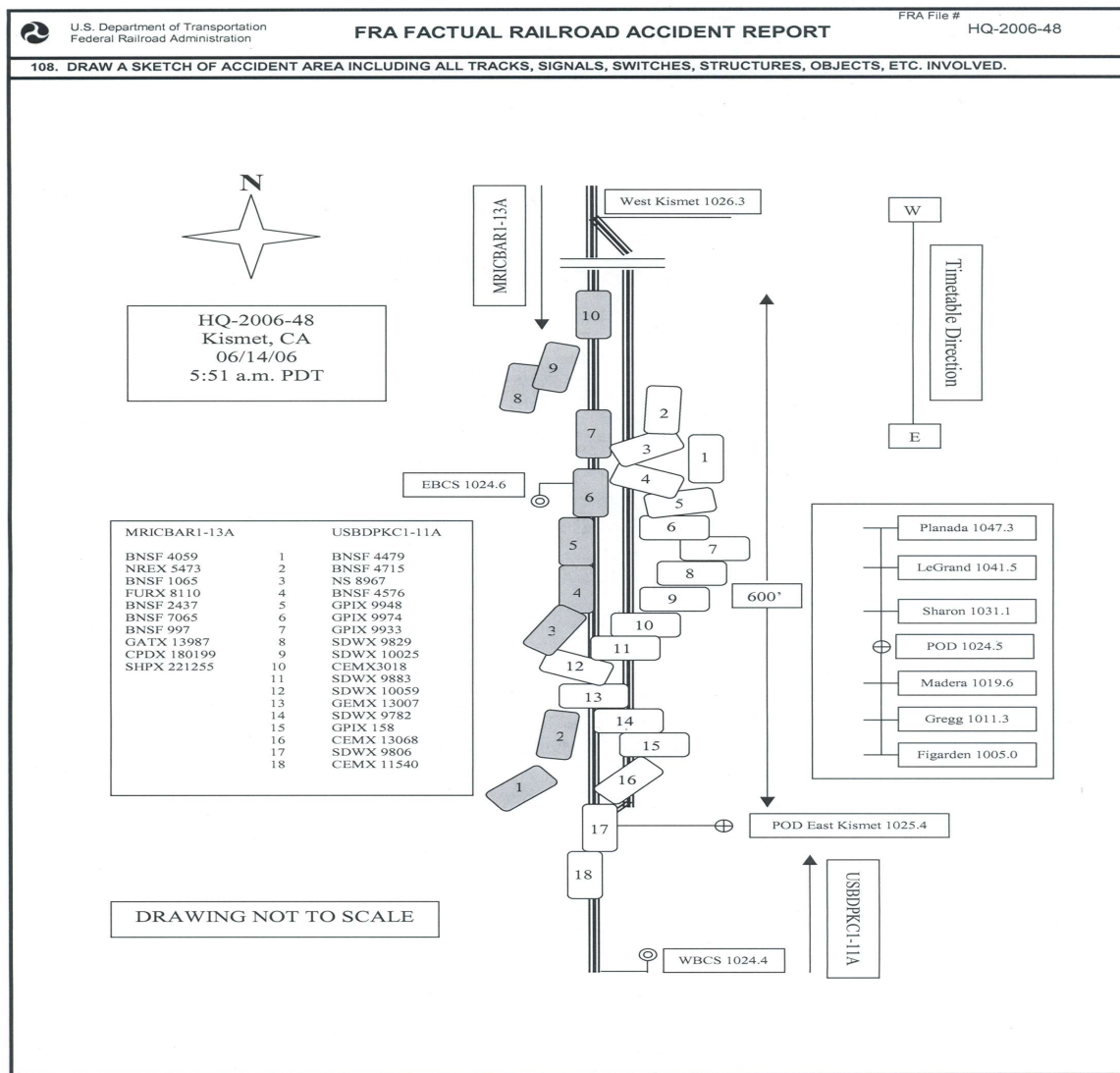
***Burlington Northern Santa Fe
Kismet, CA
June 14, 2006***

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.

