

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, DC 20594
Office of Railroad, Pipeline, and Hazardous Materials Safety
Railroad Division (RPH-10)

***The Head-on Collision of Norfolk Southern Corporation Trains 192P-005 into
Standing Train P22 at Graniteville, South Carolina on January 6, 2005.***

Mechanical Factual as of 5-04-05
DCA 05 MR008

GENERAL

Carrier: Norfolk Southern Corporation (NS)
Date/Time: January 6, 2005, 2:35 a.m. EST
Trains: NS mixed freight train 192P-005, and NS local P22
Railroad: Piedmont Division, Norfolk Southern
Location: MP 178.2, Graniteville, South Carolina
NTSB No: DCA 05 MR 008

MECHANICAL GROUP

Russell G. Quimby
Safety Engineer-Rail
NTSB, RPH-10
490 L'Enfant Plaza East SW
Washington, DC 20594
Office [REDACTED]
Home [REDACTED]
Page [REDACTED]
Cell [REDACTED]
[REDACTED]

Mike Ellisor
Railroad Safety Investigator
Office of Regulatory Staff
State of South Carolina
101 Executive Center Dr.
P.O. Drawer 11649
Columbia, SC 29211
Office [REDACTED]
Cell [REDACTED]
[REDACTED]

Jerry L. Marcum
Division Road Foreman
Of Engines
Piedmont Division
Norfolk Southern Corporation
1120 W. Washington Street
Greenville, SC 29601
Office [REDACTED]
Fax 864-255-5741
Cell [REDACTED]
[REDACTED]

Joseph P. Koeck
MP&E Inspector
Federal Railroad Administration
7508 East Independence Blvd. Suite 124
Charlotte, NC 28227

Gary R. Winfrey
Division Manager
Mechanical Operations
Virginia/Pocahontas Division
Norfolk Southern Corporation
800 Princeton Ave, Room 204
Bluefield, WV 24701
Office [REDACTED]
Fax 304-325-4273
[REDACTED]

ACCIDENT SUMMARY

At about 2:35 a.m. EST, northbound Norfolk Southern Corporation mixed freight 192 P0-05 collided head-on into a standing locomotive and two cars of unoccupied NS local train P22 on the Avondale Mill spur of the NS Piedmont Division in Graniteville, South Carolina.¹ The collision resulted in derailment of the local's locomotive and 2 cars, and the two-unit locomotive and first 16 cars of the train 192. The collision also resulted in the breach of a loaded chlorine tank car, which subsequently resulted in a release and 9 fatalities including the engineer, local mill workers and residents, and 58 injuries.

Local train P22 had been left secured on the Avondale Mill industrial spur track at about 6:57 p.m. January 5th. The turnout switch to the spur had been locked and left in the diverging route position onto the mill spur track.

EQUIPMENT AND TRAIN HISTORY

At the time of the collision, local P22 consisted of one locomotive unit, NS 4622, (an EMD GP-59) and two empty covered hopper cars; PPGX 12119, and WITX 4760².

Train 192 P0-05 consisted of two locomotive units pulling 42 cars (25 loads, 17 empties). Of the 25 loaded cars, 14 were designated dangerous or hazardous material according to the NS consist list. The train trailing tonnage was 3,520 tons; train length was 2,553 feet. See the attached consist list, which was taken by an Automatic Equipment Identification scanner at MP 190.12 on the "R-Line" just north of the NS Savanna River Bridge. A subsequent check of this consist list against actual cars proved it accurate.

Train 192 P0-05 originated in Macon, Georgia and was destined for Columbia, South Carolina. A train crew change was made in Augusta, Georgia.

A number of consist changes were made to the train enroute as follows:

| In/Out | Location | Date | Time | Loco | Units | Loads | Empties | Tonnage |
|--------|----------------|--------|------|------|-------|-------|---------|---------|
| Out | Macon, GA | 1-5-05 | 1330 | 2 | 16 | 14 | 2356 | |
| In | Tenniville, GA | " | 1900 | " | " | " | " | |
| Out | Tenniville, GA | " | 1950 | " | 43 | 14 | 5858 | |
| In | Nixon, GA | " | 2250 | " | " | " | " | |
| Out | Nixon, GA | " | 2345 | " | 16 | 14 | 2356 | |
| In | Augusta, GA | 1-6-05 | 0005 | " | " | " | " | |
| Out | Augusta, GA | " | 0213 | " | 25 | 17 | 3524 | |

NS mechanical personnel successfully performed an FRA Class I³ (initial terminal) air brake test at Macon at 11:50 a.m. on train 192. Train 192 departed

¹ Both the leading locomotive units of each train struck short-nose to short-nose. All locomotive units were designated with the front, "F", on the long hood end. Both the striking locomotive units were moving in reverse and the parked locomotive was parked in reverse, short nose out.

