United States Environmental Protection Agency
Region IV
POLLUTION REPORT

Date: Friday, May 20, 2005
From: Kevin Misenheimer

To: Kevin Misenheimer, EPA

Subject: FINAL Polrep
Norfolk Southern Graniteville Derailment
Marshal Street, Graniteville, SC
Latitude: 33.5661000
Longitude: -81.8078000

POLREP No.:	2	**Site #:**	A4GY
Reporting Period:		**D.O. #:**	
Start Date:	1/6/2005	**Response Authority:**	CERCLA
Mob Date:	1/6/2005	**Response Type:**	
Demob Date:	1/21/2005	**NPL Status:**	Non NPL
Completion Date:	1/21/2005	**Incident Category:**	Removal Action
CERCLIS ID #:	SCN000409724	**Contract #**	
RCRIS ID #:			

Site Description

At approximately 0240 hours on 6 January, 2005, a Norfolk Southern (NS) train derailed after it collided with a parked train near Marshall Street in downtown Graniteville, Aiken County, South Carolina (Railroad Milepost R178). The train was reportedly traveling at 45 miles per hour when it hit the parked train and derailed. Sixteen cars and two locomotives derailed from the NS train, including four hazardous materials cars. Two rail cars and one locomotive derailed from the parked train. Three of the hazardous materials cars contained chlorine and one contained sodium hydroxide. During the derailment, one of the chlorine cars (UTLX 900270) was punctured, releasing chlorine into the environment. Two other chlorine cars; the north car (SBLX14146) and south car (GATX17105) and one sodium hydroxide car (TATX58326) were involved in the derailment. In addition, diesel fuel was discharged from the wrecked locomotives. Also, several cars containing Kaolin clay were upended resulting in a spill of the material. Norfolk Southern reported the release of chlorine to the National Response Center at 0358 hours on 6 January, 2005 (Ref: NRC report 746298).

The derailment and subsequent puncture of the chlorine car ("holed" car) released a chlorine vapor cloud into the Graniteville area. Initial reports indicated several fatalities and numerous injuries resulting from the release. Further investigations later on determined that nine persons were killed as a result of the accident. Persons who were potentially exposed to chlorine were sent to local hospitals for decontamination and follow up care. An initial evacuation of a 0.5 mile radius around the incident scene was ordered and individuals outside the evacuation zone were advised to shelter in place. Initial response to the incident was conducted by Graniteville-Vaucluse-Warrenville Volunteer Fire Department (GVW) and Aiken County Sheriff's Office personnel. Representatives from South Carolina Department of Health and Environmental Control (SCDHEC), Savannah River Site Fire Department (mutual aid to GVW) and personnel and contractors from Norfolk Southern also responded to the incident in the early morning hours of 6 January. Initial assessments were made by these entities to ascertain the conditions in and around the derailment scene.

The derailment site is located on Marshall Street in downtown Graniteville, South Carolina. The area is a mixed residential, commercial and industrial area. Approximately 5,400 residents live within a 1-mile radius of the incident scene. Avondale textile mill is located immediately adjacent to the derailment site.

A total of 18 cars derailed during the accident. Four rail cars containing hazardous substances were derailed. One chlorine rail car, containing 90 tons of product, was breached and released approximately 40 tons of chlorine. The size of the breach in the holed car was measured to be approximately 24" x 4". Auto-refrigeration occurred on the holed car and approximately 50 tons of product was retained in the car. The release of chlorine vapor migrated from the derailment site, over and through the adjacent Avondale Mills plant and then over a large number of commercial and residential areas in Graniteville before it dissipated. Some of the chlorine gas settled into low lying areas and dissolved into the waters of

Horse Creek, located adjacent to the Woodhead division of Avondale Mills. A fish kill was subsequently observed in Horse Creek due to this release. Three other hazardous materials cars (two chlorine and one sodium hydroxide) were derailed and the integrity of these cars was initially unknown. Additionally, approximately 3,000 gallons of diesel fuel was discharged from one of the wrecked locomotives.

