

EMERGENCY RESPONSE REVIEW

Union Pacific / Burlington Northern Train
Derailment, Macdona, Texas

FINAL REPORT :: AUGUST 18, 2004



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The Environmental Protection Agency (EPA) Region 6 is issuing this Emergency Response Review as part of its ongoing effort to protect human health and the environment by responding effectively to chemical accidents.

Emergency Response Reviews are designed to:

- Review with a local community and state officials the response procedures and outcomes to a specific chemical accident, affecting that community;
- Share information about chemical response safety practices;
- Develop potential recommendations and lessons learned to more effectively respond to an accidental release in the future;
- Build cooperation among local, state, and federal government agencies.

Emergency Response Reviews are entirely voluntary and may include all local, state, and federal entities involved with the response, as well as the responsible party and their representatives.

This document does not substitute for EPA's regulations, nor is it a regulation itself. It cannot impose legally binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based upon circumstances. This guidance does not represent final agency action, and may change in the future, as appropriate.

SUMMARY OF INCIDENT

On Monday, June 28, 2004, at approximately 5:03 a.m., a west-bound Union Pacific train struck an east-bound Burlington Northern train near Macdona, Texas, in southwest Bexar County. The National Transportation Safety Board (NTSB) is currently investigating the underlying cause of the incident, which is not addressed within this report.

The collision resulted in the derailment of four (4) locomotives and 35 railcars. In addition to a small fire involving spilled fuel, a breached 90-ton chlorine car released approximately 60 tons (120,000 pounds). Secondary releases included nitrogen fertilizer solution and the diesel fuel.

As confirmed by the Bexar County Medical Examiner, the chlorine release resulted in three fatalities (two civilians residing approximately 105 yards from the chlorine release point, and the conductor of the Union Pacific train).

According to NTSB records, 43 other personnel, including residents, the UP Engineer and response personnel were transported and examined and/or admitted to local hospitals for treatment.

Additional information regarding the response may be found at <http://www.epaosc.net/macdonatrainderailment>.

Responding personnel included the following organizations:

- Southwest Volunteer Fire Department
- Jarrett Volunteer Fire Department
- Sandy Oaks Volunteer Fire Department
- Geronimo Volunteer Fire Department
- Universal City Fire Department
- San Antonio Fire / Police Department
- Bexar County Sheriff Department
- Bexar County Emergency Management / Fire Marshal Office
- Texas Commission of Environmental Quality
- U.S. Environmental Protection Agency
 - EPA - START: Weston Solutions
- Union Pacific Railroad
 - Hulcher Environmental
 - Eagle Environmental Services
 - Specialized Response Solutions
 - Center for Toxicology and Environmental Health

Response operations included:

- Initial entries into the area for rescue and recovery
- Evacuation / Shelter-in-Place
- Establishment of a unified command structure through Incident Command System to manage the response
- Establishing a network of continuous air monitoring for chlorine
- Stopping of the chlorine release from the rail car (through plugging and patching), and stabilization of the car
- Lime neutralization of hydrochloric acid formed during the chlorine release
- Recovery of free diesel fuel spilled during the accident
- Eventual relocation of the rail car to continue rail traffic upon completion of track repair
- Clearance sampling of displaced residences to be able to re-enter homes.
- Offloading of chlorine into frac-tanks, and reaction with sodium hydroxide to produce liquid sodium hypochlorite (bleach), which was transported to an OxyChem facility for further processing
- Continued priority for health and safety of all field personnel during the response.

On July 16, EPA Region 6 invited state and local organizations involved in the response to come together as a group and discuss the strengths and key issues surrounding the response. This report is a result of that meeting. A list of attendees is attached to this report.

