Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2005-37

Montana Rail Link (MRL)
Helena, Montana
April 28, 2005

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-2005-37

1.Name of Railroad Operating Train #1: Montana Rail Link [MRL]	1a. Alphabetic Code: MRL	1b. Railroad Accident/Incident No.: 2005060
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: Montana Rail Link [MRL]	3a. Alphabetic Code: MRL	3b. Railroad Accident/Incident No.: 2005060
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident: Month 04 / Day 28 / Year 2005	6. Time of Accident/Incident: 10:00: ☑ 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
9	0	0	0	System

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
Helena	10.9	N/A	MT	LEWIS AND CLARK

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
40 F		2		2		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
Single Main Track		2	0		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: 1

26. Was Equipment Attended? 1. Yes 2. No — Code: 1

27. Train Number/Symbol: PTACD EN125

28. Speed (recorded speed, if available) — R - Recorded; E - Estimated: 22 MPH — Code: R

29. Trailing Tons (gross tonnage, excluding power units): 5477

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): e | 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	27	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
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	8	0	0	0	0	(1) Total in Equipment Consist	68	0	10	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	30	0	0	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
70000.	250000.	H520	E02C

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 9 Mi 15	Hrs 9 Mi 15

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; 2. Passenger train; 3. Commuter train; 4. Work train; 5. Single car; 6. Cut of cars; 7. Yard/switching; 8. Light loco(s).; 9. Maint./inspect.car; A. Spec. MoW Equip. — Code: N/A

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

54. Train Number/Symbol: N/A

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

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): 0

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	0	N/A
(2) Causing (if mechanical cause reported)	0	0	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
0	0	0	0

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): 0

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: 0

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:

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

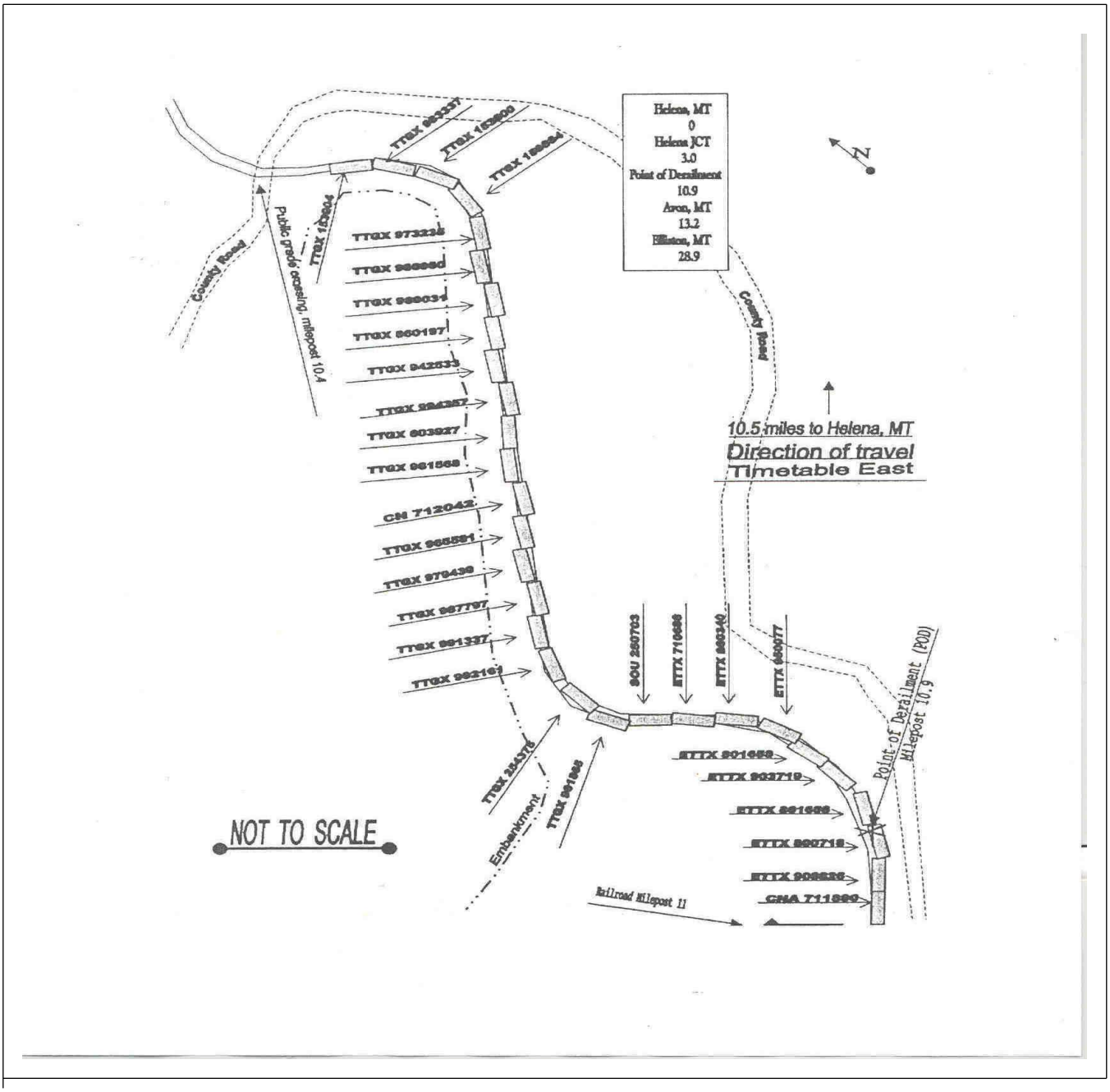
105. Locomotive Auxiliary Lights Operational? 1. Yes 2. No
Code: N/A