Potential threats to public health and the environment posed by this incident included actual and potential exposure to humans and animals from chlorine vapors in the air, potential dermal exposure to chlorine and hydrochloric acid near the derailment scene; actual and potential exposure to chlorine in the water by aquatic life in Horse Creek and Langley Pond; and a threat of discharge of oil into a waterway. In addition, three rail cars containing hazardous substances (chlorine and sodium hydroxide) presented a serious threat of release into the environment.

Current Activities

6. January, 2005

At approximately 0530 on 6 January, 2005 the Region 4 Duty OSC dispatched R-1 FOSC Misenheimer to respond to a train derailment in Graniteville, SC. The R4 Duty FOSC also dispatched personnel from the Superfund Technical Assessment and Response Team (START). At approximately 0830, FOSC Misenheimer arrived at the local command post, located in a large parking lot on U.S. Highway 1 South, Aiken, SC. The FOSC met with local and state officials and began to gather details regarding the incident and the current situation. Response resources already on scene included: Aiken County Sheriffs Department, Graniteville-Vaucluse-Warrenville Volunteer Fire Department (GVW), South Carolina Department of Health and Environmental Control (SCDHEC), South Carolina Law Enforcement Division (SLED), Aiken County Emergency Services, Federal Railroad Administration and Norfolk Southern representatives. In addition, mutual aid assets from Savannah River Site Fire Department (SRSFD) were on scene to assist firefighting and hazardous materials operations. Norfolk Southern contractors Hulcher, Specialized Response Solutions (SRS), RJ Corman, Inc., Hepaco, and Center for Toxicology and Environmental Health (CTEH) were either already on scene or en route.

FOSC Misenheimer immediately began to coordinate with the incident commanders on scene (GVW Fire Chief, Aiken County Sheriff, and SCDHEC State On-Scene Coordinator (SOSC)) and to get briefings from Norfolk Southern. Initial activities taken at the scene included search and rescue operations (GVW), damage assessments (NS), and environmental / air monitoring (SCDHEC). Based on these assessments and subsequent debriefings to the FOSC, it was determined that four hazardous materials cars had derailed (3 chlorine and 1 sodium hydroxide). One of the chlorine cars had been breached ("holed car") and had released a significant chlorine vapor cloud. Chlorine vapor was continuing to release from the derailment scene either from the holed car or from residual soil contamination. The condition of the other hazmat rail cars was unknown because NS responders had not conducted a thorough damage assessment. Also, it was reported that the sodium hydroxide car might be damaged and leaking product.

Given the magnitude and hazardous nature of the incident, R-1 FOSC requested additional EPA resources from Atlanta. This included additional FOSCs, START, the Agency for Toxic Substances and Disease Registry (ATSDR) and a Level-A team from the U.S. Coast Guard Gulf Strike Team (GST), Mobile, AL. The initial START team arrived on scene at approximately 1100 hours. After initial set-up and calibration of equipment, START conducted Level B entries into the hotzone to monitor chlorine levels using Single Point Monitors (SPM). These entries were supported by SRSFD and decontamination facilities were provided by Hepaco.

The Sheriff requested a meeting with EPA, SCDHEC and NS officials to discuss the status of the response. It was decided that, due to the unknown conditions of the remaining hazardous materials railcars and the potential for additional chlorine releases, an evacuation order would be issued for a 1-mile radius around the derailment. This order also included a shelter-in-place for a 2-mile radius around the derailment and a curfew from 1800 to 0700 hours.

Representatives from the National Transportation Safety Board (NTSB) and Federal Bureau of Investigation (FBI) on scene requested a meeting with EPA to discuss their investigation of the accident scene. NTSB investigators indicated their desire to inspect and document evidence around the derailment including areas around the wrecked locomotives and the rail switching mechanism. During this meeting, FOSC Misenheimer told NTSB and FBI officials that the areas around the derailment were contaminated and that a release of chlorine from the holed car or one of the other chlorine rail cars could occur at any time. FOSC Misenheimer advised NTSB / FBI that any personnel working around the derailment would need to be HAZWOPER certified and have Level C and B Personal Protective Equipment (PPE). NTSB / FBI indicated that none of their personnel on scene had the appropriate training or equipment to perform

work in the hotzone. FBI decided to request assistance from the Hazardous Materials Response Unit (HMRU) in Virginia. FBI indicated that HMRU assets would arrive on scene on 7 January, to conduct investigation work for NTSB.