1. Name of Railroad Operating Train #1 BNSF Rwy Co. [BNSF]			1a. Alphabetic Code BNSF			1b. Railroad Accident/Incident No. CA0606115						
2. Name of Railroad Operating Train #2 BNSF Rwy Co. [BNSF]			2a. Alphabetic Code BNSF			2b. Railroad Accident/Incident CA0606115						
3. Name of Railroad Responsible for Track Maintenance: BNSF Rwy Co. [BNSF]			3a. Alphabetic Code BNSF			3b. Railroad Accident/Incident No. CA0606115						
4. U.S. DOT_AAR Grade Crossing Identification Number			5. Date of Accident/Incident Month Day Year 06 14 2006			6. Time of Accident/Incident 05:51:01 <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM						
7. Type of Accident/Incident (single entry in code box)												
1. Derailment			4. Side collision			7. Hwy-rail crossing						
2. Head on collision			5. Raking collision			10. Explosion-detonation						
3. Rear end collision			6. Broken Train collision			11. Fire/violent rupture						
			9. Obstruction			12. Other impacts						
						13. Other (describe in narrative)						
02												
8. Cars Carrying HAZMAT 43		9. HAZMAT Cars Damaged/Derailed 2		10. Cars Releasing HAZMAT 0		11. People Evacuated 0		12. Division California				
13. Nearest City/Town Kismet/Madera			14. Milepost (to nearest tenth) 1024.5		15. State Abbr Code N/A CA		16. County MADERA					
17. Temperature (F) (specify if minus) 52 F		18. Visibility (single entry) Code 1. Dawn 3. Dusk 2. Day 4. Dark 1		19. Weather (single entry) Code 1. Clear 3. Rain 5. Sleet 2. Cloudy 4. Fog 6. Snow 1		20. Type of Track Code 1. Main 3. Siding 2. Yard 4. Industry 1						
21. Track Name/Number Main Track			22. FRA Track Code Class (1-9, X) 4		23. Annual Track Density (gross tons in millions) 47.07		24. Time Table Direction Code 1. North 3. East 3					
OPERATING TRAIN #1												
25. Type of Equipment Consist (single entry)			1. Freight train 4. Work train 7. Yard/switching 2. Passenger train 5. Single car 8. Light loco(s). 3. Commuter train 6. Cut of cars 9. Maint./inspect.car			A. Spec. MoW Equip. Code 1		26. Was Equipment Attended? 1. Yes 2. No 1				
27. Train Number/Symbol MRICB AR113												
28. Speed (recorded speed, if available) Code R - Recorded E - Estimated 22 MPH R		30. 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) Code(s) e. Traffic k. Direct traffic control f. Interlocking l. Yard limits					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					
29. Trailing Tons (gross tonnage, excluding power units) 5286		e		N/A		N/A		0				
31. Principal Car/Unit		a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	32. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.							
(1) First involved (derailed, struck, etc)		N/A	1	N/A	Alcohol		Drugs					
(2) Causing (if mechanical cause reported)		0	0	N/A	0		1					
		33. Was this consist transporting passengers? (Y/N)		N								
34. Locomotive Units		a. Head End	b. Mid Train		c. Rear End	35. Cars		a. Freight	b. Pass.	c. Freight	d. Pass.	e. Caboose
(1) Total in Train		7	0	0	0	0	(1) Total in Equipment Consist	35	0	20	0	0
(2) Total Derailed		3	0	0	0	0	(2) Total Derailed	1	0	2	0	0
36. Equipment Damage This Consist		2287716		37. Track, Signal, Way, & Structure Damage 392000		38. Primary Cause Code H221		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 9 Mi 26		45. Conductor Hrs 9 Mi 26		
Casualties to:		46. Railroad Employees		47. Train Passengers		48. Other		49. EOT Device? 1. Yes 2. No 1		50. Was EOT Device Properly Armed? 1. Yes 2. No 1		
Fatal		0		0		0		51. Caboose Occupied by Crew? 1. Yes 2. No		N/A		
Nonfatal		N/A		0		0						
OPERATING TRAIN #2												
52. Type of Equipment Consist (single entry)			1. Freight train 4. Work train 7. Yard/switching 2. Passenger train 5. Single car 8. Light loco(s). 3. Commuter train 6. Cut of cars 9. Maint./inspect.car			A. Spec. MoW Equip. Code 1		53. Was Equipment Attended? 1. Yes 2. No 1		54. Train Number/Symbol USBDP KC111		
55. Speed (recorded speed, if available) Code R - Recorded E - Estimated 38 MPH R		57. 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					57a. Remotely Controlled Locomotive? 0 = Not a remotely controlled 1 = Remote control portable					