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-37-
2005
sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

Eastbound BNSF Railway Company (BNSF) Train P-TACDEN1-25A, which was traveling over and being operated by the Montana Rail Link, Inc. (MRL), derailed at 10 a.m., MDT, on April 28, 2005. The derailment occurred on the west end spiral of a curve (identified as curve 10-C), at milepost 10.95, on the MRL's 3rd. Subdivision. The point of derailment (milepost 10.95) is located 10.95 miles west of the city of Helena, Montana.

At the time of the accident, Train P-TACDEN1-25A was being operated by a MRL helper locomotive consist. The helper consist (five units) was attached to the front of Train P-TACDEN1-25A, at Elliston, Montana. Control of the BNSF train was shifted to the leading locomotive of the MRL helper consist. The helper consist assisted the BNSF train over an ascending mountain grade, and was descending a 2.2-degree grade with the P-TACDEN1-25A in tow, at a recorded speed of 22 mph. The train started experiencing air brake problems as it was descending the mountain. The engineer decided to stop his train, at milepost 10.1. After stopping the crew was notified by MRL track maintenance personnel that part of the train had derailed. Upon inspection it was discovered that a total of 30 cars (19th through 48th) were derailed. All 30 cars had remained upright and near the track.

At the time of the accident it was daylight, cloudy and 40 °F. No hazardous materials were involved and there were no injuries reported.

As a result of the accident the railroad estimated total damages of $320,000. ($250,000 for track and $70,000 for equipment).

The probable cause of the accident was rail roll-out on the high side of a curve, due to excessive buff forces created by excessive axles of dynamic braking force.

110. NARRATIVE

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

Circumstances Prior to the Accident

On April 28, 2005, after completing a statutory off-duty period, a train crew consisting of an engineer and conductor went on duty at Helena, Montana, at 00:45 a.m. (MDT), this was the crew's home terminal. The crew was assigned to operate a four unit locomotive helper consist to assist trains traversing the mountain grade between Helena and Elliston, Montana. Prior to the accident, the helper consist had assisted two westbound trains from Helena to Elliston. No unusual conditions had occurred during the previous trips.

Upon arrival at Elliston, with the second westbound train, the helper crew was notified to pick up locomotive MRL 218. The crew added the locomotive to the east end of the helper consist, for its eastward movement to Helena.

After placing the locomotive in the consist, the helper crew conducted a brake function test. No unusual conditions were found. The engineer communicated by radio to the train dispatcher that they were ready to depart Elliston siding for Helena. At this time the engineer was informed, by the dispatcher, they were to assist an eastbound train traverse the mountain grade.

The eastbound train was identified as the P-TACDEN1-25A. Train P-TACDEN1-25A consisted of three locomotives, 68 loaded cars, 10 empties, 5,477 trailing tons and was 7,373 feet in length. The class 1 (initial terminal) air brake test had been conducted in Seattle, Washington by the BNSF Railway Company, on April 26, 2005. The leading locomotive in the consist was experiencing shutdown problems do to the engine tripping the low water safety device. This resulted in the helper consist being assigned to assist in movement over the mountain grade. The helper consist was attached to the front end of Train P-TACDEN1-25A, and control of the train was shifted to the leading unit. After conducting the required air test, the train departed Elliston eastward toward Helena.

As the eastbound train approached the accident area, the locomotive engineer was seated at the controls on the right (south) side of the leading locomotive. The conductor was seated on the left (north) side.

Approaching the derailment site west to east from milepost 11.5, there is in succession, a tangent 1,575 feet in length, a 1-degree 56-minute curve to the right 443 feet in length, another tangent 905 feet in length, and a 4-degree curve to the left 501 feet to the point of derailment and 574 feet beyond. Followed by right and left-hand curves beyond. The grade is 2.2-percent descending.

In the accident area, trains operate on a single main track by authority of a Traffic Control System (TCS), controlled by a dispatcher, located in Missoula, Montana. Montana Rail Link Timetable No. 13, effective 0001 Sunday, April 3, 2005 authorizes a maximum freight train speed of 25 mph. Both the timetable and geographic direction of the train was eastward.

The Accident

According to the engineer, after the train started to descend the mountain grade it begin to experience air brake problems. The train's air brake line was not maintaining the desired air pressure after the brakes were applied. The engineer stopped the train west of the west siding switch at Austin, Montana (approximately milepost 13.2). The engineer waited at this location to allow air pressure to increase to 75 pounds on the rear of the train. He then released the independent brakes of the locomotives and continued eastward.