Norfolk Southern contractor CTEH placed Area Rae chlorine monitors around the derailed hazardous materials cars and began to collect data.

7 January, 2005

Additional EPA assets arrived on scene during the morning, including FOSCs, START responders, the Mobile Command Post (MCP) and the GST Level-A team. EPA's forward command post was set up on U.S. Highway 1 at the Honda dealership. This forward command post was co-located with the local hazardous materials response staging area. An Incident Command System was established which integrated EPA, USCG-GST, START and ATSDR assets. EPA Incident Command continued to work with State and local officials to further establish and refine a more formalized Unified Command (UC) system.

In the early morning, Norfolk Southern contractors initiated operations to remove undamaged railcars from the incident scene. This operation involved working in from both ends of the derailment towards the four hazmat rail cars. At approximately 1100 hours, Norfolk Southern contractors suspended operations at the request of the Aiken County Sheriff, in order to allow local officials to conduct search and recovery operations in the area surrounding the derailment and within the adjacent textile mill. EPA/USCG, Savannah River Site Hazmat and SCDHEC provided air monitoring support and other technical support to local officials during this operation. EPA and the Gulf Strike Team (GST) conducted several level B entries in order to monitor for chlorine levels in areas where local officials were working. During this operation, NS contractor Hepaco placed and monitored boom in Horse Creek to address concerns regarding the potential for diesel to migrate into the creek.

During the day, EPA met with officials from Norfolk Southern and their contractors (Hulcher, CTEH, Inc. and Hepaco) to discuss operational planning and coordination. A meeting schedule was set in order to plan activities on a daily basis. EPA and CTEH, Inc. representatives also discussed ways to integrate air monitoring assets into one, unified system. A web based server was created by CTEH, Inc intended for use in posting air monitoring data. In addition, EPA met with Norfolk Southern representatives and requested them to set up a check-point where all responders entering the area of the incident must check in and out. This check-point would also be used to warn responders of the latest monitoring results and current activities in the area of the incident. EPA also requested a map be prepared showing which areas required minimum Level C and minimum Level B protection to enter the area.

Norfolk Southern contractors added a lime-slurry to the incident scene area. This operation was intended to minimize chlorine releases from the soils near the damaged chlorine tanker rail cars. Norfolk Southern contractor Hepaco decontaminated 17 railcars that were previously removed from the site and transported them to Augusta, GA for further inspection and repair. EPA, START and GST conducted air monitoring and oversight to the railcar decontamination project and to the addition of the lime slurry to the incident scene area. NS initiated planning for the operation to address the four derailed hazardous materials rail cars.

8 January, 2005

Norfolk Southern once again suspended operations around the derailment scene in order for local officials to conduct final search and recovery operations around the derailment scene and in the adjacent Avondale textile mill. During this operation, EPA provided technical assistance to local officials. GVW requested EPA to conduct air monitoring at a home in which an elderly woman and her mentally handicapped son had remained since the incident on 6 January. EPA, START and GST entered the house and determined that there were no elevated levels of chlorine. Elevated levels of carbon monoxide were found, most likely due to the HVAC system. EPA, START and GST also made an entry into the woods behind the Woodhead Plant to continue to support the local search and rescue operations. EPA provided air monitoring support. GST provided health and safety support to local coroners to allow them to make an entry into the Woodhead Plant to identify and recover the remains of the last unaccounted citizen from the mill. GST also assisted local EMS and GVW in dumping coal from the boiler of the mill on Gregg St. to mitigate the fire that had started as a result of the derailment incident.

Once the search and recovery operations were suspended, NS continued application of hydro-mulching lime on the chlorine contaminated soil. NS also made preparations to transfer product from the sodium hydroxide railcar to tanker trucks and subsequently to frac tanks located at a safe working distance from the derailment. At this time, it was determined that, contrary to initial reports, no sodium hydroxide had been released. NS also began to construct the unit that would be used to remove chlorine gas from the holed car and sparge the gas into an 18% sodium hydroxide solution, thus forming bleach.