56. Trailing Tons (gross tonnage, excluding power units)		4113		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		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 N/A		Drugs N/A	
(1) First involved (derailed, struck, etc)		BNSF 4479		1		N/A									
(2) Causing (if mechanical cause reported)		0		0		N/A		60. Was this consist transporting passengers? (Y/N)				N			
61. Locomotive Units		a. Head End		Mid Train b. Manual c. Remote		Rear End d. Manual c. Remote		62. Cars		Loade a. Freight b. Pass.		Empty c. Freight d. Pass.		e. Caboose	
(1) Total in Train		4		0 0		0 0		(1) Total in Equipment Consist		30 0		0 0		0 0	
(2) Total Derailed		4		0 0		0 0		(2) Total Derailed		14 0		0 0		0 0	
63. Equipment Damage This Consist		2644812		64. Track, Signal, Way, & Structure Damage		0		65. Primary Cause Code		H221		66. Contributing Cause Code		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		0		Hrs 2 Mi 06		Hrs 2 Mi 06					
Casualties to:		73. Railroad Employees		74. Train Passengers		75. Other		76. EOT Device?		77. Was EOT Device Properly Armed?					
Fatal		0		0		0		1. Yes 2. No 1		1. Yes 2. No 1					
Nonfatal		2		0		0		78. Caboose Occupied by Crew?		N/A					
								1. Yes 2. No							
Highway User Involved				Rail Equipment Involved											
79. Type		C. Truck-Trailer. F. Bus J. Other Motor Vehicle		Code		83. Equipment		3. Train (standing) 6. Light Loco(s) (moving)		Code					
A. Auto D. Pick-Up Truck G. School Bus K. Pedestrian				N/A		1. Train(units pulling) 4. Car(s)(moving)		7. Light(s) (standing)		N/A					
B. Truck E. Van H. Motorcycle M. Other (spec. in narrative)				N/A		2. Train(units pushing) 5. Car(s)(standing)		8. Other (specify in narrative)		N/A					
80. Vehicle Speed (est. MPH at impact)		N/A		81. Direction geographical		Code		84. Position of Car Unit in Train		N/A					
				1. North 2. South 3. East 4. West		N/A									
82. Position				Code		85. Circumstance		Code							
1. Stalled on Crossing 2. Stopped on Crossing 3. Moving Over Crossing 4. Trapped				N/A		1. Rail Equipment Struck Highway User		N/A							
86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?				Code		86b. Was there a hazardous materials release by		Code							
1. Highway User 2. Rail Equipment 3. Both 4. Neither				N/A		1. Highway User 2. Rail Equipment 3. Both 4. Neither		N/A							
86c. State here the name and quantity of the hazardous materials released, if any.														N/A	
87. Type of Crossing		1. Gates 4. Wig Wags		7. Crossbucks 10. Flagged by crew		88. Signaled Crossing Warning		Code		89. Whistle Ban		Code			
2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (spec. in narr.)		3. Standard FLS 6. Audible 9. Watchman 12. None				(See instructions for codes)		N/A		1. Yes 2. No 3. Unknown		N/A			
Code(s)		N/A N/A N/A		N/A N/A N/A N/A											
90. Location of Warning		Code		91. Crossing Warning Interconnected with Highway Signals		Code		92. Crossing Illuminated by Street Lights or Special Lights		Code					
1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach		N/A		1. Yes 2. No 3. Unknown		N/A		1. Yes 2. No 3. Unknown		N/A					
93. Driver's Age		94. Driver's Gender		Code		95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train		Code		96. Driver		Code			
0		1. Male 2. Female		N/A		1. Yes 2. No 3. Unknown		N/A		1. Drove around or thru the Gate 4. Stopped on Crossing 2. Stopped and then Proceeded 5. Other (specify in narrative) 3. Did not Stop		N/A			
97. Driver Passed Standing Highway Vehicle		Code		98. View of Track Obscured by (primary obstruction)		Code									
1. Yes 2. No 3. Unknown		N/A		1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify in narrative) 2. Standing Railroad Equipment 4. Topography 6. Highway Vehicle 8. Not obstructed		N/A									
101. Casualties to Highway-Rail Crossing Users		Killed		Injured		99. Driver Was		Code		100. Was Driver in the Vehicle?		Code			
		0		0		1. Killed 2. Injured 3. Uninjured		N/A		1. Yes 2. No		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?		Code		105. Locomotive Auxiliary Lights Operational?		Code									
1. Yes 2. No		N/A		1. Yes 2. No		N/A									
106. Locomotive Headlight Illuminated?		Code		107. Locomotive Audible Warning Sounded?		Code									
1. Yes 2. No		N/A		1. Yes 2. No		N/A									

