Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2005-106

Norfolk Southern (NS)
Canton, Ohio
December 6, 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-2005-106

1.Name of Railroad Operating Train #1	1a. Alphabetic Code	1b. Railroad Accident/Incident No.
Norfolk Southern Corp. [NS]	NS	023235
2.Name of Railroad Operating Train #2	2a. Alphabetic Code	2b. Railroad Accident/Incident
N/A	N/A	N/A
3.Name of Railroad Responsible for Track Maintenance:	3a. Alphabetic Code	3b. Railroad Accident/Incident No.
Norfolk Southern Corp. [NS]	NS	023235
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident: Month 12 / Day 06 / Year 2005	6. Time of Accident/Incident: 11:15:00 ☑ 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*) — **08**

8. Cars Carrying HAZMAT	9. HAZMAT Cars Damaged/Derailed	10. Cars Releasing HAZMAT	11. People Evacuated	12. Division
1	0	0	0	Pittsburgh

13. Nearest City/Town	14. Milepost (*to nearest tenth*)	15. State Abbr	15. State Code	16. County
Canton	105.6	N/A	OH	STARK

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
21 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
1 Main Track FtWayne		4	7		4

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	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
	1	1		13VC606

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?
21 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*): 2690

Code(s): e | N/A | N/A | N/A | N/A

30a. Remotely Controlled Locomotive?: 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	1	N/A
(2) Causing (*if mechanical cause reported*)	N/A	N/A	N/A

32. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

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
(1) Total in Train	4	0	0	0	0
(2) Total Derailed	0	0	0	0	0

35. Cars	Loaded a. Freight	Loaded b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	8	0	42	0	0
(2) Total Derailed	0	0	0	0	0

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
0	0	M307	M304

Number of Crew Members				Length of Time on Duty	
40. Engineer/ Operators	41. Firemen	42. Conductors	43. Brakemen	44. Engineer/Operator	45. Conductor
1	0	1	0	Hrs 6 Mi 0	Hrs 6 Mi 0

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	50. Was EOT Device Properly Armed? 1. Yes 2. No
1	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	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
	N/A	N/A		N/A

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?
0 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

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2005-106

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)*
(1) First involved *(derailed, struck, etc)*	0	N/A	N/A
(2) Causing *(if mechanical cause reported)*	0	N/A	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	Loaded a. Freight	Loaded 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	64. Track, Signal, Way, & Structure Damage	65. Primary Cause Code	66. Contributing Cause Code
0	0	N/A	N/A

Number of Crew Members

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

Length of Time on Duty

71. Engineer/Operator	72. Conductor
Hrs 0 Mi 0	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: A

80. Vehicle Speed *(est. MPH at impact)*: 10

81. Direction *(geographical)* 1.North 2.South 3.East 4.West | Code: 2

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

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: 4

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: 1

84. Position of Car Unit in Train: 1

85. Circumstance — 1. Rail Equipment Struck Highway User 2. Rail Equipment Struck by Highway User | Code: 1

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

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

No hazardous materials released.

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)	01	N/A	N/A	N/A	N/A	N/A	N/A

88. Signaled Crossing Warning *(See instructions for codes)* | Code: 07

89. Whistle Ban 1. Yes 2. No 3. Unknown | Code: 2

90. Location of Warning 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach | Code: 1

91. Crossing Warning Interconnected with Highway Signals 1. Yes 2. No 3. Unknown | Code: 2

92. Crossing Illuminated by Street Lights or Special Lights 1. Yes 2. No 3. Unknown | Code: 2

93. Driver's Age: 18

94. Driver's Gender 1. Male 2. Female | Code: 1

95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train 1. Yes 2. No 3. Unknown | Code: 2