OBSERVATIONS / RECOMMENDATIONS

<p>Observation # 1</p>	<p>EPA Region 6 commends the tremendous effort carried out by all response organizations referenced above during the response effort.</p> <p>Throughout the response, numerous local responders displayed bravery and professionalism in their efforts, as well as a sincere effort to assist trapped and wounded citizens.</p>
<p>Recommendation # 1</p>	<p>All local response organizations should review their response protocols based on the following:</p> <p>“Response teams to a disaster scene have a responsibility to first protect themselves and their team members. If you or your team is injured, not only the number of victims is increased, but the response is now delayed, resulting in additional resource utilization. This delay and need for additional resources due to your inability to keep yourself and your team protected could cost other victims their lives.</p> <p style="text-align: center;">DISASTER Paradigm: Safety and Security</p> <p>Don't be selfish - protect yourself. Scene priorities:</p> <ul style="list-style-type: none"> ● Protect yourself and your team members first ● Protect the public ● Protect the patients ● Protect the environment <p>Once your team has safely entered the scene, focus on protecting the public ...” <u>"Basic Disaster Life Support Manual, Version 2.5"</u></p> <p>A first responder's first duty at any incident is safety. This issue is always paramount. When a responder is injured, they become part of the problem, instead of a solution to the problem. Never should any responder unnecessarily risk their lives. Individuals become emergency responders to help other individuals and their communities, safely and efficiently.</p> <p>All response entities within Bexar County should continue to provide mutual aid, as appropriate, in a cooperative spirit that ensures a successful response to incidents anywhere within Bexar County.</p>
<p>Observation # 2</p>	<p>Various response agencies within the Bexar County area documented different times for response activities</p>
<p>Recommendation # 2</p>	<p>All local response organizations should review and adopt a method to synchronize time lines to ensure consistency in documentation during a response</p>

<p>Observation # 3</p>	<p>There were several instances where individuals missed verbal and visual indicators of a potential hazardous materials presence. Examples of these indicators would be:</p> <ul style="list-style-type: none"> ● Various callers to 911 mentioned “train derailment” or “train wreck.” However the dispatcher(s) apparently only picked up on the words “smoke” and “difficulty breathing.” ● The Union Pacific Railroad notified the Sheriff’s Dispatcher of a possible train incident at 5:12 a.m. before responders arrived on the scene at 5:15 a.m. ● Responding Fire and Law Enforcement Units reported driving into a “yellow cloud” of an “unknown substance.” ● Personnel from the Southwest Volunteer Fire Department found the train engineer and transported him, in the command vehicle, to the fire station for decontamination. ● First responders and HAZMAT team members make entries into the contaminated area and are unable to safely return to the warm zone due to the distance required for travel. ● Personal protective equipment is removed in the hot zone without adequate monitoring data and / or because of heat stress and depletion of supplied air.
<p>Recommendation # 3</p>	<p>All response organizations within Bexar County should review their hazardous materials training programs, and determine need for further training for all personnel to ensure the safety of all responders, as well as the awareness and recognition of hazardous conditions.</p> <ul style="list-style-type: none"> ● Occupational Safety & Health Administration (OSHA) 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER) ● OSHA 29CFR 1910.134, Respiratory Protection (Commonly referred to in the fire service as the Two In/Two Out Rule) ● Environmental Protection Agency (EPA) 40 CFR 311, Worker Protection ● National Fire Protection Association (NFPA) 471, Recommended Practice For Responding to Hazardous Materials Incidents ● NFPA 472, Professional Competence of Responders to Hazardous Materials Incidents ● NFPA 473, Competencies for Emergency Medical Personnel Responding to Hazardous Materials Incidents ● NFPA 1500, Standard on Fire Department Occupational Safety and Health Program ● NFPA 1561, Standard on Emergency Services Incident Management Systems ● NFPA 1994, Protective Ensembles for Hazardous Materials Emergencies ● NFPA 1720, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments.