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



109. SYNOPSIS OF THE ACCIDENT

At approximately 5:51 a.m. PDT, June 14, 2006, an eastbound BNSF freight train M-RICBAR1-13 (Train #1) struck a westbound BNSF unit train U-SBDPKC1-11 (Train #2) head-on at the East Kismet Siding, Kismet (Madera County), California, Stockton Subdivision, milepost 1024.5. Track speed in the area is 55 mph for freight and 40 mph at both ends of the Kismet Siding. The method of operation is Traffic Control System/Centralized Traffic Control and is controlled by a dispatcher in San Bernardino, California.

Speed of Train #1 at impact was 22 mph, while Train #2's speed was 38 mph. Three of the seven locomotives on Train #1 derailed along with two tank cars (one non-placarded, one placarded FLAMMABLE); one placarded tank car with FLAMMABLE GAS was knocked off its center pin but did not derail. No hazardous materials were released and there was no evacuation ordered. All four of the locomotives on Train #2 derailed as did 14 loaded hopper cars of cement. Train speeds were verified from event recorder downloads of the lead locomotives.

All crew members from both trains sustained non life-threatening injuries; one required an extended hospital stay.

Damages were estimated at: equipment, \$4,932,528; track and structures, \$392,000; no damage to signals.

Weather at the time of the accident was dawn, clear and a temperature of 52 degrees Fahrenheit.

The probable cause is the failure of Train #1 to comply with automatic block or interlocking signal displaying a stop indication.

110. NARRATIVE

The following information was obtained from an investigation that was conducted by the Federal Railroad Administration.

Circumstances Prior to the Accident

MRICBAR1-13 (Train #1)

On June 13, 2006, a crew consisting of an engineer, conductor and brakeman went on duty at 8:25 p.m. PDT at the BNSF Richmond (CA) Yard. This was their home terminal and all three crew members received more than the statutory off-duty time prior to reporting for work. The crew departed Richmond at approximately 10:35 p.m. with seven locomotives, five loads and five empties, added 30 loads and 15 empties in Pittsburg, CA, and departed at 1:50 a.m. on their final leg for Calwa (Fresno) with seven locomotives, 35 loads and 20 empties, 5286 trailing tons and 4,073 feet in length. When it departed Pittsburg, Train #1 was designated as a "key" train, which meant it was to remain on main line track until it arrived at its destination in Calwa (Fresno). According to the crew, the trip was uneventful approaching the area known as Kismet Siding, near Madera, California.

