Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2008-96

Amtrak (ATK)
Northbrook, IL
December 25, 2008

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-2008-96

1.Name of Railroad Operating Train #1: Amtrak [ATK]	1a. Alphabetic Code: ATK	1b. Railroad Accident/Incident No.: 110589
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident No.: N/A
3.Name of Railroad Operating Train #3: N/A	3a. Alphabetic Code: N/A	3b. Railroad Accident/Incident No.: N/A
4.Name of Railroad Responsible for Track Maintenance: Northeast IL Regional Commuter Rail Corp. [NIRC]	4a. Alphabetic Code: NIRC	4b. Railroad Accident/Incident No.: USB041

5. U.S. DOT_AAR Grade Crossing Identification Number: 388037N	6. Date of Accident/Incident: Month 12 Day 25 Year 2008	7. Time of Accident/Incident: 07:05:00 ☐ AM ☑ PM

8. 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)* — Code: 07

9. Cars Carrying HAZMAT	10. HAZMAT Cars Damaged/Derailed	11. Cars Releasing HAZMAT	12. People Evacuated	13. Division
0	N/A	N/A	0	CHICAGO

14. Nearest City/Town	15. Milepost *(to nearest tenth)*	16. State Abbr	16. State Code	17. County
NORTHBROOK	21.9	N/A	IL	COOK

18. Temperature (F) *(specify if minus)*	19. Visibility *(single entry)* 1. Dawn 2. Day 3.Dusk 4.Dark — Code	20. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow — Code	21. Type of Track 1. Main 2. Yard 3. Siding 4. Industry — Code
20 F	4	1	1

22. Track Name/Number	23. FRA Track Class (1-9, X) — Code	24. Annual Track Density *(gross tons in millions)*	25. Time Table Direction 1. North 2. South 3. East 4. West — Code
MAIN TRACK TWO	4	26.9	3

OPERATING TRAIN #1

26. 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	27. Was Equipment Attended? 1. Yes 2. No — Code	28. Train Number/Symbol
2	1	ATK 340

29. Speed *(recorded speed, if available)* R - Recorded E - Estimated — Code	31. Method(s) of Operation *(enter code(s) that apply)*	31a. Remotely Controlled Locomotive?
74 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
30. Trailing Tons *(gross tonnage, excluding power units)*: N/A	Code(s): e N/A N/A N/A N/A	0

32. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded *(yes/no)*
(1) First involved *(derailed, struck, etc)*	90368	1	N/A
(2) Causing *(if mechanical cause reported)*	0	0	N/A

33. 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

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

35. 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	1	0	0	0	1
(2) Total Derailed	0	0	0	0	0

36. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	0	5	0	0	0
(2) Total Derailed	0	0	0	0	0

37. Equipment Damage This Consist	38. Track, Signal, Way, & Structure Damage	39. Primary Cause Code	40. Contributing Cause Code
$600.00	$0.00	M307	M399

Number of Crew Members: 41. Engineer/ Operators	42. Firemen	43. Conductors	44. Brakemen
1	0	1	0

Length of Time on Duty: 45. Engineer/Operator	46. Conductor
Hrs 6 Mi 35	Hrs 3 Mi 45

Casualties to:	47. Railroad Employees	48. Train Passengers	49. Other
Fatal	0	0	0
Nonfatal	0	0	0

50. EOT Device? 1. Yes 2. No	51. Was EOT Device Properly Armed? 1. Yes 2. No
2	2

52. Caboose Occupied by Crew? 1. Yes 2. No: 2

OPERATING TRAIN #2

53. 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	54. Was Equipment Attended? 1. Yes 2. No — Code	55. Train Number/Symbol
N/A	N/A	N/A

56. Speed *(recorded speed, if available)* R - Recorded E - Estimated — Code	58. Method(s) of Operation *(enter code(s) that apply)*	58a. 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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57. Trailing Tons *(gross tonnage, excluding power units)* N/A

c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; o. Positive train control; p. Other *(Specify in narrative)* Code(s) N/A N/A N/A N/A N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter N/A

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

60. 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

61. Was this consist transporting passengers? (Y/N) N/A

62. 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	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

63. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(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

