

Miamisburg, Ohio Train Derailment

The National Hazardous Materials Fusion Center offers *Hazmat History* as an avenue for responders to learn from the past and apply those lessons learned to future incidents for a more successful outcome. This coincides with the overarching mission of the Fusion Center – to improve hazmat responder safety and enhance the decision-making process during pre-planning and mitigation of hazmat incidents.

Incident Details:

Location and Date

Miamisburg, OH July 8, 1986

Hazardous Material Involved

Phosphorus, (Yellow)

Type (mode of transportation, fixed facility)

Rail

Overview

On July 8, 1986 at 4:25 pm, a southbound Baltimore and Ohio Railroad Company (B&O) freight train Southland Flyer (SLFR) derailed. The train consisted of a locomotive and 44 cars traveling over the bridge spanning Bear Creek near Miamisburg, Ohio. The train was traveling at 72 km/h (45 mph), was equipped with an 'end-of-train' monitoring device and four crewmembers were in the locomotive. Fifteen of the 44 cars derailed. Three tanks cars breached and lost some or all of their contents. Within minutes, large plumes of smoke were emitted from the wreckage and soon thereafter, a large pool of spilled material ignited.

The locomotive and the first 27 cars remained coupled together and stopped 6.67 km (21,867 ft) south of bridge 497. The last four of these cars derailed but remained upright and separate from the trailing cars by .47 km (1,531 ft). The next 11 cars derailed but remained aligned with the track structure and came to a stop south of the bridge while the remaining cars came to rest on the north side of the bridge.

The thirtieth car, Union Tank Care Company (YTLX) 79499 was loaded with yellow phosphorous and came to rest on its side south of the bridge with its dome rotated to the east approximately 45 degrees . The tank car's 5 cm (2 in) water induction pipe was open. The B-end top washout muzzle along with the tank shell adjacent to the airbrake support bracket were breached during the derailment. A subsequent fire resulted, releasing thick clouds of phosphorus combustion effluents. Liquid phosphorus was released on the ground through the 20 cm (8in) tear in the bottom of the tank shell near the airbrake support bracket attachment. The exposed phosphorus smoldered then ignited within 15 minutes.

The thirty-third car, a tank car loaded with molten sulfur, began releasing its contents during the derailment just north of the bridge. This car came to rest straddling the south headwall of the bridge and just behind the thirtieth car. This car received three tank head punctures from which a large amount of molten sulfur was released onto the bridge and into the creek before the phosphorus ignited.

The thirty-fourth tank car containing tallow, came to rest on the south span of the bridge. The leading head had a 30 by 15 cm (12 by 6 in) puncture directly above the drat sill. The tallow released into the creek through this puncture.

The conductor reviewed the waybills to determine what materials might be involved. The waybills indicated that two of the cars contained dangerous commodities consisting of sodium hydrosulfide (twelfth car) and yellow phosphorus (thirtieth car). The conductor and the front brakeman walked north along the train to determine which cars had derailed.

As the first responders arrived they were unable to identify what was involved because the placards had been ripped off during the derailment and the heavy smoke plume was obstructing their view. They were met by the conductor and informed yellow phosphorus was involved. This information was relayed to the Fire Chief who was en route. The Fire Chief ordered an immediate evacuation of the west side of the Great Miami River. Shortly after arriving and observing the direction and size of the smoke plume, he ordered the evacuation of the northeast section of Miamisburg which happened to be approximately 1/3 of the city.

The Miamisburg Fire Department was assisted by 14 additional fire departments from nearby communities. Numerous county, regional and state agencies arrived and offered assistance. When support agencies arrived there was at least one attempt to assume command of the incident. The Train Master arrived and responded to the command post. The Fire Chief who established command consulted with other chiefs on the scene and decided to fight the fire from a distance using water cannons with direct hose streams. The Train Master challenged the Incident Commander's authority to handle the emergency and was subsequently escorted from the command post under threat of arrest.

At approximately 7:10 four fire engines were moved into position and approximately 13.25 kl (3,500 gal) of water per minute were directed onto the fire. Because of the information made available about the hazard of highly toxic gas being formed if the phosphorus and sulfur combined, the Incident Commander ordered all personnel out of the area.

The evacuation continued to progress and was expanded to include Miamisburg, West Carrollton, and Moraine. At this point approximately 7,000 people had been evacuated from primarily residential areas. The winds shifted causing the large smoke plume to be carried over Miamisburg. Later in the evening on July 9 the winds subsided and a weather inversion occurred causing the plume to remain close to the ground. The city and surrounding areas initiated a second major evacuation effecting approximately 30,000 people.

With the arrival of specialists representing the shipper, carrier, subcontractors, and state and federal agencies, several meetings were held to provide information and recommendations to the Incident Commander. Shortly after midnight a B&O evaluation team was allowed to enter the area. The team estimated that approximately 15 kl (4,000 gal) of phosphorus remained in the burning tank car.

During the first and second day of the emergency, numerous proposals for handling the phosphorous tank car were suggested and evaluated. Some of these included; direct hose stream attack, plugging, water flooding of the interior of the tank car, foam application, burial, opening the manhole to allow air injection to accelerate the burn rate, and use of explosive demolition (it was suggested that the Air Force could use a Fighter from nearby Wright Patterson to shoot the tank car with a missile).

The Incident Commander, in consultation with the city manager, decided to proceed with the suggestion of opening the manhole to accelerate the burn rate.

Over the five day duration of the incident, crews were rotated in and out, millions of gallons of water were flowed onto the fire. By the time the emergency was declared under control, local hospitals received 569 persons with nonfatal injuries, including 13 emergency response personnel. Of these, 27 were hospitalized due to their injuries. The cost, excluding costs to evacuees, community disruption, or business interruptions was estimated to be over \$3.5 million U.S. dollars.

To learn more refer to the attached source list.

Lessons Learned/Smart Practices

- Have a solid disaster plan in place. Make sure it is up-to-date and complies with the county's emergency operations plan. It should be exercised regularly.
- Based on the disaster plan, have a quick reference checklist to enact the plan.
- Establish mutual aid agreements at all levels; local, county, regional and state. Conduct training exercises based on these plans.
- Have a working knowledge of hazardous materials being transported through and within your jurisdiction. This incident prompted changes in state legislation on reporting requirements.

- Maintain a unified command structure. Once in place and working, do not be intimidated into giving up command to other arriving agencies, rather work them into the current structure.
- Use the experience and knowledge of other emergency responders, government representatives, subcontractors, shippers, manufacturers and their representatives by conducting periodic information sharing and brainstorming meetings.



Sources

<http://www.ohiohistorycentral.org/entry.php?rec=1632>

<http://www.supremecourt.ohio.gov/rod/docs/pdf/0/1994/1994-Ohio-490.pdf>

http://www.lrc.fema.gov/starweb/lrcweb/servlet.starweb?path=lrcweb/STARLibraries1.web&search=SUB%3Dhazardous*%20and%20itype%3Dreport

Some information for this summary was gathered and reviewed through interviews with personnel actually involved with the command of this incident.