Kismet Siding is approximately six miles timetable west (geographic north) of Madera and approximately 30.7 miles timetable east (geographic south) of Merced. All directions used in this report are timetable directions. However, the geographic direction is north-south and Train #1, while traveling timetable eastbound, was moving in a geographic southerly direction.

In this part of the railroad, the track is constructed of 136-lb. continuously welded rail (CWR) and ballast and ties are in excellent condition. Approaching the accident site, the single main track is tangent and virtually level for four miles with an unobstructed view ahead. The right-of-way is built on a fill that elevates the track above the surrounding rural farmland, further increasing visibility. An irrigation canal is immediately adjacent to the right-of-way on the south side (geographic west side).

During the trip to Kismet, the engineer was at the controls on the right side of the locomotive and the other crew members were seated on the opposite side of the cab. Investigation revealed the plan was for Train #1 to stop prior to and hold the main line west of the East Kismet Siding switch to meet westbound U-SBDPKC1-11 (Train #2) and allow Train #2 to enter the Kismet Siding (siding length 9,085 feet). Once clear, Train #1 would then proceed eastward towards Calwa, approximately 30.5 miles away.

USBDPKC1-11 (Train #2)

On June 14, 2006, the engineer and conductor of Train #2 went on duty at 3:45 a.m. PDT at Calwa, California. This is their home terminal and both crew members received the statutory off-duty time prior to reporting for duty. They were instructed to proceed to the BNSF Polk Yard, Sacramento. Train #2 departed Calwa westbound (geographic north) at 4:56 a.m. with four locomotives and 30 loaded hopper cars of cement, 4,109 trailing tons and 1,542 feet in length. The crew described the trip from Calwa as uneventful. As the train proceeded railroad west from Madera towards the East Kismet Siding, the locomotive engineer was at the controls on the right side of the locomotive and the conductor was seated on the opposite side of the cab.

Approaching the accident site, the track begins a one degree, 12-minute right hand curve that straightens out to tangent track approximately 1,000 feet east of the East Kismet switch. Train #2's instructions were to proceed westbound and enter the siding at the East Kismet Siding switch to allow Train #1 to proceed.

The Accident

MRICBAR1-13 (Train #1)

According to the download of the signal system, Train #1's engineer received a flashing intermediate yellow over red aspect at milepost 1027.2, indicating he should "proceed prepared to pass next signal not exceeding 40 mph and be prepared to enter diverging route at prescribed speed" (GCOR Rule 9.1.6). An analysis of the lead locomotive (BNSF 4059) event recorder indicates Train #1's speed was a constant 44 mph in throttle 2 from at least milepost 1028. At the West Kismet Siding switch, milepost 1026.3, Train #1 received a solid yellow over red aspect, indicating "proceed prepared to stop at next signal; trains exceeding 30 mph immediately reduce to that speed" (GCOR Rule 9.1.8). From the West Kismet Siding switch, the red aspect would have been clearly visible at the East Kismet Siding over 9,000 feet away. Now in throttle 1, the event recorder download indicates the engineer sounded his horn at the private crossing at West Kismet, milepost 1026.4, at a speed of 44 mph, a distance of 7,716 feet prior to impact. The download then indicates the locomotive's alerter alarm was reset 4,059 feet prior to impact, speed was 43 mph, and the throttle raised from throttle 1 to throttle 2 position. At 3,413 feet prior to impact, the locomotive was momentarily dropped to throttle 1 and returned to throttle 2; speed approximately 43 mph. At 1,059 feet prior to impact, the engineer placed the train into emergency from the automatic air valve without bailing the independent brake, indicating the engineer's intent to immediately stop the train. The crew of eastbound Train #1 exited the lead locomotive prior to impact. The event recorder download indicates speed at impact was 22 mph. A review of the Switch Position Awareness Form (SPAF) for Train #1 shows no signals were called or acknowledged past East Sharon, milepost 1029.8.