64. Equipment Damage This Consist N/A

65. Track, Signal, Way, & Structure Damage N/A

66. Primary Cause Code N/A

67. Contributing Cause Code N/A

Number of Crew Members

68. Engineer/ Operators	69. Firemen	70. Conductors	71. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

72. Engineer/Operator Hrs N/A Mi N/A

73. Conductor Hrs N/A Mi N/A

Casualties to:	74. Railroad Employees	75. Train Passengers	76. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

77. EOT Device? 1. Yes 2. No N/A

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

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

OPERATING TRAIN #3

80. 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

81. Was Equipment Attended? 1. Yes 2. No Code N/A

82. Train Number/Symbol N/A

83. Speed *(recorded speed, if available)* Code
R - Recorded
E - Estimated N/A MPH N/A

84. Trailing Tons *(gross tonnage, excluding power units)* N/A

85. 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) N/A N/A N/A N/A N/A

85a. 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 N/A

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

87. 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

88. Was this consist transporting passengers? (Y/N) N/A

89. 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	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

90. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(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

91. Equipment Damage This Consist N/A

92. Track, Signal, Way, & Structure Damage N/A

93. Primary Cause Code N/A

94. Contributing Cause Code N/A

Number of Crew Members

95. Engineer/ Operators	96. Firemen	97. Conductors	98. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

99. Engineer/Operator Hrs N/A Mi N/A

100. Conductor Hrs N/A Mi N/A

Casualties to:	101. Railroad Employees	102. Train	103. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

104. EOT 1. Yes 2. No N/A

105. Was EOT Device Properly 1. Yes 2. No N/A

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

Highway User Involved

107. Code: 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)*

108. Vehicle Speed *(est. MPH at impact)* 25

109. *geographical)* Code: 4
1.North 2.South 3.East 4.West

Rail Equipment Involved

111. Equipment Code: 2
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)*

112. Position of Car Unit in 1

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110. Position	Code	113. Circumstance	Code
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped	3	1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User	2
114a. 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	4	114b. Was there a hazardous materials release 1. Highway User 2. Rail Equipment 3. Both 4. Neither	4

114c. State here the name and quantity of the hazardous materials released, if any.
N/A

115. Type 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)	01	03	06	07	N/A	N/A	N/A

116. Signaled Crossing *(See instructions for codes)*	Code	117. Whistle Ban 1. Yes 2. No 3. Unknown	Code
	06		1

118. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach	Code	119. Crossing Warning with Highway Signals 1. Yes 2. No 3. Unknown	Code	120. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown	Code
	1		2		2