<p>Observation # 4</p>	<p>Concerns have been voiced regarding time required by responding agencies to enter the immediate affected area</p> <p>Southwest Volunteer Fire Department initially responded to “medical emergency” based on 911 information, and was not aware of the train derailment and the magnitude of the emergency until arrival on scene and exposure to chlorine.</p> <p>Conditions of Response:</p> <ul style="list-style-type: none"> ● Dark, early morning / nighttime environment ● Overwhelming concentration of chlorine gas in ambient environment <ul style="list-style-type: none"> ● Models run after the incident to determine potential concentration levels indicate that the ambient air immediately around the derailment site may have reached 400,000 parts per million (ppm) of chlorine gas within a few minutes. For perspective, the Immediately Dangerous to Life and Health threshold for chlorine is 20 ppm, and levels of 450 ppm and above are considered lethal. ● The derailment blocked access to residences from the main road. Exit and access to the rear was blocked by a flooded river. ● Travel time / distance required for entry teams likely exceeded available air supplies carried by responders. <p>Based on these conditions, immediate rescue of residents by Southwest VFD was unfeasible and would have put initial responders in an extremely unsafe environment, compromising their health and safety.</p> <p>Additionally, the lack of warning time and the overwhelming concentration of chlorine in the affected area implies that any potential actions communicated to the two closest residents (Ms. Hale and Ms. Koerber) by the 911 Center could not affect the outcome for those individuals.</p>
<p>Observation # 5</p>	<p>Questions were raised on the correct procedure for requesting assistance (either by local/State/Federal organization) from the TCEQ Strike Team during a major response</p>
<p>Recommendation # 5</p>	<p>Local response entities should make the request to the Director of the TCEQ Regional Office of the affected area. That request will then be forwarded to the Director of the Field Operations Division (FOD), TCEQ, Central Office, Austin.</p> <p>EPA staff should make all request for the TCEQ Strike Team through the Director of the Field Operations Division (FOD) or the Program Manger, Waste and Emergency Response, FOD TCEQ, Central Office, Austin.</p> <p>All deployments of the TCEQ Strike Team are approved by the Director of the FOD or the Program Manger, Waste and Emergency Response, FOD</p>
<p>Observation # 6</p>	<p>Teams entering the hotzone had difficulties accessing residences due to high security fences, locked gates, etc.</p>
<p>Recommendation # 6</p>	<p>Initial entry teams may need to carry tools to gain forced entry (bolt cutters, etc.)</p>

<p>Observation # 7</p>	<p>San Antonio Fire Department was asked to respond under mutual aid and arrived on-scene at 0615 hours.</p> <p>Before making the first entry, San Antonio must complete several procedures to ensure a safe entry, including:</p> <ul style="list-style-type: none"> ● Attempt to identify chemical released <ul style="list-style-type: none"> ● hazards of chemical ● amount being released ● impact area of release ● Location of, and route to potential victims ● Perimeter monitoring to determine “hotzone” ● Medical monitoring of entering personnel ● Safety meeting to discuss potential hazards faced by entry personnel ● Tactical strategies of entry (objectives, outcomes) ● Establishment of decontamination station ● Preparation of backup team
<p>Recommendation # 7</p>	<p>San Antonio should review their entry procedures, and work with other hazardous materials teams in the State, to identify opportunities to streamline procedures without sacrificing safety of the teams.</p>
<p>Observation # 8</p>	<p>Potentially key information (i.e., alternate entry routes into the area) collected during the initial portion of the response by various entities under Mutual Aid agreements was not readily acted upon, or was disregarded.</p> <p>Responding agencies need to have confidence in each others abilities and training for these agreements to work.</p>
<p>Recommendation # 8</p>	<p>All information collected and disseminated by responders can be valuable. Responding organizations need to ensure that information passed on is evaluated and acted upon, as appropriate.</p> <p>Mutual Aid Agreements be reviewed and updated, Joint Standard Operating Procedures should be developed for the all responding agencies, and joint training between the responding organizations conducted to raise levels of confidence.</p>
<p>Observation # 9</p>	<p>Initial responding organizations could not easily identify the cargo or the released material, since the manifest for the Union Pacific train was not readily available, and the engineer / conductor were not able to provide information due to injuries received.</p>
<p>Recommendation # 9</p>	<p>911 Dispatcher should have the ability to contact the railroad’s response center hot line to obtain a list of materials carried on a specific shipment. This will assist responders in determining appropriate entry strategies and PPE.</p>