The impact caused three locomotives and two cars of Train #1 to derail. One other car was knocked off its center pin but did not derail. Damage was confined to an area less than 600 feet from the point of impact.

The crew injuries were reported as follows: the locomotive engineer sustained bruises, abrasions and contusions, was hospitalized and released; the conductor suffered a fractured ankle and sprains, was hospitalized and released; the brakemen sustained bruises and abrasions, was examined and released.

Following the accident, Train #1's crew members were interviewed. The locomotive engineer stated he was well rested and not tired and that he and the conductor were calling signals. He stated when the train left Sharon (milepost 1031.1) they were running "on color" and when they got to the approach at the west end of Kismet siding it went from approach (yellow) to clear, so he "proceeded to keep going east." As he proceeded, he looked at the signal at the east end of Kismet and stated it looked red, so he plugged the train. He insisted the signal went clear and denied falling asleep on duty.

The conductor indicated that as the sun was coming up, he was having trouble seeing the approach signal to Kismet which was an "approach medium." Later, when they were approaching the yellow at the west end of Kismet, he thought he saw the signal fluctuate and asked the engineer, "Did that signal fluctuate?" The engineer replied, "It went clear." As his back was turned to put on sunglasses, he then turned and noticed they were approaching a red block at the east end of Kismet. He asked the engineer about it and there was no response. He then sat down where he had a clear view of the signal and yelled at the engineer, "Hey, that's a red block." After some dialog between he and the engineer, the conductor saw the headlight of westbound Train #2 and "that is when they plugged it." He acknowledged they were by a "hard yellow" at the west end of Kismet and felt that the engineer did not react quickly enough to the red signal at East Kismet.

The brakeman stated he did not remember what the preceding signal indication was at the west end of Kismet and he did not call the indication. He also stated that with the sunlight, the crew could not determine the color of the signal at the east end of Kismet, but it looked red. He then recalled someone saying "is that signal red?" and then the conductor yelled at him to go out the back door.

At some point after the locomotive was placed in emergency and prior to impact, all three crew members of Train #1 jumped clear of the locomotive and sustained injuries.

Post-accident analysis of records indicate Train #1's engineer was off-duty for more than 81 hours and the conductor was off-duty in excess of 48 hours prior to reporting for duty in Richmond. The brakeman was off-duty for 12.5 hours.

USBDPKC1-11 (Train #2)

Westbound Train #2 operated at normal track speed from Calwa to Kismet. The event recorder download indicates Train #2 began to slow to 40 mph as it prepared to enter the siding at East Kismet. According to the westbound Train #2 conductor, Train #1 became visible as Train #2 rounded the curve just east of the East Kismet switch. Realizing they were going too fast to safely jump and in the few seconds available to make a decision, they decided to ride it out in hopes that the lead locomotive would enter and clear the east switch and perhaps be dealt a glancing blow. Based on the event recorder download of the lead locomotive, Train #2's speed at impact was 38 mph. The point of impact on the lead locomotive was directly on the left front corner, indicating it had traveled approximately 40 feet into the siding when it was struck. Damages were confined to an area of less than 600 feet from the point of impact.

The crew injuries were reported as follows: the engineer sustained a fractured pelvis and internal injuries and was hospitalized; the conductor sustained multiple lacerations and contusions and a possible concussion, was hospitalized and released.