START and GST set up five Area Rae chlorine monitors and established a data monitoring center co-located with CTEH at the funeral home. This operation was conducted in Level B. A request to the EPA Environmental Response Team (ERT) for air monitoring assistance. ERT advised that additional Area Rae units would be mobilized from Las Vegas to support the EPA mission.

EPA met with NS, State and local officials to discuss the procedures to be followed by the Unified Command. It was decided that an Incident Command Post (ICP) should be established which would provide working space and meeting facilities for the UC member agencies. NS was tasked to locate a facility and provide logistical support to the ICP. EPA also issued a Notice of Federal Interest (NOFI) to Norfolk Southern to document EPA's concerns regarding the observed release of chlorine to Horse Creek and the threat of discharge of diesel fuel to Horse Creek.

9 January, 2005

EPA and START continued to operate and maintain the Area Rae chlorine monitors. An additional 11 Area Rae monitors from ERT arrived on scene along with ERT and Response Engineering Analytical Contract (REAC) personnel. EPA established locations for the additional monitors and conducted Level B entries into the exclusion zone in order to set up the monitors. Repeater towers were also set up to improve communications between the Area Raes and the data monitoring center.

Norfolk Southern completed transfer of product from the derailed sodium hydroxide car. NS also applied the temporary patch to the holed chorine car and began the process of removing chlorine product and sparging through sodium hydroxide to produce bleach. GST conducted air monitoring during this operation and conducted oversight of all operations. NS also began to fabricate a permanent lead patch to place onto the holed car. NS made preparations to transfer chlorine from the two full and intact rail cars.

Members of the BellSouth hazmat team (Saber Team) arrived on site to investigate their phone line terminus located near the crash site. They were concerned about potential damage to their equipment which might compromise the 911 system. The Saber Team conducted an entry and found no evidence of corrosion or damage to the system.

The Unified Command Incident Command Post (ICP) was established at the old antique mall on U.S. Highway 1, Aiken. Members of all agencies represented in the Unified Command dispatched personnel to man the ICP for shifts covering 24 hours a day.

10 January, 2005

EPA, GST, START and CTEH continued maintenance of the Area Rae network. Operation and maintenance on the Area Raes continued throughout the day. The highest chlorine reading recorded was 1.4 ppm in the park next to the derailment.

DHEC continued the investigation of streams and water bodies near the derailment. A fish kill was reported in Langley Pond. It was determined that the fish may have washed down stream into Langley Pond from Horse Creek. DHEC arranged for Natural Resource personnel to further investigate the reported fish kill.

Norfolk Southern moved the empty sodium hydroxide car away from the derailment scene. NS also set up and began to transfer chlorine product from the northern most rail car. NS continued to sparge chlorine from the holed chlorine car. NS decided to not use a lead permanent patch, but rather fabricate a steel patch to place on the holed car. Work was initiated to fabricate the steel permanent patch. GST provided oversight of NS activities.

ATSDR, CTEH, NS, DHEC and EPA set up a work group to begin working on a residential reoccupation plan for implementation at the time the evacuation was lifted. The group decided to produce a fact sheet that would be distributed to the public when they returned to their homes. The fact sheet would describe precautions that residents needed to take as well as address concerns regarding the effects that the chlorine may have had on the environment.

The Bell South Saber Team continued to investigate the central switching office located approximately 200 yards from the derailment scene. NTSB entered the exclusion area to investigate the locomotives involved in the accident.

11 January, 2005

EPA continued operation and maintenance of the Area Rae chlorine air monitoring network. During this period, 25 Area Raes were deployed and operational; 12 from EPA-ERT, 4 from the USCG and 9 from NS contractor CTEH. Two detections of chlorine were noted including a concentration of 1.9 ppm near the derailment site and 1.0 ppm near the Woodhead plant.