² These cars contained silica sand and carbon black residue respectively.

³ CFR Part 232.205

Macon at 1:30 p.m. on January 5th with a two-unit locomotive pulling 16 loaded cars and 14 empty cars. While en-route, the locomotive cab portion of the end-of-train device (EOT) developed telemetry problems, which resulted in the crew switching locomotive units at McBeam, Georgia and reestablishing proper contact. No other problems were encountered en-route. The train arrived at 10:50 p.m. at NS Nixon Yard in Augusta, Georgia where train crews changed at the yard office. The accident crew then took the train across town to the NS Augusta Yard and performed switching, and added cars to the outbound consist. Upon reconfiguring the train, the accident crew performed a successful air brake test and NS required train inspection. Train 192 finally departed Augusta Yard at 2:05 a.m. on January 6th. No other stops were made and no problems were reported or recorded from there until 22 minutes later at the collision site.

POST-ACCIDENT MECHANICAL INSPECTIONS

The day after the accident, January 7, 2005 the NTSB event recorder and mechanical group chairmen secured the 8-track event recorder tape, track warrant, and various documents from the lead locomotive unit (NS 6653) of train 192. Besides the track warrant, other documents retrieved were:

- 1) Norfolk Southern Railway Locomotive Daily Inspection Form, Form ME-65 (3/02) for NS 6653
- 2) Train Tonnage Profile (computer printout) dated 01/06/05, 00:24a for Train 192P-005
- 3) NS Form ME-112 (6/03) Operational Status of Dynamic Brakes for locomotive units NS 6653 and NS 6593 dated 1-1-05, time 11:05p.m.
- 4) Computed Generated Form FRA F 6180-49A (Blue Card) for locomotive unit NS 6653
- 5) Dispatcher's Bulletin No. 378 dated 1-05-05 station Augusta, issued 11:54 p.m. and originally issued 1-04-05 4:26 p.m.
- 6) Dispatcher's Bulletin No. 826 for the Warren/Oakwood District issued 10-13-04 11:11 a.m.
- 7) NS Corporation Form ME-60 (rev, 1/03) [Locomotive Inspection Form] completed for Macon, Georgia on 1-5-05 at 1:30 p.m. for NS 6653.

On January 8, 2005 the mechanical group met at the NS Augusta Yard to inspect the 26 non-derailed cars, which had been taken from the accident site, decontaminated, and spotted on track #7 that morning. A two-unit locomotive (NS 9253, NS 9112) coupled onto the 26-car block⁴ at 9:30 a.m. and charged the air brake system. A working two-way end-of-train (EOT) device was already on the end (NS403130).

The FRED⁵ was monitored by a carman while an airbrake test was performed in the following manner:

- 1) The brake system was charge to 90psi.

⁴ The two end cars had been derailed and although added to the non-derailed cars, were not inspected therefore, only 26 of 28 cars were inspected and tested.

⁵ FRED is the flashing rear-end device and is the train end portion of the EOT device.

- 2) A leakage test was performed and resulted in a 1 psi drop per minute after a 20psi reduction; cutting out maintaining; waiting one minute; and then noting the pressure drop over the next succeeding minute.
- 3) After cutting in the maintaining feature and recharging the system, a 20-lb reduction was made and stabilized after several minutes.
- 4) An emergency application was then made with the automatic brake handle. Zero pressure was noted at the rear end after 3 seconds.
- 5) The system was then recharged and stabilized.
- 6) A 20-lb reduction was then made, angle cocks turned, and the locomotives cut away. The train was then inspected.

A South Carolina State inspector and an NS carman inspected one side of the 26-car block, and an NTSB investigator and FRA inspector inspected the other side. Besides a number of FRA safety appliance defects the following was found: 2 broken brake shoes, 1 knuckle pin defect, 1 leaking roller bearing seal, 2 piston travel defects, and 1 brake shoe failed to center. One car had the brakes cut out, SOU 98325. These defects would not have affected the performance of the train.