Train #2's conductor was briefly interviewed after the collision and indicated his train received an approach medium as they neared East Kismet and a diverging approach at East Kismet. He estimated their speed was 40 mph. He stated he heard a "Mayday, Mayday" over his radio as his train rounded the "corner" (right hand curve prior to East Kismet Siding) and estimated that was 2,000 feet from east switch. He stated his reaction was "there [sic] gonna hit us" and said to the engineer, "Let's ride it out, we don't have time." When asked why he chose not to jump, he replied there was "not enough time, going to [sic] fast." He also stated that following the collision, the crew of Train #1 made no attempt to help them. Train #2's engineer was not interviewed.

Post-accident FRA testing was performed on crew members of both trains. The conductor of Train #1 tested positive for drugs. All other crew members tested negative.

Analysis and Conclusions

Analysis

Track

FRA and California Public Utilities Commission (CPUC) track inspectors performed extensive analysis of the track in the area of the collision. Their findings indicate no conditions existed that would have contributed to the accident. Visibility along the direction of travel was unimpaired by vegetation due to the elevated roadbed and wide right-of-way on either side. The tangent track and near zero elevation afforded an unobstructed view of the signals from the west end of Kismet to the east end.

Signal and Train Control

BNSF, FRA and CPUC signal personnel performed post-accident signal tests. There were no exceptions noted and the signal system functioned as intended. Test records and trouble history records were requested and reviewed. There were no defective conditions that would have contributed to the accident.

BNSF conducted an accident re-enactment on the morning of June 21, 2006, in clear conditions virtually identical to those encountered on the morning of June 14, 2006. Those present onboard included a BNSF road foreman of engines, a general road foreman, a BNSF attorney, and a Brotherhood of Locomotive Engineers and Trainmen (BLET) representative. Because the operation of the signal system is critical in determining the probable cause of the accident, FRA emphasized its importance by assigning a Signal and Train Control (S&TC) inspector and an Operating Practices (OP) inspector to ride along in the cab of the re-enactment locomotive (BNSF 1107) to observe and record the events. Details of the re-enactment relative to the signal system are described as follows:

- At 5:34 a.m. PDT, BNSF 1107 departed from the siding at Sharon with a clear signal aspect conveying siding-to-main movement in an eastward direction. All present onboard were able to see the flashing yellow intermediate signal ahead at milepost 1027.2 while passing the clear signal at East Sharon, milepost 1029.7.

- At 5:38 a.m. PDT, BNSF 1107 reached a top speed of 40 mph on the approach to the intermediate signal at milepost 1027.2, which displayed a flashing yellow over red aspect. This signal was taken by the BNSF 1107 at 5:40 a.m. PDT. Upon passing this signal, the yellow signal aspect at West Kismet, milepost 1026.3, was clearly visible by all present onboard.

- At 5:42 a.m. PDT, BNSF 1107 passed the yellow over red signals at West Kismet, and at the same time the red signal at East Kismet was evident to all present onboard.

- BNSF 1107 came to a stop short of the red eastbound mainline signal at East Kismet at 5:45 a.m. PDT. All signals were clearly visible during this re-enacted train movement. At 5:49 a.m. PDT, BNSF 1107 made a reverse move back to Sharon for a second re-enactment. The sun became visible at 5:53 a.m. PDT, and it was positioned approximately 90 degrees from the head end of the BNSF 1107. It was not within the line of sight in relation to those onboard and the signals.

- In summary, all signals were clearly visible during this exercise. Each signal became visible prior to or at the preceding signal. Furthermore, the sun would not have been in a position at 5:51 a.m. PDT on the date of the accident that would have caused a problem in conveying signal indications. All of those onboard agreed to these conclusions.

In order to determine if sun glare at dawn may have obscured or hampered Train #1 crew's forward vision, the U.S. Naval Observatory's Astronomical Applications Department indicates sunrise occurred at 5:40 a.m. PDT. However, looking geographic east to the horizon and perpendicular to the direction of travel, the sun is behind the Sierra Mountain range in the distance and the actual time the sun appeared over the mountains on June 14, 2006 may have either been concurrent with or after the time of the accident at 5:51 a.m. PDT. This is further supported by the Naval Observatory's record that sunrise on the day of the re-enactment, June 21, 2006, was at 5:41 a.m. PDT and the observation made during the re-enactment wherein all agreed the sun became visible at 5:53 a.m. PDT.

