Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2005-23

Iowa Chicago & Eastern (ICE)/BNSF Railway (BNSF)
Cottage Grove, Minnesota
March 19, 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-2005-23

1.Name of Railroad Operating Train #1 Iowa Chicago and Eastern RR Corp. [ICE]	1a. Alphabetic Code ICE	1b. Railroad Accident/Incident No. 2005071
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: Iowa Chicago and Eastern RR Corp. [ICE]	3a. Alphabetic Code ICE	3b. Railroad Accident/Incident No. 2005071
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident Month 03 / Day 19 / Year 2005	6. Time of Accident/Incident 12:34:00 ☐ AM ☑ PM

7. Type of Accident/Indicent (single entry in code box)	1. Derailment	4. Side collision	7. Hwy-rail crossing	10. Explosion-detonation	13. Other (describe in narrative)	
	2. Head on collision	5. Raking collision	8. RR grade crossing	11. Fire/violent rupture		
	3. Rear end collision	6. Broken Train collision	9. Obstruction	12. Other impacts		01

8. Cars Carrying HAZMAT	9. HAZMAT Cars Damaged/Derailed	10. Cars Releasing HAZMAT	11. People Evacuated	12. Division
10	2	0	0	TWIN CITIES

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
COTTAGE GROVE	414.4B	N/A	MN	WASHINGTON

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
35 F		2		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
NUMBER TWO MAIN TRAC		3	37		3

OPERATING TRAIN #1

25. Type of Equipment Consist (single entry)				A. Spec. MoW Equip. Code	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
1. Freight train	4. Work train	7. Yard/switching					
2. Passenger train	5. Single car	8. Light loco(s).		1	1	1	MSPK C18
3. Commuter train	6. Cut of cars	9. Maint./inspect.car					

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?
	38	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)	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)	Code(s)					30a. Remotely Controlled Locomotive?
9148	e	N/A	N/A	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.	Alcohol	Drugs
(1) First involved (derailed, struck, etc)	N/A	40	yes		N/A	N/A
(2) Causing (if mechanical cause reported)	0	0	N/A	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	0	0	(1) Total in Equipment Consist	61	0	49	0	0
(2) Total Derailed	0	0	0	0	0	(2) Total Derailed	13	0	8	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
359743	228100	T111	M599

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	0	1	0	Hrs 3 Mi 34	Hrs 3 Mi 34

Casualties to:	46. Railroad Employees	47. Train Passengers	48. Other	49. EOT Device? 1. Yes 2. No	50. Was EOT Device Properly Armed? 1. Yes 2. No
Fatal	0	0	0	1	1
Nonfatal	N/A	0	0	51. Caboose Occupied by Crew? 1. Yes 2. No	N/A

OPERATING TRAIN #2

52. Type of Equipment Consist (single entry)				A. Spec. MoW Equip. Code	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
1. Freight train	4. Work train	7. Yard/switching					
2. Passenger train	5. Single car	8. Light loco(s).		N/A	N/A	N/A	N/A
3. Commuter train	6. Cut of cars	9. Maint./inspect.car					

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?
	N/A	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)	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
N/A			N/A N/A N/A N/A N/A	N/A

58. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.	Alcohol	Drugs
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A		N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	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	62. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Train	N/A	N/A	N/A	N/A	N/A	(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A	(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

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

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

Casualties to:	73. Railroad Employees	74. Train Passengers	75. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

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

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

Highway User Involved

79. Type — Code: N/A
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)

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

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

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

86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — Code: N/A
1. Highway User 2. Rail Equipment 3. Both 4. Neither

Rail Equipment Involved

83. Equipment — Code: N/A
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)

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

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

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

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

87. Type of Crossing Warning	1.Gates	2.Cantilever FLS	3.Standard FLS	4.Wig Wags	5.Hwy. traffic signals	6.Audible	7.Crossbucks	8.Stop signs	9.Watchman	10.Flagged by crew	11.Other (spec. in narr.)	12.None
Code(s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A					