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: 3

97. Driver Passed Standing Highway Vehicle 1. Yes 2. No 3. Unknown | Code: 3

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: 8

101. Casulties to Highway-Rail Crossing Users	Killed	Injured
	0	2

99. Driver Was 1. Killed 2.Injured 3. Uninjured | Code: 2

100. Was Driver in the Vehicle? 1. Yes 2. No | Code: 1

102. Highway Vehicle Property Damage *(est. dollar damage)*: 2000

103. Total Number of Highway-Rail Crossing Users *(include driver)*: 2

104. Locomotive Auxiliary Lights? 1. Yes 2. No | Code: 1

105. Locomotive Auxiliary Lights Operational? 1. Yes 2. No | Code: 1

106. Locomotive Headlight Illuminated? 1. Yes 2. No | Code: 1

107. Locomotive Audible Warning Sounded? 1. Yes 2. No | Code: 1

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

Sorry, the report can not display the file.

109. SYNOPSIS OF THE ACCIDENT

On Tuesday, December 06, 2005 at about 11:15a.m, an activation failure occurred on the Norfolk Southern (NS) at Perry Drive, Canton, Ohio, in Stark County AAR/DOT 502708Y. The Maintenance of Way (MofW) was working on Track 2 with a Form D supplemented with red stop boards. All trains were not to proceed by the stop boards before acquiring permission. The speed limit through the work area was 25 miles per hour. An NS maintainer working with the MofW, after annulling warning protection on three Highway Grade Crossings (HGCs) east of Perry Drive, annulled the HGCs on Track 2 at Perry Drive. He first applied a jumper wire from B12 to the XPR to clear the crossing and accommodate highway users. Then he applied a track load simulator and jumper wires to the Track 2 Grade Crossing Predictor (GCP) at Perry Road. He forgot to remove the first jumper applied to the XPR, before leaving Perry Drive to perform other associated work. NS Westward Train 13VC606, a mixed freight, requested and received permission to proceed through the work area which included Perry Drive. The HGCs did not activate and NS 13VC606 struck a southward passenger vehicle on the crossing. After the collision, the conductor notified the Pittsburgh West Dispatcher in Pittsburgh, PA, via radio.

110. NARRATIVE

Circumstances Prior to the Accident

On December 6, 2006 at about 7:05 a.m., an NS Maintainer Test, reported to work at Raff Road, Canton, OH, to annul the highway grade crossing systems (HGCS) for maintenance of way (MofW) work. The MofW was scheduled to work a surfacing gang on Main Track 2 between Control Point (CP) Fairhope, milepost PC 96.8, and CP Reed, milepost PC106.5. The maintainer test, first annulled the HGCS at Raff Road, milepost PC104.12, and then proceeded to Clarendon Avenue, milepost 103.30, where he annulled the HGCS and removed two tuned shunt devices. At about 7:25 a.m., he then annulled the HGCS at Maryland Avenue at milepost PC103.54. When he arrived at Perry Drive, milepost 105.6, at about 7:30 a.m., the HGCS was activated (gates down & lights flashing) and two MofW employees were flagging vehicles around the gates. Many highway users were waiting to cross the railroad.

The maintainer test, after entering the equipment bungalow, placed a jumper wire from B12 (12 volts dc) to the positive control wire of the XPR relay to clear the warning protection and facilitate traffic waiting to cross the railroad. He then removed the track connection wires from the Safetran 3000 Grade Crossing Predictor (GCP) terminals XMT1 and XMTT2, and placed a track load simulator across the same terminals. He then applied a jumper wire from the XMT1 terminal to the RCV1 terminal and from the XMT2 terminal to the RCV2 terminal. As per NS Standards and Procedures SP-1001, Jumpers, Use of on Highway Grade Crossing Equipment, revised 06/03/03; he applied an external jumper tag on the bungalow door, recorded the jumpers wires that he applied to the GCP on the Jumper Inventory Form, and recorded the information on the Jumper Location Control Sheet. He then closed the bungalow and left Perry Drive to perform other duties.