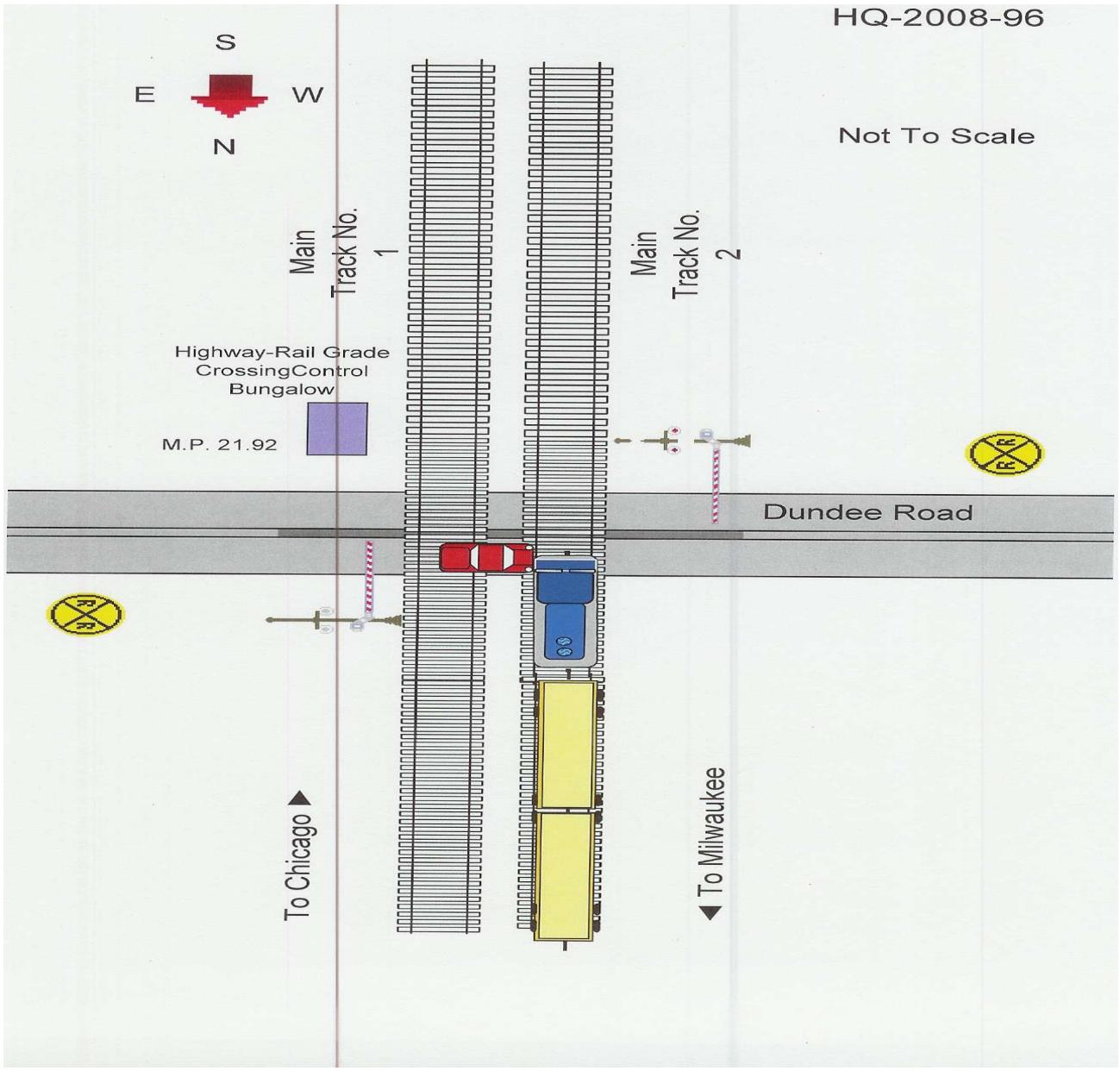
121. Age	122. Driver's Gender 1. Male 2. Female	Code	123. Driver Drove Behind or in Front of and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown	Code	124. Driver 1. Drove around or thru the Gate 2. Stopped and then Proceeded 3. Did not Stop 4. Stopped on Crossing 5. Other *(specify in narrative)*	Code
25		1		2		5

125. Driver Passed Highway Vehicle 1. Yes 2. No 3. Unknown	Code	126. 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
	2		8

Casualties to:	Killed	Injured	127. Driver 1. Killed 2.Injured 3. Uninjured	Code	128. Was Driver in the Vehicle? 1. Yes 2. No	Code
				3		1
129. Highway-Rail Crossing Users	0	0	130. Highway Vehicle Property Damage *(est. dollar damage)*	14000	131. Total Number of Highway-Rail Crossing Users *(include driver)*	2

132. Locomotive Auxiliary Lights? 1. Yes 2. No	Code	133. Locomotive Auxiliary Lights Operational? 1. Yes 2. No	Code
	N/A		N/A
134. Locomotive Headlight Illuminated? 1. Yes 2. No	Code	135. Locomotive Audible Warning Sounded? 1. Yes 2. No	Code
	N/A		N/A

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



137. SYNOPSIS OF THE ACCIDENT

A westbound automobile collided with southbound (timetable direction east) Amtrak Passenger Train No. 340 at a highway-rail grade crossing on December 25, 2008, at 7:05 p.m., CST. The accident occurred in Northbrook, Illinois, on Canadian Pacific Railway's (CP), Chicago Service Area, C&M Subdivision, at milepost 21.92. There were no reportable injuries to the automobile driver or the occupant. The automobile was totaled. There were no reported injuries to the crew or train passengers of Amtrak 340. The lead "Non-Powered Control Unit" (Cab Car 90368) sustained damages of about $600.

The Northbrook Police Department responded to the collision; the driver of the automobile was issued a traffic citation under Illinois Traffic Code 5/11-1201 -Obedience to signal indicating approach of train.

The Northeast Illinois Regional Commuter Rail Corporation (NIRC) is responsible for maintenance and required testing of the active warning devices at Dundee Road.