88. Signaled Crossing Warning (See instructions for codes) Code	89. Whistle Ban Code 1. Yes 2. No 3. Unknown
N/A	N/A

90. Location of Warning Code 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	91. Crossing Warning Interconnected with Highway Signals Code 1. Yes 2. No 3. Unknown	92. Crossing Illuminated by Street Lights or Special Lights Code 1. Yes 2. No 3. Unknown
N/A	N/A	N/A

93. Driver's Age	94. Driver's Gender Code 1. Male 2. Female	95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train Code 1. Yes 2. No 3. Unknown	96. Driver Code 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)
N/A	N/A	N/A	N/A

97. Driver Passed Standing Highway Vehicle Code 1. Yes 2. No 3. Unknown	98. View of Track Obscured by (primary obstruction) Code 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
N/A	N/A

101. Casulties to Highway-Rail Crossing Users	Killed	Injured
	N/A	N/A

99. Driver Was Code 1. Killed 2.Injured 3. Uninjured	100. Was Driver in the Vehicle? Code 1. Yes 2. No
N/A	N/A
102. Highway Vehicle Property Damage (est. dollar damage): N/A	103. Total Number of Highway-Rail Crossing Users (include driver): N/A

104. Locomotive Auxiliary Lights? Code 1. Yes 2. No	105. Locomotive Auxiliary Lights Operational? Code 1. Yes 2. No
N/A	N/A
106. Locomotive Headlight Illuminated? Code 1. Yes 2. No	107. Locomotive Audible Warning Sounded? Code 1. Yes 2. No
N/A	N/A

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

109. SYNOPSIS OF THE ACCIDENT

An eastbound ICE freight train, operating on BNSF trackage, derailed 21 cars on March 19, 2005, at 12:34 p.m. CST. The derailment occurred in Cottage Grove, Minnesota (MN), at BNSF Milepost 414.4B on the St. Paul Subdivision.

The 21 derailed cars included two hazardous material cars. One residue car was compromised but with no loss of product and no evacuation. The total damages amounted to $587,843.

At the time of derailment it was daylight and clear, with a northwest wind of about 11 mph. The temperature was 35° F.

The derailment was caused by failure of track fasteners, allowing a wide gage condition on curved track at milepost 414.4B.

110. NARRATIVE

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

Circumstances Prior to the Accident

The crew of train ICE MSPKC-18 East included a locomotive engineer and an assistant engineer (conductor). They went on duty at 9 a.m. CST, March 19, 2005, at the SOO / CP St. Paul Yard in St. Paul, MN. This was the away terminal for both crew members, and both received more than the statutory off duty period, prior to reporting for duty.

Their assigned freight train consisted of two locomotives, 61 loads and 49 empty cars of several varieties. It was 6611feet long and weighed 9148 tons. The train was scheduled to travel to Marquette, Iowa, with no stops en route. The train received a Class One initial terminal train air brake test, and departed St. Paul Yard at 12 p.m.

As the eastbound train approached the accident area, the locomotive engineer was seated at the controls on the south side of the leading locomotive. The conductor was seated on the north side of the leading locomotive in the second of two seats. The lead locomotive was operating with the short end forward.

In this area of the railroad there is a tangent of 2000 feet, followed by a 2° 45" curve to the left of about 600 feet, then about a 2000 foot tangent, followed by a 3° 11" curve to the right for 1000 feet and reversing to a 3° curve for 1100 feet to the point of derailment and 200 feet beyond. The grade is .25% descending for 5 miles to milepost 414.8B and begins a short undulating and descending grade of about .1% through the point of derailment (POD) and about 9000 feet beyond.

The railroad timetable and geographical direction of the train was east. Timetable directions are used throughout this report.

The Accident

The train was being operated at 40 mph approaching the accident area. At the time the accident occurred, the train was being operated at 38 mph. Both speeds were recorded by the event recorder of the controlling locomotive. The maximum authorized speed for mixed freight trains is 40 mph, as designated in BNSF Timetable No. 2, dated November 17, 2004.