The crew of train NS 13VC606 West included a locomotive engineer and a conductor. The crew went on duty at 5:15 a.m., EST, December 06, 2006, at Conway Yard in Conway, PA. Conway is the away home terminal for both crew members and they received the minimum statutory off duty period, prior to reporting for duty. Their assigned train had four locomotives hauling 52 loaded and eight empty cars. It was 3706 feet long and weighed 2690 tons. The train is scheduled daily from Conway, PA to Columbus, OH, receiving a re-crew at Mansfield, OH.

The trip from Conway up to the MofW work area on Main Track 1 was uneventful. As train NS 13VC606 approached CP Reed, the engineer was seated at the controls on the north side of the locomotive and the

conductor was in his seat on the south side of the locomotive.
Two persons were traveling north to south on Perry Drive in a 1991 Buick Park Avenue. A report filed by the railroad indicated the Ohio State Highway Patrol estimated the driver was operating the vehicle at about ten mph when the collision occurred. The posted speed limit is 35 mph.
The track approaching the accident site is in succession, a .61 % descending grade for 5200 feet and a .23 % ascending grade for 3700 feet. The tracks approaching the accident site are tangent to Perry Drive. Starting west of Perry Drive is a 0° 30-minute left-hand curve with a .23 % grade for 2500 feet. Traveling north to south on Perry Drive there is a 2.5 % ascending grade, to100 feet either side of the crossing.
The railroad timetable direction and the geographical direction of the train is west. Timetable directions are used throughout the report.

The Accident
The accident occurred at Perry Drive, Canton, OH on the Norfolk Southern's Ft Wayne Line which is located on the Pittsburgh Division of the Northern Region, AAR/DOT No. 502708Y. It is a two-lane highway-rail grade crossing on two main tracks having flashing lights, gates, a bell, cross-bucks and a two tracks signs controlled by a Safetran 3000 Grade Crossing Predictor (GCP). Perry Drive crosses Norfolk Southern at about 90°. The signals at CP Reed on tracks one and two are bypassed by wide band shunts at the west absolute signals and narrow band shunts at the east absolute signal. The Ft Wayne Line in the area of the accident has a traffic control system on two main tracks with US&S position light signals and US&S Model 23b machines controlled by biased neutral track circuits and underground signal control cable operated by the Pittsburgh West Dispatcher in Pittsburgh, PA. CP Reed is operated by a US&S Micro Code System (MCS) controller.
Train NS 13VC606, with NS Lead Locomotive 2543, was being operated in the #2 throttle position, drawing about 100-150 amperes with no braking, at 21 mph approaching the accident area. The train crews view of the south side crossing flasher mast and gate is obstructed by stacks of lumber wrapped in white plastic at Stark Truss. The train crew's view on the north side is unobstructed. The locomotive engineer and conductor stated that they noticed the gates were not protecting the crossing about three to four car lengths east of Perry Drive. The driver did not respond to the locomotive horn. The engineer immediately initiated an emergency train air brake application. The train was proceeding at about 21 mph when the automobile was struck. NS Lead Locomotive 2543 sustained insignificant damage. The train speed was recorded by the event recorder of the controlling locomotive. The maximum authorized speed for this train was 25 mph through the established MofW work area.
The automobile, a 1991 Buick Park Avenue, was traveling north to south on Perry Drive. The crossing gates were vertical and the flashing lights were not operating. The driver did not respond to the locomotive horn. The railroad accident report indicated the Ohio State Highway Patrol stated the driver was operating the vehicle at about ten mph when the collision occurred. The southward approach to Perry Drive is slightly ascending from the railroad crossing sign to about 100 feet from the railroad and is level from that point to the Main Track 2. The posted speed limit for Perry Drive is 35 mph.
The train struck the left rear side of the automobile. The automobile was then forced around and slid south along the west side of Perry Drive for about 85 feet before coming to rest against a utility pole. The train came to a stop about 500 feet west of the crossing.
After the train stopped, the locomotive engineer stayed on the locomotive to establish radio communications with the train dispatcher. The conductor walked back to the automobile to await arrival of emergency response personnel.
Both automobile passengers departed their vehicle without assistance. An Ohio State Highway Patrol (OSHP) officer arrived on the scene at 11:33 a.m. The OSHP officer ascertained that the train crew members needed no medical attention. The officer then interviewed the train crew members. The automobile passengers were transported to Aultman Hospital by ambulance.
A NS trainmaster was dispatched to the scene from Canton and arrived about 11:45 a.m. He ascertained the condition of the train and track structure. There was no hazardous materials involvement and only minor structural damage to the lead locomotive. The trainmaster discussed the situation with the OSHP officer. The train and a new crew were released to proceed at 1:20 p.m., and continued the trip to Mansfield, which is about 70 miles west of Canton.
Analysis
The driver was an eighteen-year-old male. The passenger of the automobile was a eighteen year-old female. The highway-rail crossing at grade is equipped with warning lights, gates, and a bell. There is an advanced warning sign posted about 300 feet from the crossing with highway markings. There are no paving marks on the highway surface at the crossing. The crossing and both sides of the crossing are maintained by Norfolk Southern. The surface of the street and crossing is blacktop.
The railroad has a whistle post in place about 1300 feet east of the crossing. The event recorder indicates the locomotive engineer began sounding his horn at about 200 to 240 feet from the crossing.