EPA, GST, Norfolk Southern contractors and a Gregg Plant representative made entries into the Gregg Finishing Plant. Multiple buildings on site were entered with no detections noted on chlorine specific monitoring equipment

Norfolk Southern completed the liquid transfer from the first full chlorine car (northernmost). NS then began the process of evacuating chlorine vapors from the car. NS setup and began liquid transfer from the second chlorine tank (railcar No. GATX 17105). Norfolk Southern continued to sparge chlorine gas from the holed tank car into the sodium hydroxide solution. NS contractors continued fabrication and modification of the steel patch.

South Carolina Department of Natural Resources continued to investigate the fish kill on Langley Pond. At least 250 dead fish were observed and an enumeration study was scheduled.

NS, CTEH, DHEC, EPA and ATSDR continued to develop a residential reoccupation strategy.

12 January, 2005

EPA continued operation and maintenance of the Area Rae chlorine air monitoring network. On 12 January, 25 Area Raes were operational; 12 from EPA-ERT, 4 from the USCG and 9 from NS contractor CTEH. There were four detections of chlorine during this operational period. A chlorine concentration of 1.4 ppm was detected near the derailment site and 0.1 ppm was detected approximately 500-yards upwind on three occasions during the operational period.

Norfolk Southern contractors set up and completed the liquid transfer from the second chlorine car. NS contractor continued to sparge chlorine gas from the holed tank car into sodium hydroxide. NS contractors applied the steel permanent patch on the holed chlorine car.

GST escorted State Senator Tom Moore and ten Avondale Mill officials on a perimeter reconnaissance of the Gregg Plant to locate temporary storage locations for equipment. GST also assisted the United States Postal Services HAZMAT team with an entry to the Graniteville Post Office to assess facility conditions and equipment. EPA and GST teams also assessed air quality at the Valley Fair Church. No chlorine levels were detected; however the teams were unable to access the basement.

After coordination with the Aiken County School Board, EPA and GST conducted entries into Byrd Elementary School and Leveille McCampbell Middle School. The entry team monitored air quality and tested surfaces for pH. No chlorine detections or abnormal pH readings were found. The teams also assessed busses at Byrd Elementary.

ATSDR, CTEH, Norfolk Southern, EPA and DHEC completed the reoccupation fact sheet and distributed it to the public at 1900 hours. The fact sheet described the precautions residents needed to take upon reentering their homes and businesses as well as explained the impacts of chlorine in the environment. In addition, this work group began to develop procedures for sampling homes during the re-occupation process. EPA began to mobilize personnel and equipment to support sampling efforts including an ERT member to support data management. In addition, EPA mobilized a Safety Officer to the scene to help overall coordination of safety issues for hotzone work and for the re-occupation operation. CTEH provided a plume model for a potential worst-case chlorine release from the patched chlorine car. The model output indicated that such a release would adversely impact at a distance of approximately 600 yards from the derailment location. This information was used to help plan staggered reoccupation zones.

South Carolina Department of Natural Resources completed an enumeration study of the fish kill at Langley Pond. Subsequently, NS contractors began clean-up of the fish carcasses.

An EPA veterinarian mobilized to the site to assist local animal control officials with animal care issues in both the exclusion zone and evacuated areas.

13 January, 2005

EPA and START continued operation and maintenance of the Area-RAE chlorine air monitoring network. At approximately 1430 hours, a detection of 0.7 ppm (10 second spike) chlorine was reported from a Norfolk Southern (NS) contractor CTEH Area-RAE located adjacent to the vapor transfer process. At 1500, NS discovered a potential crack in the vapor transfer line. Hotzone operations were halted and the personnel were evacuated. NS contractor completed a Level B entry to assess the patch. An additional chlorine reading of 30 ppm was detected several feet from the sparge car. No elevated chlorine concentrations were detected on the downwind Area-RAEs. Major operations were limited for the afternoon/evening. Also, an EPA Area-RAE unit located downwind from the wreck site detected 0.1 ppm immediately after the release noted above. Later in the evening, two elevated chlorine detections were observed on a CTEH monitor located adjacent to the sparge car. Levels of 3.3 ppm and 2.5 ppm were detected. After investigation, NS determined that there was a leaking gasket in the chlorine vapor recovery system. NS contractors repaired the gasket. Due to inclement weather, EPA removed Area-RAEs from outside locations during this operational period.