Observation # 10	Discussions with various response officials indicate there may have been some confusion concerning the structure and implementation of the initial Incident Command / Unified Command
Recommendation # 10	<p>As various elements are integrated into the response, Unified Command should ensure those elements are aware of the need for them to function within the Unified Command, and their role within Unified Command.</p> <p>All emergency responders should be familiar with procedures on how to use an incident management system. Initial or additional training should be provided for all law enforcement, EMS, and fire personnel on Incident Command / Unified Command. This would help to reduce communication problems with other responding agencies, both State and Federal, eliminates duplication of efforts and help to reduce confusion at the incident.</p> <p>Response entities must provide collected information to Unified Command (i.e., air monitoring results, sampling results, plume models, maps, etc.) in a timely manner.</p> <p>All State and local organizations are required to adopt the newly developed National Incident Management System (NIMS) to receive federal preparedness assistance. All response organizations within Bexar County should strive to make this an accepted practice throughout the County.</p> <p>In a large incident of this type, once an initial Incident Commander is identified and established, he or she should stay at the established Command Post and manage the activities of the response. This is particularly important during the initial response activities, when command structure is still evolving and conditions are unstable.</p> <p>It is recognized that in such a situation as this event, all responders feel a need to respond and actively participate in the entry to attempt to assist victims. However, an established command system must be followed. If not, confusion over command structure can occur.</p>
Observation # 11	During the second day of the response, lime was applied to neutralize the hydrochloric acid formed during the release. Use of dry lime, and an incident during the application, resulted in a large cloud which was perceived by the community as another hazardous chemical release, resulting in additional community concern.
Recommendation # 11	Personnel at the Operations level should ensure that appropriate community notification occurs before any action is initiated that may result in community concerns.
Observation # 12	Southwest Volunteer Fire Department transported the rail engineer to their station without first decontaminating him.
Recommendation # 12	Southwest VFD should review their response procedures, specifically decontamination procedures of victims, to ensure that transport does not unnecessarily expose response personnel, equipment, and transport vehicles to contamination from the victim.

Observation # 13	Reports indicated initial confusion from various elements of the response on the identity and role of the Public Information Officer during the first day of the response. The San Antonio Fire Department supplied a PIO during the first day. Once Unified Command was established, the PIO was established through the Bexar County Emergency Management Office.
Recommendation # 13	Once Unified Command establishes a Public Information Officer, ensure that person is identified to all elements of the response, including the media, role of that position, and information flow through that position. San Antonio Fire Department should review procedures to ensure that the appointed PIO understand the need to coordinate all activities with the Unified Command, as the Bexar County PIO did.
Observation # 14	Volunteer Fire Departments all asked for future “hands-on” training with railroad officials on specific response strategies and techniques for train derailments and hazardous materials releases.
Recommendation # 14	Union Pacific should work with other rail companies to participate in such training for local responders within Bexar County, as requested. The Bexar County LEPC had already scheduled three days of training and drill on chlorine rail cars prior to the derailment with Union Pacific response personnel.
Observation # 15	Blockage of access and egress routes by responders / residents by the derailed trains hampered or precluded the response and potential evacuation by the residents.
Recommendation # 15	Bexar County and incorporated Cities should coordinate with Union Pacific and other rail companies operating in Bexar County to assess lines throughout the County, to identify other areas where a similar blockage may occur in a neighborhood or area during a derailment.