The active warning devices did not detect the train.
The leading locomotive was equipped with a headlight, the auxiliary lights and the audible warning device required by the Federal Railroad Administration. The conductor said all visual and audible warning devices were working as intended. The Canton Ohio Terminal Superintendent verified the operation of the audible and visual warning devices immediately upon arriving at the accident scene.
The locomotive was also equipped with a speed indicator and an event recorder as required.
The relevant event recorder data was downloaded by the NS Canton, OH Trainmaster at 11:40 a.m. and analyzed by the NS Pittsburgh Division Road Foreman. The analysis disclosed that the locomotive engineer was in compliance with all applicable railroad operating rules and train handling requirements.
The maintainer test that applied the jumpers was taken to a local hospital for a toxicological test. The results of the test were negative.
Conclusions
The railroad crew members were in full compliance with all applicable standards. The maintainer test who annulled the highway grade crossing system violated rule SP-1001 of NS 's Standard Procedures Manual and 49CFR Part 234 GRADE CROSSING SIGNAL SYSTEM SAFETY, Subpart D Maintenance, Inspection, and Testing, Section 234.209 Interference with normal functioning of system.
§234.209 The normal functioning of any system shall not be interfered with in testing or otherwise without first taking measures to provide for safety of highway traffic that depends on normal functioning of such system. Which states in part . . . . .
"Not providing alternative methods of maintaining safety for the highway user while testing or performing work on the warning systems or on track and other railroad systems or structures which may affect the integrity of the warning system."
NS cited the maintainer test with the violation of FRA Rules and was suspended for 30 days.

Probable Cause & Contributing Factors
The accident occurred because the maintainer test (Mr. McClure) applied a jumper wire from B12 to the positive coil wire of the XPR relay. The XPR energized and the HGCS de-activated. Mr. McClure placed the jumper on the XPR to facilitate highway users while he was applying other jumper wires to annul the HGCS on Track 2. Track 1 was a live track, but train movement was controlled by the MW employee in charge. NS policy for applying jumpers requires employees to record the jumper wires that are applied at a location on a NS jumper form. Mr. McClure recorded the jumper wires applied to the Track 2 Safetran 3000 Grade Crossing Predictor (GCP), but failed to record the jumper wire applied on the XPR relay. Mr. McClure left Perry Drive to work at another location. He forgot to remove the jumper wire from the XPR relay. The jumper prevented the detection of a train on Track 1 and the HGCS activation at Perry Drive.
#