January 12, 2005 Safety Board investigators were able to enter the wreck site and recover the following documents and items from the locomotive unit cabs of train 192:

- 1) Norfolk Southern Railway Locomotive Daily Inspection Form, Form ME-65 (3/02) for NS 6593
- 2) Computed Generated Form FRA F 6180-49A (Blue Card) for locomotive unit NS 6593
- 3) Dispatcher's Bulletin No. 378 dated 1-05-05 station Augusta, issued 11:54 p.m. and originally issued 1-04-05 4:26 p.m.
- 4) NS Corporation Form ME-60 (rev, 1/03) [Locomotive Inspection Form] completed for Macon, Georgia on 1-5-05 at 1:30 p.m. for NS 6593.
- 5) NS Form 1043-BT (Rev 3/04) , Report of Satisfactory Class 1 Brake Test (A6) Performed [and] Report of Satisfactory EOTD Test Performed for train 192 dated 1-5-05 at 11:10 a.m. for 30 cars at Macon [Georgia] [including] EOTD test for #15396, [and reverse side] RECORD OF CLASS 1 BRAKE TEST(S) and INSPECTIONS EN ROUTE, dated 1-6 [05] time 2:10 a.m. for 12 cars, head car NS 269182, and rear car CSXT 495573 at Augusta, GA by Wm Wright.
- 6) NS Form 11498 (Rev 1/97) END OF TRIP FORM for train 192 dated 1-06-05 at 12:30 a.m. with TRAIN DELAYS Mile Post D122 for 2 Units 12:30 – 2:15 a.m.
- 7) Computer generated TRACK INVENTORY 242H MACON, 01/05/2005 12:49 p.m. 32 cars, 16 loads, 14 empties 2354 tons 1903 feet FCAP for locomotive units NS 6593 followed by NS 6653, first car NS 473153, last car CSXT 497760.

END-OF-TRAIN DEVICE (EOT) AND EMERGENCY BRAKING

The lead locomotive unit, NS 6653, of mixed freight train 192 P0-05 was equipped with an automatic two-way EOT⁶. Movement by the engineer of the automatic brake handle to the emergency position would automatically (via telemetry) cause an emergency air brake application to also be activated from the rear-end EOT device. This system is designed to insure a complete and quicker propagation of an emergency brake application throughout a train. The event recorder was unable to provide information as to whether the striking engineer placed the train brakes in emergency prior to the collision. However, post-accident inspection of the control stand in the cab of NS 6653 showed the automatic brake handle in the emergency position, and post-accident testimony by the conductor indicated that the engineer place the train brakes in emergency.

The rear portion of the EOT, the flashing rear end device (FRED), was sent to WABTEC Railway Electronics in Germantown, Maryland for testing. Two complete tests were performed. According to the WABTEC January 14, 2005, report, all components functioned and the device operated as designed.

EQUIPMENT DAMAGE

| Sequence Number | Vehicle ID | Load/Empty | Type | Damages \$ Value |
|-----------------|------------|------------|----------------|------------------|
| 1 NS | 6653 | Loco | EMD SD-60 | 637,435 |
| 2 NS | 6593 | Loco | EMD SD-60 | 415,135 |
| 3 NS | 473153 | L | Box Car | 72,000 |
| 4 NS | 269182 | L | Covered Hopper | 8,000 |
| 5 SOU | 6774 | L | Covered Hopper | 8,000 |
| 6 ACFX | 51213 | E | Covered Hopper | 20,000 |
| 7 NAHX | 551307 | E | Covered Hopper | 30,000 |
| 8 SBLX | 14146 | L | Tank Car | 65,000 |
| 9 GATX | 17105 | L | Tank Car | 29,273 |
| 10 GATX | 58326 | L | Tank Car | 24,383 |
| 11 UTLX | 900270 | L | Tank Car | 56,262 |
| 12 NAHX | 551599 | E | Covered Hopper | 42,000 |
| 13 CSXT | 496430 | L | Coil Car | 60,000 |
| 14 CSXT | 496904 | L | Coil Car | 55,000 |
| 15 CSXT | 495573 | L | Coil Car | 45,000 |
| 16 NS | 411178 | L | Box Car | 25,000 |
| 17 NS | 403130 | L | Box Car | 6,975 |
| 18 GATX | 31941 | E | Tank Car | 2,400 |
| Total | | | | \$1,601,863 |

⁶ This locomotive unit NS 6653 was modified November 17, 2002 at NS Juniata Shop to the automatic version of the two-way EOT.