Norfolk Southern contractors loaded the empty chlorine railcars and sodium hydroxide railcar onto flatcars for transport to Augusta. In addition, all but 3 of the remaining railcars (non-HAZMAT) were loaded onto flatcars. NS contractor began loading Kaolin (clay) into roll-off boxes for disposal. NS contractor continued to sparge chlorine gas from the holed tank car into sodium hydroxide.

EPA, GST and START provided additional assistance to local officials in monitoring and evaluating conditions in buildings impacted by the chlorine release. EPA coordinated with Avondale Mill officials to access locked areas of the Gregg Plant. One entry was conducted to recover a computer processing unit which contained critical information to support the re-start process for the Avondale Mill. During this entry, no elevated chlorine levels were detected. GST also conducted air monitoring and pH testing at the Graniteville-Vaucluse-Warrenville Fire Station. No elevated or abnormal reading was detected.

Aiken County Sheriff's Office lifted the evacuation in several areas including Zone 1: neighborhoods around Laurel and Trolley Line Road, Zone 2: Warrenville area south of U.S.1 and Zone 3: subdivisions west of Ergle St. SC DHEC, CTEH, and EPA coordinated with the Aiken County Sheriff's Office to assist residents with reoccupation. Reentry/decontamination fact sheets describing the precautions residents should take upon reentering their homes and businesses were distributed to residents upon reentry. The fact sheets were also posted in visible areas throughout the community (i.e., gas stations). Index cards were also provided to residents to post on their front doors to request reoccupation sampling. EPA and CTEH sampling teams deployed to the reoccupied areas to provide home re-occupation sampling to those residents who desired that their homes be tested. For each home visited, the teams collected air monitoring readings for chlorine and hydrochloric acid in the lower levels of the residence. Wipe samples were also collected from non-porous surfaces and tested for pH. All sampling results were recorded on data sheets and returned to CTEH for data management. Each residence that was sampled received a statement from EPA, DHEC, CTEH, ATSDR and NS that cleared the building for reoccupation. Approximately 2,000 residents returned to their homes and 200 homes/businesses were sampled with no elevated air monitoring or pH levels reported.

The EPA Safety Officer began to coordinate with Norfolk Southern to revise site specific health and safety guidelines for on-site personnel. EPA ERT veterinarian continued to coordinate and assist local animal control officials with the handling of animal related issues.

14 January, 2005

EPA and START continued operation and maintenance of the Area-RAE chlorine air monitoring network. EPA contractors continued to reconfigure the air monitoring network as the evacuations were lifted. EPA and NS met to discuss the evacuation and exclusion zone, which was set as a 500 yard radius around the chlorine operations. An amendment was made to the health and safety protocols to account for access control and emergency egress within the 500 yard evacuation zone.

Norfolk Southern contractors continued to remove chlorine from the holed chlorine tank car and produce bleach. The process rate encountered was estimated at about ½ ton per day. Fourteen loads of contaminated soil were loaded for offsite shipment. Approximately 9,000 gallons of bleach (produced from the chlorine offloading operation) were loaded and prepared for transport offsite by truck. Preparations were made for removing the three locomotives from the site. GST provided oversight

of NS activities.

EPA and GST completed monitoring of seven buildings in Graniteville. Monitoring consisted of chlorine gas monitoring throughout the buildings (except for confined space areas) and pH sampling of surfaces. The following Avondale facilities were completed: Gregg Building, Purchasing, Plant Services, Gregg Filter Plant, Granite Building, Administration, Engineering. In addition, the Friedman School (all buildings) was completed. The EPA entry teams reported no elevated detections of chlorine and no unusual pH readings. Norfolk Southern sampling teams monitored the Avondale Mills buildings within the immediate plume impact area. Several of these buildings (Hickman, Woodhead, IT) had evidence of surface corrosion and low pH levels, but no residual chlorine levels.

