

**NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE of RAILROAD, PIPELINE &
HAZARDOUS MATERIALS INVESTIGATIONS
WASHINGTON, DC 20594**



DCA 05 MR 008
HEAD ON COLLISION of
NS RAILROAD TRAINS at
GRANITEVILLE, SOUTH CAROLINA on JANUARY 6, 2005

Track Factual Report

ACCIDENT

Location:	Graniteville, South Carolina
Date:	January 6, 2005
Carrier:	Norfolk Southern Railway (NS)
Train Symbol:	NS 192P005 (Northbound Freight) NS P22005(Aiken Turnaround Local Freight)
Location:	Eastern Region - Piedmont Division - Line Segment Columbia, S. C. to Augusta, GA Mile Post R178.3
Industry:	Avondale Mills – Gregg Plant
NTSB Number:	DCA 05 FR 008

Graniteville - Track Group

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SYNOPSIS

About 2:39 a.m., eastern standard time, on January 6, 2005, northbound Norfolk Southern Railway freight train 192P005 struck an unoccupied parked train and derailed after encountering an open switch in Graniteville, South Carolina. The train was northbound in non-signaled track warrant territory with a timetable speed of 49 mph. The 42-car train was powered by two locomotives and was made up of 25 loads and 17 empties.

About 7 hours before the accident, a local train, P22P005, had used the main line switch at MP R 178.3 to enter an industrial track at that location. After servicing a local industry, the crew secured their train and departed the area around 7:00 p.m. The crew was transported by a van to their home terminal, where they cleared their track warrant at 7:53 p.m. No trains had used the main track from the time the local train departed the area until the arrival of the accident train. The engineer of the accident train initiated an emergency application of the air brakes as his train neared the switch. While in emergency braking, the train was diverted onto the sidetrack and struck the local train locomotive. The two locomotives and the first 14 cars from train 192P005 derailed. Included in the derailment were three cars of chlorine and one car of sodium hydroxide. A breach of a tank car of chlorine, the 9th car behind the locomotives, prompted an evacuation of about 5,400 people. Due to the significant release of chlorine gas, the engineer received fatal injuries; eight other people were fatally injured by the chlorine gas inhalation. The conductor and 72 other people were hospitalized with inhalation injuries.

Weather at the time of the accident was dark, dry, and cloudy and 59° F. Actual damages have not been totaled, however preliminary estimates were over \$2.8 million.

The Aiken Local crew described in detail how they worked the plant before going off duty on the mill lead. There were no train movements on the Columbia - Augusta Line after the local crew tied up in the Mill. According to the brakeman on the local, he lined and locked the switch open for the Avondale Mill track when they arrived to work the plant that evening. He stated that the switch worked properly and he had had no problems with the switch or the lock.

According to the Aiken Local crew none of them were aware that the switch had been relined and locked for the main track before they departed from the Avondale Mill track.

As train 192P005, northbound arrived in Graniteville it was operating within track speed on track warrant authority. The train 192P005 entered the opened switch that has a maximum authorized speed of 15 mph when used. Just before impact, the train moving about 42 mph entered the switch for Avondale Mills at near maximum main track speed. The post accident inspection revealed that the switch and the 15 mph turnout on the Avondale Mill track withstood the excessive speed entry and was not damaged. After entering the track train 192P005 struck the

off duty local in the Avondale Mill and derailed, resulting released of chlorine from a tank car within the train.

When the accident occurred at 2:39 a.m. on 1/06/05, the Aiken Local crew was off duty and they were unaware that the collision had taken place until the next morning. Condition of the No. 192P-005 crew, after the collision was one dead and one injured. Evacuation of estimated 5400 residents with eight residents believed to have died from chlorine fumes.

Track /train Operation

The accident occurred on the NS Columbia – Augusta Line on the Piedmont Division, a part of the Eastern Region of the Norfolk Southern Railway. The line at Graniteville, SC was a single main track controlled by a train dispatcher using non-signaled Track Warrant Control system from the NS office in Greenville, SC.

According to the Terminal Superintendent in charge of the territory, there are 5 trains operating over the track at Graniteville in a 24-hour period. There are two through freights in each direction operating between Augusta, GA and Columbia, SC in addition to the Aiken local.

The main track in the area where the accident occurred had a curve speed restriction of 45 MPH for trains on both sides of the Avondale Gregg Plant turnout. The plant turnout is near the point of collision at Mile Post R178.3 in Graniteville, SC. The maximum authorized track speed is 49 mph for trains. The track is maintained to FRA Class 4 track standards. The track is maintained for maximum allowable operating speed for train using FRA Class 4 track where train speed could be 60 MPH for freight trains.