At the time of the incident it was dark and clear. The temperature was 20 °F.

The probable cause of the accident was the failure of the highway-rail grade crossing warning system at Dundee Road to indicate the approach of Amtrak 340 at least 20 seconds prior to Amtrak 340's arrival at the highway-rail grade crossing.

A contributing cause was NIRC's placing the highway-rail crossing warning system at Dundee Road back in service using a "wrap" circuit as the primary detection circuit without providing an alternative means to actively warn highway users of approaching trains.

A second contributing cause was NIRC's failure to comply with Safetran Systems "safety/mandatory bulletin", CSB-08, dated June 20, 2008.

138. NARRATIVE

CIRCUMSTANCES PRIOR TO THE ACCIDENT

The crew of Amtrak (ATK) Passenger Train 340 included a locomotive engineer and a conductor. The engineer went on duty at 12:20 p.m., and the conductor went on duty at 12:30 p.m., December 25, 2008, at Amtrak Train Depot located in Milwaukee, Wisconsin. This is the home terminal for both crew members. Both crew members received more than the required statutory off-duty rest period prior to reporting for duty, both employees had worked less than twelve hours their previous shift.

ATK 340 consisted of one cab car, five passenger cars, and a pushing locomotive. ATK 340 was scheduled for three intermediate stops and scheduled to arrive at Chicago, Illinois at 7:14 p.m. Amtrak 340 received an initial terminal train air brake test at Milwaukee and departed Amtrak's Milwaukee Train Depot at 5:45 p.m.

As ATK 340, traveling southbound (timetable direction east), approached the accident area the locomotive engineer was seated at the controls on the west side of the cab car. The conductor was located in the second passenger car.

Dundee Road is located at milepost 21.92 on Canadian Pacific Railway's (CP) Chicago Service Area, C&M Subdivision. Dundee Road, DOT No. 388 037 N is located in the city of Northbrook. Northeast Illinois Regional Commuter Rail (NIRC) maintains the track and signal system; the Canadian Pacific (CP) dispatches trains on the C&M Subdivision. The warning devices consist of gates; cantilever mounted flashing lights, cross bucks, and a bell. Dundee Road is a four lane road with two eastbound and two westbound lanes perpendicularly crossing the two CP main tracks. There is a raised median in approach to the highway-rail grade crossing from both directions. Each lane is approximately ten feet wide.

Traveling southward towards Dundee Road the track structure is tangent and is nearly level. South of Dundee Road the track structure begins a 0.23 percent decent and then levels again. Traveling east to west Dundee Road drops slightly to the railroad tracks then levels off.

Dundee Road is located in a quiet zone. The locomotive engineer did not sound the locomotive horn prior to the accident.

The railroad timetable direction of ATK 340 was east. The geographical direction was south. Geographical directions are used throughout this report. The maximum allowable speed for passenger trains at the location of the accident is 79 mph.

THE ACCIDENT

AMTRAK PASSENGER TRAIN ATK 340

ATK 340 was being operated at an estimated speed of 74 mph approaching the accident scene. As the locomotive engineer approached the highway-rail grade crossing, he noticed the gates were not coming down. He stated he immediately made a reduction of 23 lbs to the train air brake system. He then noticed an automobile approaching from his left that was unable to stop. The automobile struck the cab car. When ATK 340 stopped, the engineer called “emergency” on the radio and the conductor went back to the highway-rail grade crossing to determine the extent of damage.

HIGHWAY VEHICLE

The automobile was traveling east to west on Dundee Road. According to the Illinois Traffic Crash Report completed by the Northbrook Police Department, the driver said he saw the lights activate but did not have time to stop, so he continued through the highway-rail grade crossing before the gates came down. As the driver proceeded across the first set of tracks, the highway vehicle struck train Cab Car 90368 on the left side in the vicinity of the battery compartment.

The automobile came to rest in the right lane of travel for westbound highway traffic with the northeast highway-rail grade crossing warning gate resting on top of the automobile.

FRA’s investigation could not determine when the highway-rail grade crossing warning devices were activated prior to the highway user striking the locomotive. FRA cannot prove or disprove the validity of the citation issued by the Northbrook Police Department, as the highway-rail grade crossing warning devices failed to provide a minimum of 20 seconds warning time to the highway user.