The Aiken County Sheriff's Office, after consultation with other agencies, lifted the evacuation in Zone 4, which was the area extending from the southern edge of the 500 yard radius around the incident to U.S. 1 and extending west beyond Canal Street and east to the one mile radius. Residential reoccupation continued in the Zones 1, 2 and 3. EPA and CTEH personnel continued to conduct reoccupation sampling in homes and businesses as requested. Approximately 300 homes and businesses were sampled. No elevated air monitoring or pH levels were detected. As of 14 January, approximately 4,200 residents had been allowed to return to their homes.

The EPA veterinarian completed coordination and assistance to local animal control officials in regards to animal issues. EPA OSC Smith mobilized to the site and assumed the role of Incident Commander.

15 January, 2005

EPA and START continued operation and maintenance of the Area-RAE chlorine air monitoring network until 12:00 hours. At that time, after consultation with CTEH and review of their monitoring network, the EPA Area-RAE network was decommissioned. After the EPA network was taken offline, EPA continued oversight and data review of the eleven CTEH Area-RAE monitors that were in place in and around the 500 yard evacuation zone.

Norfolk Southern contractors continued to remove chlorine from the holed chlorine tank car and produce bleach. NS also removed 16 loads of diesel contaminated soil from the site and removed the three wrecked locomotives. GST provided oversight of NS operations.

EPA and GST completed monitoring of three buildings in Graniteville. Monitoring consisted of chlorine gas monitoring throughout the buildings (except for confined space areas) and pH sampling of surfaces. The following Avondale facilities were completed: Woodhead, Hickman Hall, Hickman plant, and Whitehall. The EPA entry teams reported no elevated detections of chlorine and no unusual pH readings.

Residential reoccupation continued in the Zones 1, 2, 3 and 4. EPA and CTEH personnel continued to conduct reoccupation sampling in homes and businesses as requested. Approximately 75 homes and businesses were sampled. No elevated air monitoring or pH levels were detected.

EPA began to demobilize personnel and equipment from the incident site. All REAC and ATSDR resources demobilized on 15 January.

16 January, 2005

EPA and START conducted oversight and data review of the eleven CTEH Area-RAE monitors placed in and around the 500 yard evacuation zone.

Norfolk Southern contractors continued to remove chlorine from the holed chlorine tank car and produce bleach. The rate of removal of chlorine varied from less than ½ ton per day to more than 2 tons per day. GST provided oversight of NS operations.

EPA and GST continued to monitor buildings in the Graniteville area. The First Baptist Church, parsonage, and the Williams building were completed, along with the bank, hardware store, and Magistrate's office in the Masonic Shopping Center. The EPA entry teams reported no elevated detections of chlorine and no unusual pH readings.

The evacuation was lifted in Zone 5 and residents were allowed to return to their homes in this area. Zone 5 was defined as the area east of Gregg Street extending to Aiken Street and Bethlehem Circle. Residential reoccupation continued in the Zones 1, 2, 3 and 4. Approximately 4,500 residents have returned to their homes with approximately 900 still evacuated. EPA and CTEH personnel continued

to conduct reoccupation sampling in homes and businesses as requested. Approximately 30 homes and businesses were sampled. No elevated air monitoring or pH levels were detected.

EPA continued to demobilize personnel and equipment and reorganized on scene assets to meet the decreasing scale of the response. All EPA personnel associated with the residential reoccupation were demobilized. DHEC committed to provide resources to assist CTEH with the remaining residential sampling effort.

17 January, 2005

EPA and START conducted oversight and data review of the eleven CTEH Area-RAE monitors placed in and around the 500 yard evacuation zone.

Norfolk Southern contractors continued to remove chlorine from the holed chlorine tank car. EPA met with Norfolk Southern and their contractor, Hulcher, to discuss the chlorine vapor transfer process (sparging). Hulcher indicated that the sparging operation was running at an optimal rate. To reach the optimal rate, heat was applied to the tank car in 2 ways: heating the sweep gas (air) and heating the outside of the car. The sweep gas was heated to approximately 90°F, and the skin of the car to approximately 85 °F. As the sweep gas was removed from the rail car it was neutralized utilizing sodium hydroxide. At these temperatures, the removal rate was estimated at 2 tons of chlorine every 2-4 hours. Thermal images of the tank car indicated that approximately 9-inches of chlorine remained.