The crew members did not notice any abnormalities in the track structure as they entered the curved at milepost 10.9. The engineer stated he again was experiencing low air brake pipe pressure on the rear of his train. He contributed this to an air brake maintaining problem. Therefore, he notified, by radio, the train crew in the trailing locomotives he intended to stop again. The engineer applied dynamic braking to assist in slowing the train, while doing this, the engineer and conductor stated they felt a slight lunge forward in the cab.

From a recorded speed of 22 mph, the engineer used dynamic braking and the train's air brakes to come to a stop. After stopping the engineer instructed the conductor of his intentions to cut the helper locomotive consist away from the train, and shift the control of the train back to the leading locomotive of Train P-TACDEN1-25A. Thus allowing Train P-TACDEN1-25A to continue on to Helena, under it's own power.

An MRL roadway worker working near the right-of-way observed the front end of the train pass his location, at milepost 10.5. As the train slowed to a stop he noticed that several cars had derailed. He ran to the front of the train, and informed the train crew of the derailment.

The crew discovered that 30 cars (19th through 48th) had derailed. The cars were loaded tri-level automobile transport containers and all remained upright. Initial determination indicated the top of the south rail in a 4-degree curve to the left, had rolled outward allowing the north wheels of the cars to fall into the gage of the track.

Analysis

On April 25, 2005, a MRL track inspector conducted track inspections between Helena, Montana, milepost 0 and Garrison, Montana milepost 51. No defective conditions were noted in the accident area.

On April 26, 2005, The BNSF Track Geometry Test Car (Car 80) conducted tests through the accident area and detected deviations in the gage of track at several locations between milepost 10.92 and milepost 10.98. The deviations were 7/8-inch to 3/4-inch wide, the deviations complied with the Federal Track Safety Standards for 25 mph Class 2 track.

Inspection of the data printout from the leading locomotive's event recorder disclosed dynamic brake limitations exceeded the MRL's Air Brake and Train Handling Rules. Rule 103.2.1 states . . .High buff force generated by dynamic brake retarding force may cause a derailment or damage the track structure. Therefore, limit dynamic brake retarding force as follows:Limit the total operative dynamic brake to 28 equivalent dynamic brake axles unless further restricted by another rule or special instruction.

All eight locomotives on P-TACDEN1-25A had six axles each, thus consisting of a total of 48 axles. The engineer of Train P-TACDEN1-25A stated that he had isolated locomotive 7251, due to the engine tripping the low water button. Train P-TACDEN1-25A was operating with a total of 42 axes of dynamic braking retarding force in lieu of MRL's required maximum of 28 axes.

Inspections conducted by MRL mechanical department personnel on the remaining cars from the 49th car to the 66th, revealed a broken combination dirt collector-cut out valve in the main brake pipe on the 60th car in the consist. Air leaking from the 60th car identified as FEC 071841, contributed to the engineer's not being able to maintain train line brake pipe air pressure.

The engineer failed to follow MRL's Air Brake and Train Handling Rule 102.4 "Brakes Not Operating Properly" which states . . . If the train brakes are not operating properly, stop the train immediately and:

1 Inspect the brakes to identify and correct the problem.
2 Before proceeding, conduct an application and release test.
3 Once the train is proceeding, conduct a running air brake test.

The engineer also failed to follow MRL's Air Brake and Train Handling Rule 102.17 "Unusual Conditions" which states . . . Recognize the proper procedures for unusual train handling conditions.

A. Unusual changes in Brake Pipe Pressure, The engineer must stop and secure the train if:
- An abnormal change in or loss of brake pipe pressure occurs with the train brakes released and normal gradient established, Refer to Rule 103.7.3 concerning minimum brake pipe pressure at the rear of train.

OR

- A brake application cannot be transmitted.

This accident did not meet the criteria for 49 CFR Part 219 Subpart C Post Accident Toxicological Testing. The MRL did not elect to test the crew under MRL's authority.

Conclusion

Following the investigation it was determined the engineer had used the dynamic forces of seven locomotives with a total of 42 axles to control the speed of the train descending a mountain grade. The engineer was experiencing brake pipe air pressure maintenance problems, and had stopped the train previous to the derailment and the crew had failed to inspect the train.

After, departing from milepost 13.2 the engineer was using all 42 axles of dynamic retarding force to slow the train. The rear cars of the train moving faster than the movement of the slower front cars of the train caused a concentrating effect on the 19th car. The holding forces of the locomotive caused the 19th car's wheels to concentrate lateral forces outward to the top of the south rail of the curve. The south rail rolled outward allowing the wheels on the north side of the car to fall into the gage of the track.

Alternative disciplinary action was assessed to the engineer by the MRL, for failing to comply with MRL's Air Brake and Train Handling Rules.

Probable Cause

The FRA determined that the probable cause of the accident was rail roll-out on the high side of a curve, due to excessive buff forces created by excessive axles of dynamic braking force.