Track Inspection and Accident Location

The Norfolk Southern Piedmont Division R-line is a 190.52 mile track segment, originating at a junction to a mainline near Charlotte, NC, extending through Columbia, SC and ending in Augusta, GA. This track segment is owned and operated by Norfolk Southern Railway. The designation for direction is north and south. Numerous small towns and industries are located near this track segment. The R-line is designed and maintained to comply with The Code of Federal Regulations Class IV standards, which allow a maximum speed of 60 mph for freight trains. Timetable speed from Columbia to Augusta was 49mph with some curve restrictions along the way.

The segment of the R-line at Graniteville is a single main track. The Method of Operation is non-signal Track Warrant Control. The speed for curves in this area is 45 mph. The track is constructed with 132 lb. continuous welded rail. Crossties, tie plates, fasteners, anchors and granite ballast help maintain geometry and restrain movement within Class IV standards. Several grade crossings exist near Graniteville. The closest curvature is a left hand, one-degree curve beginning at MP R-178.45 and ending at MP R178.65. The closest turnout is at MP R178.3 and provides access to Avondale Mills. This number ten turnout is of similar construction and material to the main track and has a maximum authorized speed of 15 mph

when used. A spring frog, switch points and a New Century 51B switch stand with a high mast and red and white reflective targets were also used.

A track records inspection was performed for the R-line between Columbia, SC and Augusta, GA. The time line for the inspection was November 9, 2004 to January 5, 2005, a span of approximately eight weeks. Emphasis was placed on the segment between the MP R178 and MP R179. Norfolk Southern recorded no defects for this segment during this time period. The Federal Railroad Administration requires Class IV track to receive twice weekly inspections. Norfolk Southern was in compliance with this frequency requirement. Also, required by The Federal Railroad Administration is a monthly switch inspection. Compliance was met December 7, 2004 for this requirement. Federal Railroad Administration Report number three, dated January 8, 2005, indicate no defects noted for this records inspection. The 8 weeks track records on this line showed no defects at the Avondale Mills switch.

On January 14, 2005, final clearance was given to inspect the accident site. A track inspection was performed on the Avondale Mills turnout and the track north and south of the turnout for approximately one-tenth mile. No mainline track damage was incurred due to the accident. The track north of the turnout had been removed to allow for cleanup. The switch handle and lock had been removed from the switch by the FBI as part of the NTSB investigation. The switch stand mast and targets were removed for the NTSB's inspection. After inspection was complete, it was checked by the FBI for tampering and no evidence was found.

The Avondale Mills turnout and the track south were in tact and had no defects per 49 CFR Part 213. A section of the Avondale Mills track, near the heel of the frog and toward the mill incurred damage due to the accident and had also been removed to allow for cleanup. The remainder of the industry track was intact. NS has a maintenance limit of 141feet, beginning at the switch points and extending into the Avondale Mills industry track. Federal Railroad Administration Report number eight, dated January 14, 2005 indicates no defects noted for this inspection.

Previous Federal Railroad Administration track inspections of the R-line performed by the South Carolina State Inspector from the Office of Regulatory Staff were referenced. Report number ten dated January 19, 2004 and report number 11, dated January 20, 2004 revealed no defects at the Avondale Mills turnout or between mile post R178 and R179.

Post Accident Track Inspections and Tests

The NS track supervisor and the operations supervisor were interviewed about the track and operations in the area. There had been no reports of accidents or incidents from train operations on this line. As the NS Supervisor's who was in charge of the track and train crews what worked on the Augusta - Columbia Line neither had reports from the train crews reporting any problems with the switch or track at the Avondale Mills.

After the accident, the NTSB called the FBI in to assist us with the investigation. Prior to going

into the site at 2:30 p.m. on 1/07/05 the FBI haz/mat team arrived from Washington, DC and assisted the Track Group with the site inspection and documentation of the area. Before they entered the accident site, the NTSB Track Group Chair advised the FBI team what to look at and how to make the inspection of the switch and lock.

During the inspection, they observed the switch and lock positions, observing the switch was lined and locked for the Avondale Mills lead. It had not been touched and was just as it had been when the accident occurred. The switch points were lined for the industrial track and the banner was in the red position indicating that the switch was lined for the sidetrack. When the inspection was completed and no defects were noted with the switch points, the stand or the lock on the switch.