The train was being operated in throttle position number one to keep the train stretched, and the train was slowly decreasing in speed for a 25 mph restriction at milepost 410.3B. The train crew felt a lunge to the left and then to the right at signal 4144 (milepost 414.4B). The assistant engineer observed the second locomotive and about five cars of the train make the same motion. The engineer started to call the train dispatcher to report the rough track but waited until the dispatcher completed issuing an authority to a track inspector. The engineer reported the rough spot and as he ended the transmission he felt a tug on the train and lost brake pipe pressure. The end of train device beeped a few seconds before the head end of the train lost its air.

The assistant engineer began walking the train and found the 37th head car had a broken knuckle and was separated from the 38th car by about 400 feet. The 38th car, BNSF 518225, load of scrap metal, had the second axle of the lead truck derailed. The north wheel had fallen into the gage of the track and the south wheel was found on the field side of the south rail. This car had derailed at milepost 414.4B and was dragged for about 4028 feet. Further inspection of the train found an additional 20 cars derailed, position 82 to 101. Two of the 20 cars were hazardous material cars.

The 82nd car, GATX 49206, was a loaded Anhydrous Ammonia tank car with all wheels derailed and upright in the center of the track. The 92nd car, UTLX 48561,

was residue Ethyl Acetate tank car with the A-end in the Mississippi River and a breach about 15 feet from the B-end. There was no loss of product. The other eight hazardous material cars in the train were not effected by the derailment.

Analysis and Conclusion

Analysis

The BNSF Mechanical Department inspected the B-end of BNSF 518225 and took no exceptions. A review of this record by a FRA Motive Power and Equipment inspector verified the results.

The crew's actions during the derailment were consistent with proper train handling. A review of the lead locomotive's event recorder download by a FRA Chief Inspector confirmed this. The crew was not given a toxicological test.

The track at the POD had most of the fasteners, which were standard cut spikes, missing or broken on the pandrol plates of the elevated rail. The second and third plates east of the insulated joint had the outer shoulders broken and separated from the parent plate. The spikes were broken or had been worked out of the ties by the movement of the plates with the passing of trains. Some of the broken spikes showed signs of abrasion between the upper and lower halves of the spikes. The weakened fastener condition allowed the 38th car to push the gage out with its second axle. The north wheel fell into the gage of the track and about 10 ties east of the POD the south wheel of this axle climbed over the south rail to the field side of the track. There was no other evidence of any other wheels derailing at the POD.

BNSF track inspection records for the prior three weeks revealed no defects in the area of the POD. On March 4, 2005, an FRA Track Inspection was made with no exceptions noted in the area of the POD. The BNSF inspection of March 18, 2005, was hampered by an early spring snow storm and the track was covered with about 4 to 6 inches of newly fallen snow.

The last track work in the area of the POD was the rebuilding of the insulated joint on the high rail at milepost 414.4B on March 4, 2005. One bolt of six was missing and the joint was pulled open about 2 inches.

The train make-up may have contributed to the number of cars derailed. No cars derailed at the POD except the 38th car. The make-up of the train from the 82nd car to the end of the train was: 1-Tank loaded, 1- Box-empty, 1-Flat-loaded, 2- Flats-empty,1-Box-loaded,1- Flat-empty, 1-Box-loaded, 2-Bulkhead Flats-empty, 1-Tank-empty (Residue), 1-Hopper-empty, 16-Cover Hoppers-loaded, the last car, 1-Flat-empty.

A BNSF geometry test truck, Track Strength Analysis Recorder (STAR), with GRMS capability, tested the single main track in December 2004 with no indication of gage widening.

Conclusion

The track at the POD had a progressively deteriorating fastener condition that failed under the 143 ton car of scrap, BNSF 518225. The insulated joint west of the POD was much more securely fastened to the ties creating a short, but severe, oscillation of eastbound cars to the north and back to the south. The weakness of the fasteners on the six ties east of the insulated joint magnified the lateral effect on the cars and hastened the creation of the wide gage.

Probable Cause and Contributing Factors

Probable cause of the accident was wide gage created by the lack of fasteners. The contributing cause was BNSF's failure to inspect this section of track with proper diligence and detail, which would have revealed the accumulating weaknesses of the fasteners in the POD location. Photographic evidence indicates wear to fasteners and plates that is cumulative and may have weakened at an accelerated rate. The FRA concurs with the findings.

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