EPA and GST continued to monitor buildings in the Graniteville area. The entry teams completed monitoring of the Studio 7 hair salon located in Graniteville Shopping Center. Monitoring consisted of chlorine gas monitoring throughout the salon and pH sampling of surfaces. The entry team reported no elevated detections of chlorine and no unusual pH readings.

The evacuation was lifted in Zone 6 and residents were allowed to return to their homes in this area. Zone 6 included the two blocks of Montgomery Street and Cottage Street east of Trolley Line Road, which had not been previously opened. Residential reoccupation continued in the Zones 1, 2, 3, 4 and 5. DHEC and CTEH personnel continued to conduct reoccupation sampling in homes and businesses as requested. During reoccupation sampling at the Village Restaurant on Church Street, near Aiken Street (southeast of the wreck site), a sampling team detected a chlorine concentration of 0.1 ppm. The detection was confirmed by a second instrument. The owner informed DHEC that Clorox was used to clean the kitchen; therefore teams turned on an oven hood for approximately 10 minutes. Subsequent readings were 0.0 ppm for chlorine. The 0.1 ppm detection was attributed to the cleaning products and not incident related. Three areas remained evacuated: Seastrunk Street to Gentry Street; Gentry Street to Aiken Street; and Cottage Street to Aiken Street. The Aiken County Building Inspector advised that mandatory home inspections and sampling would be required prior to reoccupation of these areas.

EPA continued to demobilize personnel and equipment and reorganized on scene assets to meet the decreasing scale of the response.

18 January, 2005

EPA and START conducted oversight and data review of the eleven CTEH Area-RAE monitors placed in and around the 500 yard evacuation zone.

At approximately 0100 hours on 19 January, NS completed the chlorine transfer process from the holed rail car. NS then began the process of purging the holed car. GST provided oversight of NS activities.

EPA and GST continued to monitor buildings in the Graniteville area. The entry teams completed monitoring of the Family Medical Center located on Hickman Street. This facility is located near the epicenter of the chlorine release. Monitoring consisted of chlorine gas monitoring throughout the building and pH sampling of surfaces. The entry team reported no elevated detections of chlorine and no unusual pH readings. The entry team did report signs of corrosion on some of the metal instruments.

Aiken County Sheriff, DHEC and CTEH continued to coordinate the reoccupation of residents and arrange for home sampling. To date, approximately 750 homes and businesses have been assessed and cleared for reoccupation. CTEH and EPA continued to maintain a database of homes which have been assessed. The evacuation was lifted for all areas except for a 150 yard radius around the derailment site. An estimated 75 homes remained evacuated in this area. These homes require mandatory sampling per order of the Aiken County Building Inspector.

19 January, 2005

At approximately 1500 hours on 19 January 2005, NS completed the process of purging the holed chlorine rail car. Air monitoring readings of 0.0 ppm were detected at manifolds leading into the rail car. A hole was cut in the tank to allow Norfolk Southern contractors to pressure wash the railcar. NS made plans to load the tank car onto a flatcar for transportation to Augusta, GA and on to Altoona, PA where it would be impounded, subject to further investigation by NTSB. Prior to the completion of the chlorine transfer, EPA and GST provided oversight of Norfolk Southern contractors during all off-loading operations.

EPA facilitated the final meeting of the Unified Command at 1500 hours to discuss the reoccupation of the 150 yard radius zone around the derailment. Approximately 40-50 homes in this area required sampling prior to reoccupation. Aiken County Building Inspector and the Sheriff's Office agreed to coordinate the sampling of these homes with DHEC and CTEH. Once this was completed, then all road blocks and curfews would be lifted.

EPA began to demobilize all personnel and equipment from the site including START and GST resources. One ERT and one START remained on site to continue to manage and organize data and information. EPA met with DHEC and transitioned all environmental assessment and monitoring of Norfolk Southern to DHEC staff.

Next Steps

EPA will continue to compile and organize air monitoring data and maintain communications with Norfolk Southern and DHEC

response.epa.gov/NSGranitevilleDerailment