Therefore, all indications are that the signal system functioned as intended, that visibility of the signals was not hampered by line of sight or daylight, and no operational or mechanical issues surfaced that would have contributed to the accident. Despite the statement of Train #1's engineer that the signal at the west end of Kismet went clear, there is no evidence to substantiate his claim.

Track

A records review of track inspections conducted over the previous 30 days revealed no significant track defects that could have contributed to the accident.

Motive Power and Equipment

FRA Motive Power & Equipment personnel reviewed equipment inspection records and found no defects on either train that could have contributed to the accident.

Hazardous Materials

A review of the hazardous materials documentation accompanying Train #1 revealed no discrepancies.

Operating Practices

A review of Part 217 testing and inspections for the period January-March 2006 on crew members of Train #1 revealed the following:

a. locomotive engineer

8 tests - all Passed

Tests pertaining to the accident:

1 - 205 Block signal test

2 - 607 Signal Awareness Form

1 - 207 Banner test

No weekend tests

4 tests conducted on Tuesday; 4 tests conducted on Thursday

2 tests were at night: 5:15 pm and 11:15 pm

6 tests in daylight

Tests close to incident: at MP 998.1 and 998.6

b. conductor

4 tests - all Passed

Tests pertaining to the accident:

1 - 607 Signal Awareness form

all tests were conducted at MP 1189.0

all tests were conducted on Tuesdays

c. brakeman

19 tests - all Passed

Tests pertaining to the accident:

3 - 607 Signal Awareness Form

1 - 205 Block Signal Stop

11 tests were conducted on Fridays

8 tests were conducted at 3:00 pm

Tests close to incident: MP 1092.4, two at 1094.5 and 996.2

Part 217 testing and inspections on the crew members of Train #2 revealed the following:

a. locomotive engineer

6 tests - all Passed

Tests pertaining to the incident:

1 - 205 Block Signal Test

4 - 609 Grade crossing approach test

1 - Speed Restriction Test

5 tests were conducted on Saturday

Times of tests varied

Tests were conducted near accident at MP 1056.2 and 1027.9

b. conductor

5 tests - all Passed

Tests pertaining to the incident:

1 - 205 Block Signal Test

1 - 201 Restricted Speed test

No Signal Awareness Form testing

4 tests conducted on Monday
4 tests conducted at 9:04 am
1 test at 8:00 pm
Tests were conducted near accident at: 4 at MP 1178.0 and 1 at 996.0

FRA's review of the involved crews' Part 217 testing finds no significant defects in type, quantity, frequency or location.

Conclusions

Concerning eastbound Train #1, post-accident analyses of all available records, reports, inspections and data exclude track, signal and train control, and motive power and equipment as contributing to the accident. Astronomical data discounts the possibility that sunlight at dawn would have obscured or hindered vision in the direction of travel. Despite statements to the contrary, there is no basis for accepting the claims of Train #1's crew members that their signal went "clear" or their vision was hampered by the sunrise.

As for westbound Train #2, a similar review of all available records, reports and data exclude the crew members' actions as having contributed to the accident.

Probable Cause and Contributing Factors

The conductor of the eastbound train's use of cocaine may have contributed to the cause of the accident. However, the toxicological results do not allow a conclusion concerning either possible impairment or when the drug was taken. The blood contains only the inactive metabolite, benzoylecgonine, which is not normally associated with impairment. Neither impairment nor time of exposure to the drug can be derived from urine results.

The FRA determined the probable cause as the failure of Train #1 to comply with automatic block or interlocking signal displaying a stop indication.