After observing the switch position and documenting the condition of the switch, they checked to determine how secure the latch and lock were on the switch, and for tightness of the switch points. The cross ties in the switch were examined and they were in sound condition. The spikes were in the proper place and they were secure. The switch was normal and no unusual conditions were present. The switch stand, switch throw rods, switch lugs and the heel blocks were all inspected and each element was found to be in proper position, and all checked out as normal.

On March 28, 2005 at 2:30 p.m. the IIC and representatives of the NTSB track group met at the accident and made an additional inspection of the switch and found it was in FRA class IV or better condition.

While at the site, the track was walked and the group observed that sight distances from the curve at MP R-178.65 to the switch where the accident occurred. The curvature is a left hand, one-degree curve beginning at MP R-178.45 and ending at MP R178.65. During daylight hours there is an unobstructed line of sight from the curve to the turnout, which provides access to Avondale Mills at MP R178.3.

The Avondale Mills switch has a number ten turnout, it is of similar construction and material to the main track and has a maximum authorized speed of 15 mph when used. A spring frog, switch points and a New Century 51B switch stand with a high mast and red and white reflective targets were also used.

The switch is located in the city of Graniteville and a street is running along both sides of the main track. The street is 20 feet wide on each side of the track.

On March 29, 2005 the NTSB conducted sight distance tests using similar locomotive equipment to that which was on Train 192P005 during the collision. The weather and lighting conditions were similar to those reported at the time of the accident. The tests were conducted to determine the track conditions that the crews faced prior to the collision.

The weather at the time of the test was dry, cloudy and 59 degrees, similar to the conditions when the accident occurred.

The sight tests were conducted between 2:00 and 3:00 a.m., about the same time that the collision occurred. It was dark, cool and overcast. During the tests, approaching the collision site at MP R178.3, the locomotive engineer was seated on the left side (West) of the operating cab of NS locomotive 6561, a locomotive similar to the leading locomotive of train P192P005. The UTU conductor was located on the lead NS locomotive NS6561, seated on right side (East) in the locomotive cab area.

The switch stand banner at the Avondale Mills track is a 14-inch diameter banner that is attached to a 7-foot long banner shaft and mounted on top of the Avondale Mills Switch. From the seat of a locomotive operating northbound in the 1-degree right curve, (left per the track chart).

During tests on the track the red reflection from the switch banner was visible on the locomotive from the engineers seat as the locomotive headed from the curve to the tangent track. The banner could be seen at a distance of 1461 feet north of the locomotive. The red reflection was first visible to the conductor's side of the locomotive at 1339 feet.

However when the banner was first observed at the maximum distance where the crewmen could see the reflection of a red object, it could not be identified as the switch banner. It was not identified as a switch banner until the train reached a point 566 feet from the switch.

At 566 feet from the switch banner was the first point that it was obvious that the red marker was a switch banner. In the darkness, the bright head light of the locomotive lighted up the switch banner.

The switch points could not be seen until the locomotive was 220 feet from the switch stand. The crew could see the points, showing that the switch was not lined for the normal main track position at that location 220 feet away.

The street next to the Avondale Mills switch ran parallel to the main track. The street was measured to be 20 feet wide. Measurements from the centerline of the street to the switch stand, was 21 feet to the switch stand target. The view from a vehicle, such as a taxi passing next to the track was clear. The position of the switch was clearly visible from a vehicle passing the switch such as the taxi departing the mill when the local went off duty at Avondale Mills on the evening prior to the collision.

On March 29, 2005, the track group reformed at the accident site again inspected the track at the accident in Graniteville, and found that the switch was in excellent condition and it had not been damaged in the accident. The track group chair had discussion with the local track supervisor, roadmaster, roadforeman and trainmaster about the condition the switch at Avondale Mills. During these discussions it was determined that there have been no reports of vandalism on or near the Avondale Mills switch. Records inspections revealed no defects reported by train crews at the switch over the past year. Additionally the railroad had no records to indicate that the switch had been damaged during switching. In addition there were no records of any train making a trailing movement through the switch when it was left improperly lined at any time prior to the accident.

During the track and switch inspection, the Graniteville Police Department assisted the NTSB while the inspection and tests were being conducted. The track group chair checked with the police and no records were found indicating any cases of previous vandalism or cases reported to the police where the switch at the Avondale Mills track had been left open or damaged during the past five years.

End.