Parked NS Local Train P22 Consist List as of 1-06-05, Graniteville, SC

| Sequence Number | Vehicle ID | Ld/Emty | Type | Damage |
|-----------------|------------|---------|----------------|-----------|
| * 1 NS | 4622 | Loco | EMD GP-59 | \$564,616 |
| * 2 PPGX | 12119 | Empty | Covered Hopper | 500 |
| * 3 WITX | 4760 | Empty | Covered Hopper | 6,886 |
| Total | | | | \$572,002 |

Total equipment damage for this accident was \$2,173,865.

* - **Derailed** Consist information was taken by the AEI reader at MP 190.12 and physically verified for accuracy.

NS Train 192P-005 Consist List as of 1-06-05, Graniteville, SC

| Sequence Number | Vehicle ID | Ld/Emty | Type | Cargo |
|-----------------|------------|---------|----------------|----------------------------|
| * 1 NS | 6653 | Loco | EMD SD-60 | 3800 HP, Blt 1988, 26L brk |
| * 2 NS | 6593 | Loco | EMD SD-60 | |
| * 3 NS | 473153 | L | Box Car | Pulp board |
| * 4 NS | 269182 | L | Covered Hopper | Kaolin |
| * 5 SOU | 6774 | L | Covered Hopper | Kaolin |
| * 6 ACFX | 51213 | E | Covered Hopper | ----- |
| * 7 NAHX | 551307 | E | Covered Hopper | ----- |
| * 8 SBLX | 14146 | L | Tank Car | Chlorine |
| * 9 GATX | 17105 | L | Tank Car | Chlorine |
| *10 GATX | 58326 | L | Tank Car | Sodium Hydroxide |
| *11 UTLX | 900270 | L | Tank Car | Chlorine |
| *12 NAHX | 551599 | E | Covered Hopper | ----- |
| *13 CSXT | 496430 | L | Coil Car | Coil Steel |
| *14 CSXT | 496904 | L | Coil Car | Coil Steel |
| *15 CSXT | 495573 | L | Coil Car | Coil Steel |
| *16 NS | 411178 | L | Box Car | Paper Board |
| *17 NS | 403130 | L | Box Car | Paper Board |
| *18 GATX | 31941 | E | Tank Car | ----- |
| 19 GATX | 25262 | E | Tank Car | ----- |
| 20 GATX | 49030 | L | Tank Car | Cresols |
| 21 DOWX | 6695 | L | Tank Car | Corn Syrup |
| 22 WVCX | 2049 | L | High Side Gon. | Wood Chips |
| 23 WVCX | 2014 | L | High Side Gon. | Wood Chips |
| 24 WVCX | 3045 | L | High Side Gon. | Wood Chips |
| 25 WVCX | 3077 | L | High Side Gon. | Wood Chips |
| 26 UTLX | 201323 | E | Tank Car | ----- |
| 27 GPPX | 9595 | E | Tank Car | ----- |
| 28 GPPX | 5078 | E | Tank Car | ----- |
| 29 NATX | 37124 | E | Tank Car | ----- |
| 30 WVCX | 2040 | L | High Side Gon. | Wood Chips |
| 31 PTLX | 41864 | L | Covered Hopper | Pressure Differential Car |
| 32 PSPX | 5703 | L | Covered Hopper | Pressure Differential Car |
| 33 OLNX | 224010 | L | Tank Car | Sodium Hydroxide |
| 34 TTX | 804131 | L | Bulkhead Flat | Plate Steel |
| 35 CSXT | 502716 | E | Box Car | ----- |
| 36 DUPX | 22027 | L | Tank Car | Methanol |
| 37 DUPX | 22009 | L | Tank Car | Methanol |
| 38 NATX | 22479 | E | Tank Car | ----- |
| 39 NATX | 73697 | E | Tank Car | ----- |
| 40 UELX | 78286 | E | Tank Car | ----- |
| 41 SOU | 98325 | E | Covered Hopper | ----- |
| 42 CSXT | 495198 | E | Coil Car | ----- |
| 43 CSXT | 498036 | E | Coil Car | ----- |
| 44 CSXT | 497760 | E | Coil Car | ----- |
| CR | 915396 | EOT | Rear | Flashing Rear-End Device |

END SHEET