ANALYSIS AND CONCLUSIONS

ANALYSIS - TOXICOLOGICAL TESTING:
Toxicological testing was not conducted on the occupants of the automobile, the train crew or the rail passengers.

CONCLUSION:
Drug or alcohol impairment was not a casual factor in the collision.

ANALYSIS – HIGHWAY-RAIL GRADE CROSSING:

The highway-rail grade crossing is equipped with warning lights, gates, and a bell in each direction. There are pavement markings and advanced warning signs located on each side of the tracks posted approximately 280 feet from the crossing. There are also Stop Lines on each side of the crossing. The pavement markings are clearly distinguishable. The vehicle preview looking north approaching the crossing is blocked by vegetation growth that is not on railroad property. The preview looking north from the Stop Line is unobstructed. The highway in the area of the accident is maintained by the Cook County (Illinois) Highway Department.

FRA’s investigation determined that the highway-rail grade warning system did not provide a minimum of 20 seconds warning time to the highway users. There were two factors that contributed to the cause of the highway-rail grade crossing activation failure. NIRC failed to have recommended software updates installed in the DAX location at milepost 22.08, per manufacture’s recommendations. NIRC also failed to properly repair the primary highway-rail grade crossing detection system prior to the arrival of ATK 340. The highway-rail grade crossing warning system had been reported as malfunctioning the morning of December 25, 2008. NIRC did not determine the cause of the active highway-rail grade crossing warning system malfunction and

perform necessary repairs without undue delay.

CONCLUSION:
At the time of the incident the highway-rail grade crossing warning devices were not operating properly. The highway-rail grade crossing train detection circuits were not functioning per the requirements of CFR 49 Part 234.

ANALYSIS - LOCOMOTIVE SAFETY DEVICES:
The cab car was equipped with a headlight, auxiliary lights, and the audible warning device required by Federal Regulation. However, the event recorder for Cab Car 90368 was not downloaded by Amtrak. Post accident testing performed by Amtrak personnel at the Amtrak Union Station mechanical facility in Chicago verified the proper operation of the locomotive headlight, auxiliary lights, horn and bell.

CONCLUSION:
The locomotive safety devices were in compliance with Federal regulations when inspected at the Amtrak Union Station mechanical facility. Proper operation of the headlight, auxiliary lights, locomotive horn, and locomotive bell at the time of the accident could not be verified. Amtrak did not download the event data recorder for Cab Car 90368.

ANALYSIS – LOCOMOITIVE ENGINEER OPERATING PERFORMANCE:
The cab car was equipped with a speed indicator and an event recorder, as required. The relevant event recorder data was not downloaded by Amtrak prior to the departure of Amtrak 340 from Chicago. Amtrak's Union Station mechanical facility did not have a spare eight track tape to replace the data tape in Cab Car 90368. The pushing locomotive was equipped with a speed indicator and an event recorder, as required. The relevant event recorder data from the pushing locomotive was downloaded by Amtrak's Assistant Superintendent of West Operations, located in Chicago.

CONCLUSION:
The event recorder data download from ATK 340's pushing locomotive was not capable of indicating if the safety appliances on Cab Car 90368 were operating properly at the time of the collision. The safety appliances of Cab Car 90368 were found to be operating properly when tested at Amtrak's Union Station mechanical facility. The download of ATK 340's pushing locomotive indicated the locomotive engineer was in compliance with all other applicable railroad operating and train handling requirements.

ANALYSIS - FATIGUE:
FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.

FRA obtained fatigue related information, including a 10-day work history, for the locomotive engineer and the conductor of ATK 340.

CONCLUSION:
FRA concluded that fatigue was not probable for the train crew members.

PROBABLE CAUSE AND CONTRIBUTING FACTORS

The probable cause of the accident was the failure of the highway-rail grade crossing warning system at Dundee Road to indicate the approach of ATK 340 at least 20 seconds prior to Passenger Train's arrival at the highway-rail grade crossing.

A contributing cause was NIRC's placing the highway-rail crossing warning system at Dundee Road back in service using a "wrap" circuit as the primary detection circuit without providing an alternative means to actively warn highway users of approaching trains.

A second contributing cause was NIRC's failure to comply with Safetran Systems "safety/mandatory bulletin", CSB-08, dated June 20, 2008 requiring the crew to flag the crossing.