<p>Observation # 16</p>	<ul style="list-style-type: none"> (a) Radio traffic between 911 and responding organizations was not recorded, reportedly due to a malfunction of a newly installed monitoring system. The system failed on June 25. This was not discovered and corrected until June 28, creating data gaps in the record of this response. (b) Incident Commander requested an emergency notification at approximately 0715 hours on June 28. Within the 911 communications center, it was determined the number of houses covered by the notification, based on plume modeling of the chlorine release, was approximately 57,000 and the phone notifications would take an onerous amount of time (approximately 8 hours). The decision not to go forward with the alert was never relayed back to the Incident Commander, who continued to operate under the assumption that the notification was in progress. (c) Conflicting safety actions were advised to the trapped residents by 911 staff. Some were told to stay inside, while others were told to evacuate the house). No evidence of rationale on these recommendations was offered by 911. (d) Specific information gathered within the 911 Center was not passed on to the Command Post / Incident Commander in a timely manner. For example, that additional 911 calls were received that were potentially related to initial calls. (e) 911 Center did not attempt to re-contact the Hale/Koerber residence for follow-up on condition of residents or to revise advised actions for them. (f) The Hale family has expressed concerns regarding information provided to them during the incident. (g) 911 Center advised some residents over the phone to shelter-in-place, without providing them with specific instructions on how to accomplish this.
<p>Recommendation # 16</p>	<ul style="list-style-type: none"> (a) 911 Center should ensure primary backup recording systems be self monitoring and able to reliably alert on-site staff when malfunction occurs. (b) Requests by Incident Commander not completed for any reason must be relayed back to the Incident Commander immediately and clearly. (c) 911 Center should investigate the feasibility of providing hazardous materials awareness training to 911 operators, which may help in their identification of situations called in. If dispatchers had been able to recognize this as a hazardous materials incident, it is likely that responder injuries could have been reduced. (d) 911 Center should review procedures to ensure that all critical information (i.e., additional 911 calls) gathered be passed to the Command Post / Incident Commander in a timely manner. (e) 911 Center should review follow-up procedures, as appropriate. (f) 911 Center should review procedures for providing response information to those directly affected during an emergency (i.e., realistic situation reports, not raise “false hopes” of response activities, etc.) (g) 911 Center should develop a checklist / standard operating procedures that the dispatcher could use to assist the residents on how to shelter in place.

Overall, the response efforts by all parties (local, state, and the responsible party) are to be commended. Region 6 EPA hopes the above recommendations can be used to improve the response and preparedness readiness of the community, if a future emergency occurs.

Emergency Response Review (July 16, 2004) Attendees

1. Pat Fontenot, TCEQ Austin
2. Cameron Lopez, TCEQ Region 13
3. Jeff Lewellin, TCEQ Strike Team Region 14
4. Robert Reed, TCEQ Strike Team Region 13
5. Kelly Crunk, TCEQ Strike Team Region 13
6. Don Naylor, TCEQ Strike Team Region 9
7. Jim Carlisle, TCEQ Strike Team Region 13
8. Henny Karnei, TCEQ Region 13
9. Craig Meppen, TCEQ Region 13
10. Scott Harris, EPA Region 6
11. Luke Gatlin, EPA START - Weston Solutions
12. Lori Wooten, TCEQ Strike Team Region 14
13. Glenn Thomas, Union Pacific Railroad
14. John Martin, EPA Region 6
15. Darrell Scraper, Fire Chief, Southwest VFD
16. Stephen Gladstone, Regional Liaison Officer, TX DEM
17. Mike Goldsworthy, DHS/FEMA Region 6
18. Scott Lampright, Bexar County Fire Marshal Office / Emergency Management
19. Carl Mixon, Bexar County Fire Marshal Office / Emergency Management
20. Rodney Hitzfelder, Chief, San Antonio FD
21. Jennifer Peters, EPA START - Weston Solutions
22. Steve Mason, EPA Region 6
23. Patrick Lewis, Universal City FD
24. Douglas Alejandro, Assistant Chief, Sandy Oaks VFD
25. Charles Metzger, Chief, Sandy Oaks VFD
26. Geoffrey Reeder, Union Pacific Railroad
27. Tim O'Brien, Union Pacific Railroad
28. R.V. Lujan, Captain, Bexar County Sheriff Office
29. Robert Adelman, Bexar County Dispatch Supervisor
30. Don Gordon, Bexar County Emergency Medical Services
31. David Martinez, Assistant Chief, San Antonio FD